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Incidence of Stab Injury Related Deaths in Transkei Sub-Region of South Africa (1993-2015)

B Meel

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Abstract

Background: Sharp instrument injury is a preventable public health problem in South Africa. The Transkei region is not only different geopolitically from the rest of South Africa, but also in terms of injury patterns. It experiences a high rate of injuries, which is generally underestimated and underreported.

Objective: To study the incidence of stab injury related deaths in the Transkei sub-region of South Africa over a period of 23 years (1993-2015).

Method: A record review from 1993 to 2015 was undertaken of 24 419 medico-legal autopsies performed at Mthatha Forensic Pathology Laboratory.

Results: Between 1993 and 2015 autopsies were performed on 26 855 victims of unnatural death, of these, 5 205 (19.38%) were victims of stab injury, which ranked second among all causes of unnatural death in the Transkei sub-region of South Africa.

The average death rate as a result of stab injury was 33.1 per 100 000 of the population annually. Males outnumbered females (ratio 9.7:1). Most stabbings (2118 - 40.92%) occurring in the study period of 23 years were recorded among young adults between 21 and 30 years of age.

Conclusion: The stab injury death rate is increasing in the Transkei sub-region of South Africa. The situation needs urgent intervention to save lives.

Keywords: Stab injury; Sharp penetrating objects; Homicide; Murder.

Introduction

More than 1.3 million people worldwide die each year as a result of violence in all its forms, accounting for 2.5% of global mortality.¹ In 2012 an estimated 475 000 people worldwide were victims of homicide, amounting to an overall rate of 6.7 per 100 000 of the population.² Globally, more than 500 young people are murdered every day.² The South African crime statistics for April to December 2016 show that 14 333 murders were committed, down

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from 14 343 in the same period the previous year. The murder rate decreased from 26.1 to 25.6 per 100 000 people.³ The mechanism of homicide in South Africa was 33% firearms, 32% sharp force, 27% blunt force, 3% strangulation, 2% burns, 2.8% other and 0.2% unknown, according to WHO report in its country profile of 2012/13.²

A recent published autopsy report by the author (2017) in this region has shown that there was an incremental increase in unnatural deaths in the Transkei sub-region of South Africa from 1996 to 2015.³ Stab injuries are most frequent cause of homicide deaths in this part of South Africa. The 4 830 (19.47%) victims of stabbing fell prey to the commonest method of murder in this sub-region of Transkei, according to this report.⁴ Stabbing was the number one cause of unnatural deaths among males.⁴

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South Africa's unique political history and resulting social and economic inequalities have been identified as some of the possible factors contributing to the high rate of interpersonal violence.⁵ Several other factors reported to be associated with violent death include poverty, lack of education, unemployment, alcohol abuse, substance abuse and power (male dominance).⁶ The purpose of this study is to determine trends in deaths as a result of the use of sharp-pointed penetrating objects, and to highlight the problem in the Transkei sub-region of South Africa.

Methods

This is a retrospective descriptive study from the autopsy register of Mthatha Forensic Pathology Laboratory. The OR Tambo municipality is the largest and is covered fully by ten police stations. Mhlontlo municipality has four police stations, Chris Hani municipality two and Mbashe municipality one. The combined population was 400 000 in 1993, but it has been increasing by an average of 3% annually. Data were collected on a sheet of paper designed to record the postmortem number, year, gender and cause of death. These data were transferred to the Excel computer program and analysed by using the SPSS computer program.

Results

Between 1993 and 2015 autopsies were performed on 26 855 victims of unnatural death. Of these, 5 205 (19.38%) were victims of stab injury, which ranked second (both genders) among the causes of all unnatural deaths in the Transkei sub-region of South Africa (Table 1). It is the number one cause of death among males and ranked fourth among females in terms of unnatural deaths (Table 1).

Table 1: Ranks of percentage of cause death by gender in Transkei sub-region of South Africa by gender (1993 - 2015).

Rank	Males (n=21 027)		Females (n=5 828)		Total (n=26 855)	
KallK	Wates (ii 21,027)		Temates (II=5,626)		10tal (ll 20,000)	
	Cause death	n (%)	Cause death	n (%)	Cause death	n (%)
1	Stabbing	4 695 (17.48)	MVA	1 631 (30.45)	MVA	6620(24.65)
2	MVA	4 775 (17.78)	Gunshot	650 (12.13)	Stabbing	5205(19.38)
3	Gunshot	3 246 (12.09)	Poisoning	530 (9.89)	Gunshot	3 947 (14.70)
4	Assault	2 477 (9.22)	Stabbing	454 (8.47)	Assault	2 960 (11.020
5	Hanging	1 443 (5.37)	Assault	412 (7.69)	Hanging	1 630 (6.07)
6	Drowning	980 (3.65)	Drowning	325 (6.07)	Drowning	1 321 (4.92)
7	Collapse	1 605 (5.98)	Collapse	529 (9.87)	Collapse	2 164 (8.06)
8	Poisoning	621 (2.31)	Burn	266 (4.97)	Poisoning	1 152 (4.29)
9	Burns	468 (1.74)	Lightning	192 (3.580	Burns	762 (2.84)
10	Fall from height	357 (1.33)	Hanging	187 (3.34)	Fall from height	492 (1.83)
11	Lightning	288 (1.07)	Fall from height	135 (2.52)	Lightning	491 (1.83)
12	Gas suffocation	72 (0.27)	Gas suffocation	29 (0.54)	Gas suffocation	111 (0.41)
	All causes of death	100.0	All causes of death	100.0	All causes of death	100.0

Table 2: Incidence of deaths as result of stab wounds in the Transkei sub-region of South Africa by gender (1993 – 2015).

Year	Estimated population	Females (n=483)	Females (per 100 000)	Males (n=4715)	Males (per 100 000)	Total (n=5198)	Total (per 100 000)
1993	400 000	17	4.3	151	37.8	168	41.75
1994	412 000	12	2.9	100	24.3	112	27.2
1995	424 360	11	2.6	93	21.9	104	24.5
1996	439 091	12	2.7	100	22.8	112	25.5
1997	452 264	11	2.4	105	23.2	116	25.6
1998	465 832	14	3.0	118	25.3	132	28.3
1999	479 807	14	2.9	126	26.3	140	29.2
2000	494 201	23	4.7	117	23.7	140	28.3
2001	509 027	11	2.2	106	20.8	117	23.0
2002	524 298	12	2.3	128	24.4	140	26.7
2003	540 027	18	3.3	136	25.2	154	28.5
2004	556 227	11	2.0	143	25.7	154	27.7
2005	720 304	26	3.6	185	25.7	211	29.3

2006	741 913	39	5.3	224	30.2	263	35.4
2007	764 171	29	3.8	274	35.9	303	39.7
2008	787 096	29	3.7	265	33.7	294	37.4
2009	810 708	15	1.9	265	32.7	280	34.5
2010	835 030	37	4.4	305	36.5	342	41.0
2011	860 081	21	2.4	337	39.2	358	41.6
2012	885 883	20	2.3	348	39.3	368	41.5
2013	912 460	42	4.6	339	37.2	381	41.8
2014	939 833	27	2.9	339	36.1	366	38.9
2015	968 028	27	2.8	400	41.3	427	44.1
Average	648 810	21	3.2	204.5	30.0	225.3	33.1

Table 3. Age distribution among victims of stab injury in the Transkei sub-region of South Africa (1993-2015).

Age group	No. of males (%)	No. of females (%)	Total No. (%)
1-10	36 (0.69)	9(0.17)	45(0.86)
11-20	1180(21.41)	111(2.14)	1219(23.55)
21-30	2004(38.72)	114(2.20)	2118(40.92)
31-40	847(16.36)	77(1.48)	924(17.85)
41`-50	362(6.99)	66(1.27)	428(8.27)
51-60	180(3.47)	53(1.02)	233(4.50)
61-70	103(1.99)	35(0.67)	138(2.66)
71-80	52(1)	22(0.42)	74(1.42)
>=81	5(0.09)	10(0.19)	15(0.28)
Total	4692 (90.66)	483(9.33)	5175 (100)

The average death rate related to stab injury was 33.1 per 100 000 of the population per year (Table 2). The highest number (44.1 per 100 000) occurred in 2015 and the lowest (23/100 000) in 2001 (Table 2). There has been an increasing trend in death as a result of stab injury from 2005 (29.3/100 000) to 2015 (44.1/100 000) (Table 2). Males outnumbered females at a ratio of 9.7: 1 (Table 2). The highest percentage (40.92%) of stab wound related deaths were occurred among young adults between the ages of 21 and 30 (Table 3). The lowest number of deaths were recorded in the extreme age groups, i.e. under the age of 10 (0.86%) and above the age of 80 years (0.28%) (Table 3).

Discussion

People became free politically but poverty in general has not declined since 1994.⁷ The five most common causes of unnatural death in this region identified in this study lead to more than three-fourths (75.82%) of all unnatural deaths in the Transkei sub-region of South Africa (Table 1). They are motor vehicle accidents (24.65%), stab injury (19.38%), gunshot wounds (14.70%), assault (11.02%) and hanging (6.07%).⁴ These are violent forms of death that are considered most painful deaths, yet they are preventable. Stab injury is the commonest method of committing murder in this region, and ranked

number one among males over a period of 23 years (1993–2015) (Table 1). About one-fifth (19.47%) of people suffering non-natural deaths were killed by a sharp penetrating object such as a knife (Table 1). There is tradition in the Xhosa culture that a knife is given as a gift from a family member soon after the initiation ceremony. Historically, in the olden days, Xhosa people used to fight with sticks, but knives are now misused as a weapon of murder. The murder rate by knife injury alone in this region is 33.1/100 000 of the population annually (Table 2), which is higher than all combined methods (knife, gun, and blunt force) in South Africa, i.e. 31.1/100 000 annually in South Africa.²

Death as a result of stab wounds were common on the streets of Mthatha in the study period. The rate of stab injury death was 41.75 per 100 000 of the population in 1993, which came down to 27.2 per 100 000 in 1994 (Table 2). This was a remarkable achievement soon after the apartheid period ended. This decrease developed confidence in the minds of residents regarding law and order. Almost the same level of fatalities by knife continued till 2002 (Table 2). However, the stabbing death rate picked up rapidly from 28.5 per 100 000 (2003) to 44.1 per 100 000 (2015), and stabbing deaths increased one and a half times in a period of 12 years (Table 2). This increase of one and a half times (x1.54) in the death rate as a result of stab injury probably occurred because gun control was enforced in 2002. Murder by gun was replaced by murder by knife. The death rate as a result of firearms has declined drastically; it reduced by almost half in this period. The Firearms Control Act was enforced in 2000 and became effective in 2002, which has saved thousands of lives in the rest of South Africa,⁸ but Transkeian South Africans just changed the method of murder; instead of using firearms, they started using knives and stabbing people to death.⁹

Most (90.7%) victims of stab injury in this region in this study were male (Table 2). At least nine male deaths by stabbing occur for everyone female death (ratio 9.7:1) in this sub-region (Table 2). A recent (2015) study carried out in South Africa showed that the male-to-female ratio was 7:1.9 Xhosa women are resilient to non-natural death in comparison to Xhosa men. The rate of stabbing death among females is consistently and significantly low. The trend of stabbing decreased from 4.3 deaths per 100 000 of the population in 1993 to 2.8 deaths per 100 000 in 2015 (Table 2). The trend of stabbing deaths has been increasing among males, and almost doubled in 15 years (2001-2015). It rose from 20.8 per 100 000 of the population in 2001 to 41.3 per 100 000 in 2015 (Table 2).

Poverty is severe in the former Bantustans, such as the Transkei region. Seventy-three percent of the rural people in the Eastern Cape were living on less than R300 per month in 2005/2006 and more than half of them on less than R220 per month.⁷ South Africa had the worst income inequality and the highest rate of homicide of 63 countries studied.10 Over one third of South Africa's population is unemployed.¹¹ Eighty-four percent of the population of former Bantustans were either unemployed or 'not economically active', meaning permanently unemployed, in 2006/07.7 The situation is undoubtedly bleaker now than in 2006/07, after the 2008/09 global recession.7 A study carried out by Wilkinson et al (1998) has shown that high unemployment, in particular male youth unemployment, was the most consistent correlate of homicide.12

The incidence of stabbing is exceedingly high among young males in this study. More than twothirds (64.47%) of victims were between the ages of 11 and 30 in this study (Table 3). Most victims of stabbing (60.13%) were male (Table 3). More than one-fifth (21.41%) were children under the age of 20 years, and slightly less than two-fifths (38.72%) were young adults between 21 and 30 years of age (Table 3). A dominant feature of violence in South Africa is the disproportionate role of young men as perpetrators and victims. This confirms the findings of other studies that the highest homicide rates are seen in men aged between 15 and 29 years of age.⁶ Surprisingly, 45 (0.86%) of those stabbed to death in this study were children under the age of 10 years (Table 3). Alcohol is a contributing factor in a high number of stabbings in this region, as alcohol consumption is very common among young people. A study carried out by the author in the Transkei sub-region showed that about half (49.5%) of traumatic deaths were related to alcohol in the Transkei region.¹³ Alcohol consumption rates in South Africa are the highest in the world and continue to rise.¹⁴ South Africa is a hard-drinking country. It is reckoned that we consume in excess of 5 billion litres of alcohol annually.¹⁵

More than 17 million people in South Africa are dealing with depression, substance abuse, anxiety, bipolar disorder and schizophrenia.¹⁶ Stab wounds could be managed successfully in hospital, unlike firearm wounds, as a sharp implement causes less damage than a firearm. A hospital-based study carried out by the author (2004) showed that 12% of pre-hospital deaths were preventable in the Transkei sub-region of South Africa.¹⁷ The heavy burden of HIV infection in this region probably contributes to death as a result of trauma, since resources required for the care of trauma patients are used for the prevention and treatment of HIV/AIDS.¹⁸

Conclusion

The incidence of stab injury related death increased in the Transkei sub-region of South Africa in the study period of 23 years (1993 to 2015). Predominantly males were victims of these deaths. More than three-fourths (82.32%) were in the 11–40-year age group. To deal with the problem, a reduction in poverty and unemployment is urgently required, along with strengthening of the education system so that young people can complete their education. Psychological services in the community to support victims and their families are important if the culture of crime is to be changed.

Ethical Issues

The author has ethical permission for collecting data and publication (approved project No. 4114/1999) from the Ethical Committee of the University of Transkei, South Africa.

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Histopathological Study of Extapulmonary Tuberculosis: 2 Year Study

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Abstract

Introduction: Tuberculosis is an age old disease and India has the highest disease burden. With the rise in HIV cases, the incidence of extrapulmonary tuberculosis has further increased. Both TB and EPTB remains a major health problem.

Aim: To study the histopathological spectrum of EPTB with respect to its site, age and sex distribution.

Material and Methods: This study is a retrospective study carried over a period of two years. We included 86 cases of EPTB from the departmental registry. The clinical details and the histopathological findings were noted.

Results: We studied 86 cases of EPTB. Male: female ratio being 0.75. The most common age group was 21-30 years, followed by 31-40 years. Majority of cases involved the lymphoreticular system and the soft tissue. Rare sites included tonsil, thyroid, liver and kidney.

Conclusion: Incidence of EPTB is on the rise as it mimics various other disease processes and may account for disease burden. Knowledge of the various EPTB sites in essential and should be kept as a differential diagnosis in histopathological reporting.

Keywords: Tuberculosis; Extrapulmonary; Infection; Histopathology.

Introduction

TB is an infectious disease which ranks among the top 10 causes of death. It is caused by the bacillus Mycobacterium tuberculosis. Globally, 10.0 million people were estimated to have developed TB disease in 2017.¹ India has the highest incidence of tuberculosis with 8.6 million new cases diagnosed every year.²

Tuberculosis is not just a disease of the lungs but can involve any organ system. Extrapulmonary Tuberculosis (EPTB) is defined as the isolated

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occurrence of TB in any part of the body other than lungs.³ Extrapulmonary tuberculosis constitutes 10–50% of all tuberculosis in HIV negative patients and 35– 80% in HIV infected patients.⁴

EPTB involvement is higher in immuno compromised individuals. The diagnosis of EPTB is more difficult than that of PTB because of its varied clinical presentation.⁴ Diagnosis of EPTB is important because there in an increase in its incidence which leads to severe sequelae due to the delayed diagnosis leading to higher disease burden and morbidity in the population.

Tuberculous lymphadenitis remains the commonest form of extrapulmonary lymphadenitis. Despite the decrease in new cases of active tuberculosis, number of EPTB cases has remained constant. This might be due to a delay in recognition, and also a lack of consideration of tuberculosis when the presenting symptoms are other than respiratory.

Histopathology remains one of the simplest and important methods for diagnosing tuberculosis.

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Histopathological diagnosis can help in arresting disease progression and development of MDR TB and spread of infection thus reducing the disease burden.⁴

Materials and Methods

This is a retrospective study carried out in the department of pathology at Khaja Bandanawaz Institute of Medical sciences, Kalaburagi. After obtaining ethical clearance from the institutional ethical committee for conducting this study. The departmental registry was reviewed and all the cases of tuberculosis involving sites other than lungs were recorded.

A total of 86 cases of extrapulmonary tuberculosis were diagnosed in the department over a period of 2 years and that were included in the study.

The clinical details of the patients sent for histopathological analysis were obtained from the departmental registry. Gross and microscopic features of all the cases were reviewed. Representive tissue section were processed using routine hematoxylin and eosin staining and reviewed for microscopic features of tuberculosis.

Results

We studied a total of 86 cases. Out of which 49 (57%) were female and 37 (43%) were male. Male: female ratio being 0.75. The most common age group was 21–30 years, followed by 31–40 years.(Table 1) **Table 1:** Age incidence of the cases of extrapulmonary TB.

Age group	Number of cases
1-10	4
11-20	12
21-30	33
31-40	21
41-50	7
51-60	5
>60	4

Out of 86 cases of extrapulmonary tuberculosis, majority of the cases were seen involving the lymphoreticular system (17.4%), with lymph node in 13 cases and tonsils were involved in 2 cases.



Fig. 1: Microscopic picture showing (a & b) Tuberculosis of the lymph node showing typicalepitheloid cell granuloma with langhans giant cell.(c & d) tubercular granuloma in a section from TB osteomyelitis.



Fig. 2: Microscopic picture epithelioid granuloma in (a) tubercular invlolvement of skin and (b) breast tuberculosis.



Fig. 3: Microscopic picture of (a)(b) caseating epithelioid cell granuloma involving the kidney.(c)(d) section from liver showing caseating granuloma in liver.



Fig. 4: Microscopic picture showing granulomas in (a) endometrium (b) thyroid.

Second commonest site to get involved in our study was soft tissue, with a total of 14 cases (16.2%). Musculoskeletal system was the 3rd most common site to be affected by tuberculosis. We found 11 cases of TB involving bones and joints accounting to 12.7% of the cases, in which 1 case was diagnosed as tubercular synoviitis.

There were 9 cases of appendicular involvement of tuberculosis accounting to 10.4%, followed by 8 cases (9.3%) involving skin. The various forms of cutaneous TB were tuberculosis verrucosa cutis, lupus vulgaris and necrotising granulomatous lesion. We found 7 cases (8%) of tuberculosis in the breast. (Table 2)

Table 2: Site wise distribution of the cases of extrapulmonary tuberculosis.

Lymhoreticular	20(23.2%)
Soft tissue	14 (16.2%)
Musculoskeletal	11 (12.7%)
Git	9 (10.4%)
Skin	8 (9.3%)
Breast	7 (8%)
Urinary system	5 (5.8%)
FGT	5 (5.8%)
MGT	Prostate 2
	Testes 1 (3.4%)
Peritoneum	2(2.3%)
Liver	1 (1%)
Thyroid	1 (1%)

There were 5 cases involving the urinary system. 2 of which were seen in the kidney and 3 cases involved bladder presenting with urinary retention.

Tuberculosis of female genital tract was noted in 5 cases out of which 4 cases of TB endometritis and 1 case of TB salphingitis were seen. Male genital tract was involved in 3 cases, of which 2 were diagnosed as TB prostatitis and 1 case of testicular TB was seen. We found 2 cases of TB peritonitis and 1 case each of tuberculosis of the liver and thyroid was noted.

Discussion

TB is an infectious disease caused by Mycobacterium tuberculosis which is an acid fast bacillus. It typically involves the lungs, but can also involve other sites.¹ The commonest route of infection is through inhalation, and the predominant form being pulmonary tuberculosis. Tuberculosis remains an endemic disease and is the seventh leading cause of death globally.⁵

Extrapulmonary Tuberculosis (EPTB) is defined as the isolated occurrence of TB in any part of the body other than lungs.³ The various EPTB sites reported the world over are lymphatic, pleural, skeletal, central nervous system, skin, ocular, pancreatic, genitourinary and cerebral tuberculosis. Diagnosing EPTB is crucial because it can involve a variety of sites and may mimic various other disease processes.

We studied a total of 86 cases of extrapulmonary tuberculosis. Out of which 49 (57%) were female and 37 (43%) were male. Male: female ratio being 0.75. This was similar to findings in other studies.^{3,4} The most common age group was 21–30 years, followed by 31–40 years similar to Bisht et al.²

The highest numbers of cases were seen in the lymphoreticular system, with lymph node TB in 18 cases accounting to 20.9% of the cases. In a study done by Guler SA et al Tb of Lymph node was found in 12% of the cases, while Al-Otaibi Fet al found lymph nodal involvement to be as high as 42%.⁶⁷ however our results were in agreement with the results found in study conducted by Bisht et al who found it in 19.42%.² We also found 2 cases of tuberculosis involving the tonsils. In developing countries, tuberculosis amounts to 30–52% of diseases causing lymphadenopathy. Tuberculosis of the tonsils is rare and commonly presents with sore throat and cervical lymphadenopathy.⁸

In our study there were 14 cases involving the soft tissues, accounting to 16.2% of the cases. These cases involved sinus tracts, fistulous tracts, swelling on the back, chest swelling and thigh swelling.

Bone and joint tuberculosis accounts for approximately10% of all EPTB cases, and 50% of those cases have vertebral tuberculosis.⁹ Bone and joint tuberculosis were seen in 11 cases (12.7%) in our study. In studies by Ilgazli et al⁹ and Gonzalez OY et al,¹⁰ bone and joint Tb was found in 3.6% and 7% respectively. Whereas Bisht et al found it in 16.5% of the cases which is comparable to our study.²

In this study tuberculosis of the gastrointestinal system was diagnosed in 9 (10.4%) cases. In a study conducted by Gonzalez et al git was involved in 2% of the cases.¹⁰ While Ilgazli et al found it in 2.8% of the cases.⁹ It is hypothesised that these cases occurred due to endogenous reactivation of dormant bacilli in primary infection.⁹

Gastrointestinal tract is one of the most frequent sites of extrapulmonary involvement in tuberculosis.¹¹

Although cutaneous TB is rare in Western countries, it remains a significant problem in high-prevalence countries.¹² Cutaneous TB can occur

either as an exogenous infection, when bacilli from a patient with active pulmonary TB enter the skin tissue through small lesions, or endogenous infection caused by reactivation of latent TB infection.¹³

In our study skin involvement was seen in 8 cases (9.3%). In a study by Bisht et al, it was seen in 24.2%² whereas the incidence was lower in studies by Kaur et al³ and Ilgazli et al⁹ who found it in 0.5% and 1.9% respectively.

In this study tuberculosis of the breast was seen in 7 (8%) cases. This was higher than the incidence found in studies conducted by Bisht et al and Chandir s et al, who found it in 2.9% in and 1.6% respectively.^{2,3}

Urinary system was involved in 5 (5.8%) cases which was higher than the study conducted by Gonzalez OY et al who reported it in 2% in his study.¹⁰

Genital tuberculosis is reported in only 0.2 to 2% of all gynaecological cases out of which only 1-2% involve the external genitalia.^{14,15} Female genital tract tuberculosis was also seen in 5 cases (5.8%) in which 3 cases were seen in endometrium and 2 cases in the fallopian tube. Male genital organs were involved in 3 cases (3.4%) of which 2 cases were found to be involving prostate and 1 case in the testis. It was seen in 1.9% of cases in study conducted by Mithila et al.²

Peritoneum was involved in 2 cases. This was in agreement with the study conducted by Guler SA et al⁶ who found it in 1.1%. Tuberculous peritonitis is most often seen in disseminated tuberculosis. Occasionally, the bacilli can spread through the wall of infected bowel, or from mesenteric nodes.

In the present study tuberculosis involved the liver in 1 case, similar to findings in a study conducted by Gonzalez et al.¹⁰

We also found one case of extrapulmonary TB involving the thyroid.

Conclusion

Incidence of EPTB is on the rise as it mimics various other disease processes and may account for disease burden. Knowledge of the various EPTB sites is essential in early diagnosis and treatment of TB to arrest the spread of infection and counter the menace of drug resistant TB. Early diagnosis also helps reduce the morbidity and bring down the disease prevalence if treatment regimen is followed. EPTB should be kept as a differential diagnosis in histopathological reporting.

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Magnitude of Morbidity and Mortality and Trends in Fatal Railway Injuries

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Abstract

Background: Railway accidents that take human lives and economic toll are mostly underreported and go unnoticed and the victims of such incidences are poorly paid as well. Therefore it is important to pay due attention to the deaths of the Railway and devise effective policies to provide fair treatment to the victims of these incidents and also to make efforts to minimize them.

Aims: To assess and judge the exact magnitude of morbidity and mortality and trends in fatal railway injuries.

Materials and methods: This Retrospective study carried out at the mortuary of the teaching hospital on the incidence of railway deaths the material comprised of 298 victims who died exclusively of railway injuries.

Results: In our Institute, medicolegal autopsies constitute 35% of the total autopsies. Autopsies in cases of Railways constitute around 10% of the total medicolegal autopsies. Most of the victims were in the age group of 21 to 30 years, males contributed to 70% and females 30%, but still, then female, alcohol was detected in the body in 13% of cases, distribution of the external injuries showed that there are commonest in the head region(73%),More than one reason was involved in the majority of cases.

Conclusion: It is suggested that a set of preventive measures for a multipronged strategy to minimize railroad deaths.

Keywords: Railway accidents; Medicolegal autopsies; Preventive measures.

Introduction

The Indian railways are the biggest sector public sector undertaking in the county, has the second largest railway network in the world, and probably

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the most complex one. the scale of operations and the sheer size of activity is unbelievable. The total distance covered every day by the Indian railway is round 3.5 times the distance to the moon, with the increase in the number of trains passengers, an increase in the number of accident and casualties resulting there from is not unexpected.

Deaths have occurred in association with railway since the beginning of the rail industry. Rapid urbanization and expansion have put the population under different kinds of stress and strain. The changing and modern lifestyle has added further pressure. All these and many others increased the risk of un-natural death. According to the world health organization 10 lakh, people die annually worldwide due to suicide and homicide,

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other 25-lakh people die each year because of accidents.

Accidents represent a major epidemic of noncommunicable disease in the present century, they are no longer considered an accident. They are part of the price we pay for technological progress.

Public and private transport injuries are an important cause of death amend disability in the less developed world. It is knowing that anywhere in the world, effective transportation like railways holds the key too infrastructural growth. The industrial and socio-economic development of any region depends on efficient, consumer-oriented communication and transport systems. The railway role in this aspect is highly appreciated, particularly in Indian conditions. Thus, railways play an important role as an infrastructural catalytic factor is quite known and duly recognized.

The problem of railroad fatalities has different trends countries and thesis because of the variations in the mean of transport. The number of people killed and injured as a result of railroad accidents, both in the united states and in Britain has decreased progressively over the last 40 yrs. this is because they prefer air - travel then railway as a means of transport. Again, better safety precautions and methods of working also has contributed in that, but the general downward trend is sometimes intermittently reversed by individual major accidents.^{1,2}

The world health organization group selected a simple description for a working definition of the term accidents an unpremeditated event resulting in unrecognizable injury. Accidents besides causing fatalities on rare occasions more offer produce morbidity. Some of the morbid states lead to crippling and disabling conditions. Modern medical researchers have substantially reduced mortality due to infections. However, it is a paradox that this advantage has been more than nullified by the continuous or even steep rise in mortality and morbidity due to accidents and railway accidents collectively are viewed by the house of delegates of American medical association as a medical problem of major importance, affecting more persons than does all illness known today. Progressive industrialization, mechanization, and urbanization are the main causes of this rise in accidents. railway deaths in particular continue to endanger the society to an alarming degree. In a Mumbai based on the role of accidents in mortality studies 1848 cases of accidents head the list. after that as the trains and commuters and the population, in

general, have increased tremendously, logically explaining increasing train fatalities.

Railway disaster easily attracts public attention, like any catastrophe in which many peoples are injured or killed. Usually, it is a matter of technical investigation to classify the course of events and the accident. So an attempt is made here to affirm the factors responsible for railway accident deaths, to study the pattern and distribution of injuries in the decreased and to make some constructive too prevent the railway deaths and therefore to reduce mortality and mortality in day to day life.

Materials and Methods

The study was carried out at the mortuary of the teaching hospital, Mumbai. the material comprised of 298 victims who died exclusively of railway injuries. In this Retrospective study, the incidence of railway deaths, their season-wise distribution, daytime and night time occurrence of accidents age-wise distribution, sex distribution period of survival of patients after the injuries, references were also made of injuries body area-wise, external injuries type wise, injuries of the internal organs, the involvement of bones and or joints, traumatic lesions of the brain, fracture and or dislocation of the vertebral spine, the involvement of spinal cord, and incidence of deaths due to complication was studied all bodies were subjected to full complete autopsy examination blood alcohol levels were obtained for everyone except children and those who had spent a lengthy period in the hospital.

Histologic examination was made in each case including heart, lungs, liver, kidneys, spleen and brain, paraffin section. These histologic findings along with proper histories, clinical notes, external and internal examination in autopsy and chemical analysis report helped us to construct opinion in each case and these are the basic pillars in our study to fathom the actual problem of railway deaths.

The note was also made of the case where surgical aid was given. The literature on the subject was reviewed and observations made in the study were compared with the corresponding observation made by the other workers in the field.

Statically analysis is done with Microsoft excel. Frequencies, tables, and percentages are done.

Results

Table 1: Incidence of medicolegal autopsies.

Year	Total autopsies	Medicolegal autopsies	Incidence
1989	864	307	35.53%
1990	903	266	29.46%
1991	919	341	37.10%
1992	889	350	39.37%
1993	828	300	36.23%
1994	716	216	30.16%
1995	711	216	30.37%
1996	717	264	36.82%
1997	771	281	36.44%
1998	812	307	37.80%
Total	8130	2848	35.03%

In the present study, it is observed that an average of around 813 autopsies are performed every year in which 285 (medicolegal) autopsies every year, so medicolegal autopsies constitute around 35% of the total autopsies. Table 2: Incidence of rail road / railway deaths.

Years	Total medicolegal autopsies	Total railway deaths	Incidence
1989	307	67	21.83%
1990	266	30	11.28%
1991	350	21	6.16%
1992	300	34	9.72%
1993	216	23	7.67%
1994	216	21	9.73%
1995	264	13	8.01%
1996	281	25	9.47%
1997	307	31	11.03%
1998	341	33	10.75%
Total	2848	298	10.46%

In the present study, it is observed that an average of around 285 medicolegal autopsies is performed every yr. Around 30 medicolegal autopsies in railroad are performed every yr. and autopsies in railroad deaths constitutes paper 10.5% of total medicolegal autopsies.

Table 3: Age-wise distribution of cases.

Years	Birth-10yrs	11-20yrs	21-30 yrs.	31-40 yrs.	41-50 yrs.	51-60yrs	60-70 yrs.	71-80	81yrs onwards	Total
1989	2(3%)	2(3%)	36(54%)	12(18%)	8(12%)	6(9%)	1(%)	Nil	Nil	67
1990	Nil	Nil	15(50%)	9(30%)	5(17%)	1(3%)	Nil	Nil	Nil	30
1991	Nil	2(10%)	5(23%)	5(23%)	3(16%)	5(23%)	1(5%)	Nil	Nil	21
1992	Nil	1(3%)	9(27%)	14(41%)	4(12%)	5(15%)	Nil	1(3%)	Nil	34
1993	Nil	3(13%)	11(46.5%)	4(18%)	1(4.5%)	2(9%)	1(4.5%)	1(4.5%)	Nil	23
1994	Nil	Nil	8(38%)	9(43%)	4(19%)	Nil	Nil	Nil	Nell	21
1995	Nil	1(7.5%)	5(40%)	3(24%)	2(15%)	1(7.5%)	Nil	1(7.5%)	Nil	13
1996	Nil	2(8%)	6(24%)	8(32%)	4(16%)	3(12%)	2(8%)	Nil	Nil	25
1997	Nil	2(6%)	13(45%)	11(34%)	1(3%)	3(9%)	Nil	1(3%)	Nil	31
1998	Nil	1(3%)	8(24%)	13(40%)	9(27%)	1(3%)	1(3%)	Nil	Nil	33
	2(0.7%)	14(5%)	116(39%)	88(30%)	41(14%)	27%)	6(2%)	6(1.4%)	Nil	298

Railroad deaths vary significantly in different age groups. The commonest age group observed in Railroad death is 3rd decade of life

Table 4: Season wise distribution of cases.

Years	Winter		Sum	mer	Мо	nsoon	Total
	October	January	February	May	June	September	
1989	25	(37%)	20	(30%)	22	(33%)	67
1990	10	(33%)	8	(27%)	12	(40%)	30
1991	11	(52%)	2	(9%)	8	(39%)	21
1992	13	38%)	7	(21%)	14	(41%)	34
1993	9	(39%)	3	(13%)	11	(48%)	23
1994	10	(48%)	5	(21%^)	14	41%)	21
1995	3	(23%)	4	(13%)	6	46%)	13
1996	13	(52%)	6	(24%)	6	(24%)	25
1997	9	(29%)	9	29%)	13	(42%)	31
1998	14	(42%)	9	(27%)	10	(31%)	33
Total	117	(39%)	73	(24%)	108	(37%)	298

There is seasonal variation in railroad deaths, Railroad deaths are commonest in winter, closely followed by monsoon and there are comparatively rare in the summer season. There is no significant variation in railroad deaths during daytime (51%) and night time (49%).



Fig. 1: Gender-wise distribution of cases.

In Railroad deaths gender plays a significant role in statistics, Males(70%), outnumber females (30%) significantly.

Table 6: Distribution of external injuries in the study.

Years	Total no of cases of railroad deaths	No of the cases detected positive for alcohol	Percentage of total
1989	67	9	14%
1990	30	4	14%
1991	21	2	10%
1992	34	4	12%
1993	23	3	13%
1994	21	2	10%
1995	13	2	16%
1996	25	4	16%
1997	31	4	13%
1998	33	5	15%
Total	298	39	13%

Alcohol was detected in the body in 13% of the cases.

		J				
Years	Head	Thorax	Abdomen	Pelvic	Limbs	Total railroad deaths
1989	51(77%)	19(77%)	24(36%)	17(25%)	9(13%)	67
1990	21(70%)	20(67%)	6(20%)	4(14%)	3(10%)	30
1991	13(62%)	4(2%)	7(4%)	2(1%)	4 (2%)	21
1992	19(57%)	12(36%)	11(33%)	3(9%)	4(12%)	24
1993	17(74%)	6(36%)	9(39%)	6(26%)	6(26%)	23
1994	16(80%)	11(55%)	10(50%)	2(10%)	8(40%)	21
1995	9(70%)	2(16%)	2(16%)	1(8%)	3(24%)	13
1996	21(84%)	4(12%)	11(44%)	7(28%)	9(36%)	25
1997	25(81%)	108(37%)	9(29%)	6(20%)	10(32%)	31
1998	24(72%)	-	13(39%)	9(27%)	2(6%)	33
Total	216(73%)	186(62.8%	102(34%)	57(19%)	58(19%)	298

External injuries showed that there are commonest in the head region, (73%) followed by thorax (37%) abdomen (34%) pelvis (19%), and limbs(19%) of the total victims.

Table 7: Involvement of bone and joints in fatal railway accidents.

Yrs.	Skull	Clavicle	Humerus shoulder joints	Radius cartilages and strum	Ribs cartilages and sternum	Pelvis help joint	Femur knee joint	Tibia fibula ankle joint	Small bones of hands	Small bones of feet	Total no of railroad deaths
1989	48(72%)	20(30%)	7(11%)	5(8%)	19(28%)	16(24%)	4(16%)	3(5%)	16(24%)	10(15%)	67
1990	17(57%)	5(17%)	2(7%)	Nil	12(40%)	2(7%)	2(7%)	Nil	4(14%)	3(11%)	30
1991	10(50%)	6(30%)	4(20%)	1(5%)	4(20%_)	2(10%)	3(15%)	Nil	2(10%)	1(5%)	21
1992	16(47%)	10(29%)	5(14.5%)	3(9%)	13(39%)	3(9%)	4(12%)	1(3%)	7(21%)	1(3%)	34
1993	15(65%)	14(63%)	7(30%)	4(18%)	16(70%)	6(27%)	6(27%)	2(9%)	6(27%)	5(22%)	23
1994	16(80%)	5(25%)	11(55%)	5(25%)	13(65%)	2(10%)	7(35%)	3(15%)	10(50%)	8(40%)	21
1995	9(72%)	2(16%)	2(16%)	1(8%)	6(48%)	1(8%)	1*(8%)	Nil	5(40%)	4(32%)	12
1996	20(80%)	8(32%)	10(40%)	3(12%)	21((84%)	6(24%)	5(20%)	2(8%)	8(32%)	5(20%)	25
1997	24(78%)	17(55%)	10(32%)	12(39%)	18(58%)	6(19%)	7(23%)	5(16%)	15(49%)	9(29%)	31
1998	23(69%)	22(66%)	2(6%)	1(3%)	15(45%)	9(27%)	6(18%)	5(15%)	10(30%)	9(27%)	33
Total	198(67%)	109(37%)	60(20%)	35(12%)	137(46%)	53(18%)	45(15%)	21(28%)	83(28%)	55(18%)	298

More than one region was involved in the majority of cases. nothing the involvement of bones and / or joints, skull bones were the commonest (67%), followed by ribs cartilage and sternum (46%), clavicles (37%), and other bones of the day more than one bone and / or joint showed the fracture.

Table 5: Accidents associated with alcohol consumption.

Discussion

Railway accidents take a fairly large toll of human lives, in terms of both, mortality and morbidity. they are commonly met worth in those areas through which railway tracks run, particularly in suburban are as adjoining big cities. This is a retrospective study of 10 years, i.e. From 1989 to 1998. The average autopsies career accounts for around 815. A total of 8130 autopsies were performed in the 10 years. Total medicolegal autopsies per annum accounted to be around 285. Hence, medicolegal autopsy is in this Institute amounted to be around 35% of the total autopsies. (Table 1 and Table 2) Most of the victims were in the age group of 21-30 yrs followed by 31-40 yrs. age groups birth 10 vrs and 71–80 vrs. (Table 3). In the study, males contributed to 70% and females 30% but still, then female's n contributed much more as compared to their studies. (Fig. 1). In Ashwini Narayan K study age group between 21-30 years was the most vulnerable, which corresponds with various other studies.^{4,5,6} Males victims accounted for the bulk of casualty in this group. This could be explained by the above-mentioned reason and also because of a general disregard for rules in the younger age group, oppositional defiant behavior, and risk-taking behavior amongst the youth, especially the males. Male pre ponderance is consistent with numerous other research carried out.7,8 Railway network being vast, providing regular travel intervals and affordability is the chosen mode of a working individual's commuting. Therefore males are more vulnerable than females being the predominant working community in Indian society.

There is no significant variation in railroad deaths during daytime (51%) and night time (49%). (Table 4) In other studies, accidents occurred more during the morning hours which agrees with the study done by Valsala K, C. S. Sreedevi, Sreelekshmi J9, and least during the night hours.

In this study, alcohol was detected in the body in 13% of the cases, (Table 5). In Ashwini Narayan K 3 observation, epilepsy, natural diseases, and use of drugs or alcohol, dizziness was the precipitating factors in 5(15.62%) cases and 4(12.50%) of victims showed pre-existing illness. The presence of alcohol was confirmed in 2 cases and a history of anti-hypertensive medication found in 4 cases. Symonds¹⁰ identified alcohol as a major risk factor, but he stated that alcohol contributed less in railway-related accidents. Similar findings were noted by authors.¹¹ there are commonest in the head region, (73%) followed by thorax (37%) abdomen (34%) pelvis (19%), and limbs (19%) of the total victims. (Table 6) More than one region was involved in the majority of cases. nothing the involvement of bones and / or joints, skull bones were the commonest (67%), followed by ribs cartilage's and sternum (46%), clavicles (37%), and other bones of the day more than one bone and /or joint showed fracture. (Table 7). A study conducted by M.I. Sheikh, L.V. Shah and Rajesh Patel, which showed that out of 262 cases, (79.32%) of the victims died of multiple injuries, head injury, decapitation, crushing of body in parts, blunt injuries transaction of the body into two parts.¹²

Considering the enormous magnitude of railway accident mortality concerted efforts are needed towards research -experimentation, and legislation. Most of the Railway fatalities are not properly investigated and enough effort is not made by the Police to establish the identity of the victim. Timely establishment of Identity helps in handing over the body to the right relatives and also helps to a very great extent in getting all the needed information to establish the motive behind the death and also the manner of death. The inquest report becomes the main linking evidence in the interpretation of manner of death in the later part of the investigation before and after autopsy. Hence an investigating officer must actively take part in the investigation with integrity. The scene should be investigated properly and photographs should be taken from different angles as far as possible before shifting the body for autopsy.

Railway accidents can be avoided by educating the public, awareness, use of media, Strict enforcement of the railway rules avoiding ticketless traveling, Rail walking, and crossing, learning from windows, and traveling outside the railway compartments. Posting Railway Guards at most vulnerable level Crossings chosen by people committing suicide and that would help to prevent these. Footboard traveling should be punishable and improvement of the design of railway carriages, railway tracks, signal systems. Accountability of staff, continuing education programs for staff to minimize/ reduce human errors. Publication of data regarding prosecution and punishment(e.g. To stone-pelters). Prompt transportation to hospital and treatment by experts.

Conclusion

Distribution of the external injuries showed that

The primary impact of rail injuries are related to

the head and arms, chest, trunk as it is usually get struck from the side, which are usually multiple and extensive and the secondary injuries are due to been thrown down and run over resulting in the crushing and deep injuries. In our country it is becoming an increasing practice to kill a person by other modalities and keeping the dead body on a railway track or besides railway track to mimic it as a case of suicidal or accidental railway injury. Certain factors in the investigation of train accidents and subsequent autopsy examination may give rise to some definite conclusions in forming opinions. The various factors such as examination of scene of death/crime, nature of various injuries, postmortem staining on dependent parts and presence of rigor mortis gives helpful information in coming to the conclusions.

A proper coordination between the Medical Officer and Investigating Officer supplemented by good photography at the scene and during autopsy might prove to be of immense help in establishing identity and more particularly in arriving at a conclusion regarding the manner of death.

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Spectrum of Pulmonary Lesions at Autopsy

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Abstract

Background: Respiratory pathology is the commonest autopsy finding and areresponsible for a great deal of morbidity and mortality. Adult respiratory diseases in the developing world are of increasing concern. 1 This study was undertaken to detect the pulmonary pathology findings in adult autopsy cases as there is limited availability of data.

Aim: The aim of present study is to analyse the spectrum of pulmonary lesions in adult autopsy and to correlate the pulmonary pathology with the cause of death given as final autopsy diagnosis.

Design: Observational type of study.

Material and Methods: This is a prospective and retrospective study wasconducted inTertiary Care hospital, Kalaburagi over a period of 3years from July 2016 to June 2019. A total of 218 lungs of adult autopsies were performed. Autolysed specimens of lungs are excluded from the study.

Results: A total of 218 lungs of adult autopsies were performed.All cases showed one or other histopathological lesions in lung.The various pulmonary lesions were classified as pulmonary infection 49 cases (22.2%), COPD 29 cases (13.3%) and pulmonary vascular diseases 140 cases (63.9%). The pulmonary vascular diseases encountered were (CVC) Chronic Venous Congestion (Fig. 4A) (05 Cases, 2.3%), Pulmonary Edema (Fig 2 A,B) (47 cases, 21.5%), Pulmonary Hemorrhage. With Congestion (Fig 3A) (83 Cases, 38%), Acute respiratory distress syndrome (ARDS) (Fig 3B) (04 Cases, 1.8%), Pulmonary Embolism (Fig 5B) (01 Case, 0.45%). Pulmonary haemorrhage with congestion was more frequent in cases of road traffic accident and burns. Chronic obstructive pulmonary disease includes emphysema (Fig 4B) (29 cases, 13.3%).The pulmonary infections encountered were Lobar pneumonia (Fig 1A) (40 cases, 18.3%), Interstitial Pneumonia 04 cases (1.8%), Bronchopneumonia (Fig 1B) (2cases, 0.9%) and 01 cases (0.4%) each of foreign body aspiration pneumonia (Fig 9), Lung abscess and Tuberculosis (Fig 5A) respectively. The age ranged from 20 to 80 years. Majority of the cases were in the age group of 30–39 years. 70 cases (32.1%) with M:F Ratio 1.9 :1. The incidental findings in this study are each case of foreign body aspiration pneumonia and Tuberculosis.

Conclusion: In this study highlights various lesions in lungs which were confirmed by histopathological examination, which were either incidental or direct cause of death. Irrespective of cause of death, autopsy study is essential to evaluate diseases or injury that may be present and to determine the cause and manner of death.

Keywords: Adult autopsy; Pulmonary pathology; Pneumonia; Histopathological examination.

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Introduction

The lungs occupy a unique position in human body receiving virtually the entire cardiac output. They have immense structural complexity and which are concerned not only with gas transport mixing and exchanging but also with homeostasis.² Lungs

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are involved in various kinds of inflammatory, neoplastic and other lesions in adults but they are secondarily involved in almost all form of terminal diseases. The autopsy may reveal diagnosis which may not be suspected clinically or may in some way discredit.³

Out of a global total of 52.2 million deaths in 1997, 3.7 million were due to acute lower respiratory tract infections, 2.9 million to tuberculosis, 2.3 million to HIV/AIDS, 1.1 million to lung cancer and 2.9 million to variety of other respiratory diseases, mainly chronic obstructive pulmonary disease.² Today Tuberculosis remains one of the world's most lethal infectious diseases. Despite the availability of effective treatment for most cases, TB is still a cause of death in our environment. Some cases of active TB are not identified until after the patient had died and an autopsy has been performed.⁴ Adult respiratory diseases in the developing world are the major burden in terms of morbidity and mortality and particularly as related to chronic respiratory disease are increasing concern.1

Pathologic examination of lungs on autopsy gives valuable information such as various stages of fibrosis , including early patchy fibrosis and honey combing lesions, and their distribution and progression in the lungs.⁵

Therefore it is crucial to determine the cause of death in order to adopt correct prophylactic actions for the prevention of pulmonary dysfunctions and for that matter histopathological examination of lung autopsy is of great values.⁶

In view of the above and with limited data on autopsy studies related to pulmonary system, this study was undertaken to detect the pulmonary system findings in all adult autopsy cases.

Table 1: Distribution of Cases of Pulmonary Lesions.

Materials and Methods

This is a retrospective and prospective study was conducted in Tertiary Care hospital, Kalaburagi over a period of 3 years from July 2016 to June 2019. A total of 218 lungs of adult autopsies were performed. Clinical data were recorded as per proforma. Virchows technique of en block dissection was carried out. The lungs are separated from the heart as close to the hilum as possible and lungs, pleura were examined and then weight of the lungs and a detailed external gross assessment is done. Several slices are made from apex to base (sagittal) from the periphery to the hilum. Thin slices are made and fixed in 10% formalin then tissue samples were taken for study. Formal in fixed Lung specimens received in the Department of Pathology, kalaburagi were included in the study. Autolysed specimens of lungs are excluded from the study.

Results

A total of 218 lungs of adult autopsies were performed. All cases showed one or other histopathological lesions in lung. The various pulmonary lesions were classified as pulmonary infection 49 cases (22.2%), COPD 29 cases (13.3%) and pulmonary vascular diseases 140 cases (63.9%). The pulmonary vascular diseases encountered were (CVC) Chronic Venous Congestion 05 Cases (2.3%), Pulmonary Edema 47 cases (21.5%), Pulmonary Hemorrhage With Congestion 83 Cases (38%), Acute respiratory distress syndrome (ARDS) 04 Cases (1.8%), Pulmonary Embolism 01 Case (0.45%). Pulmonary haemorrhage with

i)	Pulmonary infection	No of cases	Percentage%	% Total pulmonary lesions (n=218)
1.	Lobar pneumonia	40	82	18.3
2.	Interstitial pneumonia	04	08	1.8
3.	Bronchopneumonia	02	04	0.9
4.	Aspiration pneumonia	01	02	0.4
5.	Lung abscess	01	02	0.4
6.	Tuberculosis	01	02	0.4
	Total	49	100	
ii)	Pulmonary Vascular diseases			
1.	Pulmonary Hemorrhage With Congestion	83	59	38
2.	Pulmonary Edema	47	33.5	21.5
3.	Chronic Venous Congestion	05	3.5	2.2
4.	ARDS	04	03	1.8
5.	Pulmonary Embolism	01	01	0.4
	Total	140	100	

i)	Pulmonary infection	20–29 yrs	30-39 yr	40-49 yr	50–59 yr	60-69 yr	70–80 yr	Total	% of total pulmonary lesions(n=218)
1.	Lobar pneumonia	16	15	8	-	-	1	40	18.3
2.	Bronchopneumonia	02	-	-	-	-	-	02	0.9
3.	Interstitial pneumonia	-	02	01	-	01	-	04	1.8
4.	Aspiration pneumonia	-	-	01	-	-	-	01	0.4
5.	Lung abscess			01				01	0.4
6.	Tuberculosis						01	01	0.4
ii)	Pulmonary Vascular diseases								
1.	Chronic Venous Congestion	01	01	02	01	-	-	05	2.2
2.	Pulmonary Edema	13	17	11	05	01	-	47	21.5
3.	Pulmonary Hemorrhage With Congestion	20	27	21	11	02	02	83	38
4.	ARDS	01	02	01	-	-	-	04	1.8
5.	Pulmonary Embolism	-	01	-	-	-	-	01	0.4
iii)	Emphysema	09	08	08	03	01	-	29	13.3

Table 2: Age wise distribution of pulmonary lesions.

congestion was more frequent in cases of road traffic accident and burns. Chronic obstructive pulmonary disease includes emphysema 29 cases (13.3%). The pulmonary infections encountered were Lobar pneumonia 40 cases (18.3%), Interstitial Pneumonia 04 cases (1.8%), Bronchopneumonia 2 cases (0.9%) and 01 cases (0.4%) each of foreign body aspiration pneumonia, Lung abscess and Tuberculosis respectively (Table 1). The incidental findings in this study are each case of foreign body aspiration pneumonia and Tuberculosis.

The age ranged from 20 to 80 years. Majority of the cases were in the age group of 30–39 years 70 cases (32.1%) with M:F Ratio 1.9 :1 (Table 2).

There were total 38 concomitant lesions which were overlapping with two lesions which includes Pneumonia With Edema With Emphysematous Change 25 cases, ARDS With Pulmonary Edema With Emphysematous Change 02 cases and Pulmonary Edema With Emphysematous Change. (Table 3).

Table 3: Concomitant Lesions.

1.	Pneumonia With Edema With Emphysematous Change	25
2.	ARDS With Pulmonary Edema With Emphysematous Change	02
3.	Pulmonary Edema With Emphysematous Change	11
	Total	38



Fig 1: Lobar Pneumonia: a) H & E : Alveoli are filled with neutrophils, and surrounding alveolar walls show congested capillaries (10X). b) Bronchopneumonia: H & E :shows neutrophils filling a bronchiole and expanding into the adjacent alveoli.(10x)



Fig 2: Pulmonary Edema : (a) Gross: lung, heavy, congested (b) Alveolar spaces occupied by an eosinophilicproteinaceous material with congestion (10x).



Fig 3: a) Pulmonary Hemorrhage : H & E shows Intra-alveolar hemorrhage fills alveolar spaces with blood with pigment laden macrophages (10x). b) Diffuse Alveolar Damage: H & E shows hyaline membranes admixed with scattered inflammatory cells (40x).



Fig 4: a) Chronic Venous Congestion :H & E shows dilated alveoli containing edema fluid and hemosiderin laden macrophages (heart failure cells) (10x). b) Emphysema: H & E shows abnormally large alveoli with focal destruction of alveoli by thin septa and interstitium containing edematous fluid (10x).



Fig 5: a) Tuberculosis: H & E: Granuloma (10x). b): Pulmonary Embolism: H & E shows Fat embolus -showing small vessel containing fat cells (10x).



Fig 6: Foreign Body Aspiration Pneumonia: H & E: Foreign body Aspiration Pneumonia (10X).

Discussion

Autopsy is a medical procedure that consists of a thorough examination performed on a body after death, to evaluate disease or injury that may be present and to determine the cause and manner of a person's death.⁵

Present days air pollution, environmental inhalants and chemical cum toxic substances become uncontrollable worldwide.⁷ Millions of people around the world suffer from preventable chronic respiratory diseases.⁸

The spectrum of pulmonary lesions were analysed in the present study. The distribution of pulmonary lesions vary with geographic area, age, gender, environmental, nutritional and genetic factors and socioeconomic status of the population.

The various lesions encountered were Pulmonary hemorrhage with congestion, Pulmonary Edema,

Pneumonia, Emphysema, Chronic Venous Congestion, ARDS, Tuberculosis, Pulmonary Embolism.

In present study, the commonest pulmonary lesions encountered were pulmonary haemorrhage with congestion in 83 cases (38%) correlating with the study conducted by Selvambigaiet al⁷ who found 28% cases. The incidence of pulmonary haemorrhage with congestion have significant association with traumatic cases in our study population as it was observed in Road Traffic Accident and Electrocution.

The second commonest finding was pulmonary edema were seen 21.5% cases which was correlating with study conducted by Patel CB et al⁹ with 26.7% cases. In present study, incidence of pulmonary edema was high with history of burns and traumatic condition, the similar history was seen in the study conducted by Pulak Chakma et al.¹⁰

In present study, the infective conditions like pneumonia constitute third most common histopathological pattern accounted for 21.1% cases which was consistent with study done by Shetty A. et al¹¹ with 19.4% of cases. Majority of pneumonia cases seen with history burns and trauma cases in present study.

In this study we came across 13.3% cases of Pulmonary emphysema which was consistent with study done by Selvambigai G et al⁷ 16% cases. Emphysema predominantly seen in males in present study which was fairly correlating with findings of Selvambigai G et al.⁷

In present study Acute respiratory distress syndrome (ARDS) seen in 02% cases which was correlated with the similar study done by Shetty A. et al^{11} with 02% cases.

Chronic venous congestion (CVC) was seen in 2.3% cases in present study where as similar study conducted by Shetty A. et al¹¹ showed 8.5% cases.

In our study we found incidental findings among which one case of tuberculosis and foreign body aspiration pneumonia where as study conducted by Patel CB et al⁹ also found as foreign body aspiration pneumonia as incidental finding. In the present study 38 cases showed concomitant lesions.

Conclusion

Autopsy provides normal as well as diseased human tissue for morphologic studies and it may reveal the diagnosis which may not be suspected clinically or may ,in some way, discredit. In present study, pulmonary haemorrhage and congestion was the most frequently encountered lesion in medicolegal autopsies.

The incidence of pulmonary haemorrhage was found to be 59%. Other lesions found were pulmonary edema , pneumonia, emphysema. This study highlights various lesions in lungs which are either incidental or direct cause of death. The incidental findings of tuberculosis , foreign body aspiration pneumonia also highlights the importance of gross and microscopic examination of each organ in detail from each autopsy irrespective of the cause of death.

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A Study of Sciatic Notch Index in Adult Human Pelves to Establish their Sexual Dimorphism

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Abstract

Objective: To find out the relation between sciatic notch index of adult human male and female from specimens present in the museum and inventory.

Methodology: All bony specimens for study were taken from the museum of Forensic Medicine Department and Anatomy Department of Medical College, Kolkata and also from the inventory of Kolkata Police Morgue, based on the exclusion and inclusion criteria. They are arranged systematically by putting a unique number code against each specimen and measurements are taken of dimensions of sciatic notch using the standard measuring tools and following standard anthropometric methods.

Results: Z test is done. n= 104, F=56 and M=48. For males and for females the mean Depth of sciatic notch is found to be 3.81 and 2.98 respectively.(Table 2) The mean Width of the same in males and females are found to be 3.48 and 4.23 respectively. SN Index of males and females are found to be 103.93 and 146.02 respectively.(Table 3)

Conclusion: The differences are found to be statistically significant from the specimens taken for study. As such sciatic notch index in adults may be considered to be a dependable anthropometric entity for sexing of human pelvis, particularly in mutilated and fragmented skeletal parts.

Keywords: Sciatic notch index; Adult human pelvis; Sexual dimorphism; Variability.

Introduction

In forensic and archaeological studies, there is the need for identification of human skeletal remains, particularly in respect to the "big four" traits of identification that is- age, sex, race and stature.¹ Distinctive morphological patterns and sexual dimorphism of the human hip bone makes it of interest from the- anthropological, anatomical and forensic point of view.² Shape of the greater sciatic

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notch has attracted great attention in the past. Kelley used the sciatic notch is to acetabular ratio as the osteometric method to differentiate between male and female hipbones.³ In the present study an attempt has been made to find out the baseline data of specified parameters pertaining to the sciatic notch of 104 hip bones of predetermined sex.

Aims and Objectives

- 1. To measure the depth and width of sciatic notch of the coded pelves.
- 2. To calculate the sciatic notch indices from data such generated.
- 3. To calculate the statistical significance of sciatic notch indices in relation to sexual dimorphism.
- 4. To create a baseline data in relation to different parameters studied.

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Materials and Method

Study design: Cross sectional Observational study.

Study period: 8 (eight) days.

Place of study-

- Department of Anatomy, Medical College, Kolkata.
- Department of Forensic Medicine, Medical College, Kolkata.
- Kolkata Police Morgue of Medical College, Kolkata.

Study population: All dried specimens of completely ossified human pelves / hip bones were collected from the museum and inventory. Total 104; Female 56 and Male 48.

Inclusion criteria:

- 1. All the adult hip bone of both the sexes (predetermined) was collected from the museum of Anatomy and Forensic Medicine Department and also from the inventory of Kolkata Police Morgue.
- 2. Sex all inclusive
- 3. Age Completely ossified hip bones i.e. Adult hipbones and pelves

Exclusion criteria:

- 1. Charred, mutilated and fragmented bones.
- 2. Hip bones/ pelves with discernible pathologies and anomalies both congenital and acquired.
- 3. Hip bones/ pelves lacking evidence of complete ossification of all the secondary ossification centres.

Sample size: Total 104, male-48, female-56.

Study tools and techniques

All cases presented during the period of study were considered for study after observing the inclusion and exclusion criteria. Measurements were taken with the help of a vernier caliper. For width of sciatic notch (AB) (Fig. 1) first ischial spine was marked as 'A' and posterior inferior iliac spine was marked as 'B'. A straight line was drawn between A and B using a simple metallic ruler. For depth of sciatic notch (CO) - perpendicular line was drawn from midpoint of apex of the notch "C" to the Width of the notch and marked as 'O' applying standard anthropometric tools and techniques. The data thus collected were tabulated in MS Excel sheets and analysed using SPSS software.

Review of literature

Over the years, different authors had carried various types of studies based on measurements of human greater sciatic notch of different sex and races. According to Straus (1929) the greater sciatic notch in man is better developed than and, shows sex differences not observed in, other primates. Washburn (1948) pointed out that the sex difference in the greater sciatic notch belonged to a system different from that of the pubic bone, and that it was not correlated with the subpubic angle 4 . This study was carried out to determine if indices in the sciatic notch can be used in sexing of the hip and as such entire skeleton. Sex determination from bone is very useful for anatomy, forensic and anthropological field work. Hip bone is most commonly used bone for sex identification. Reddy K.S.N., Murty O.P., in the textbook, "The Essentials of Forensic Medicine and Toxicology", 34th edition, states that sciatic notch index of male is 4 to 5 and that of female is 5 to 6 in case of foetuses. Aggrawal A., in the, "Textbook of Forensic Medicine and Toxicology", 3rd edition, states that the sciatic notch index in adult male is 145 and in adult female is 166. In male fetus its 4-5 and in female fetus it is 5-6.5 Biswas G. in his book, "Review of Forensic Medicine and Toxicology", 2nd edition states that the greater sciatic notch index in male is 4-5 and in female it is 5-6 (fetus).⁶ Knight B., Saukko P. in his book, "Knight's forensic Pathology", 3rd edition, states that the greater sciatic notch is an important criterion, being deep and narrow in male and wide and open in female. They also mentioned that the greater sciatic notch was one of the best discriminants for sex, claiming 75% success rate using this criterion alone.⁷ Dnyanesh S, Dnyanesh DK, Phaniraj S, Mallikarjun M, Vijayshri BH, Kapil A et al. in the study in 2013 on 100 dry hip bones in the Jawaharlal Nehru Medical College, at Belgaum over a period of 1 year noted that the greater sciatic notch of hip bone is found to be useful in sex determination which is a critical question encountered when a bone of unknown sex is found. It was found that the mean values of width, posterior segment, posterior angle, total angle, index I and index II of males were significantly lesser than that of females both on right and left sides.8 Thus we would have better guidelines for archeological and forensic analyses.

Consent for study

As the study was carried out on the bones taken from the museum and inventories of Medical College, patient consent was not required. Permission to get access to the museum of the departments of anatomy, and FSM and inventory of Kolkata Police Morgue for the study was obtained from the HODs of Anatomy Department and FSM Department of Medical College, Kolkata.

Results and Analysis

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Variable	Sex	Total (n) 104	Mean (cm)	Median (cm)	Mode (cm)	SD (cm)	p Value
Depth of	М	48	3.81	3.80	3.30	0.87	
Sciatic	F	56	2.98	3.00	3.00	0.55	< 0.05
Notch	M+F	104	3.08	3.00	3.00	0.66	

 Table 2: Comparison of Mean Width of Sciatic Notch in males and female.

Variable	Sex	Total (n) =104	Mean (cm)	Median (cm)	Mode (cm)	SD (cm)	p Value
Width of Sciatic Notch	М	48	3.48	3.45	3.30	0.84	
	F	56	4.23	4.00	3.00	0.57	<0.05
	M+F	104	4.13	4.00	3.00	0.65	<0.05

Table 3: Comparison of Sciatic Notch Index of males and females.

Variable	Sex	Total (n)=104	Mean (cm)	Median (cm)	Mode (cm)	SD (cm)	p Value
Sciatic Notch Index	М	48	103.93	91.45	N/A	28.81	
	F	56	146.26	143.00	160.00	31.34	< 0.05
	M+F	104	140.76	134.00	160.00	33.86	



Z test was done. N= 104, F=56 and M=48. For males and for females the Mean Depth of sciatic notch was found to be 3.81 and 2.98 respectively. The Mean Width of males and females was found to be 3.48 and 4.23 respectively. SN Index of males and females were found to be 103.93 and 146.02 respectively.(Table 1) **Table 4:** Comparison of Range of Depth, Width and Sciatic Notch Index in males and females.

	Male	Female	Both
Range of Depth	2.30-5.10	1.5-4.10	1.5-5.10
Range of Width	2.00-4.50	3.00-6.00	2.00-6.00
Range of Sciatic Notch Index	88.00-173.00	103.00-253.00	88-253.00



Fig. 1: Sciatic Notch, showing AB = width, OC= depth.

Discussion

Sexual dimorphism of the human hipbone has been extensively researched, reviewed and published in forensic as well as in anthropological literature. Bernard Knight states that- greater sciatic notch was one of the best anatomical landmark for sex determination claiming 75% success rate . In studies of Dnyanesh (p<0.05), Kalsey (p=0.02)9 and Devadas $(p=0.0003)^{10}$ width of female > male. Patriquin, reported Depth of the greater sciatic notch of males > females. Width of the greater sciatic notch of females > males. Sex determination was attempted by Rajangam on 140 hip bones. 87.7% of hip bones was accurately classified pelvic height, sciatic notch width, acetabular height were the most useful indicators.¹¹ A study was done in P D U Medical College of Gujrat to see the efficacy of sciatic notch index, n = 108 hip bone. Sciatic Notch Index was found to be 51.85% accurate in determining males.(Table 4 and graph 1) In this study also the difference in the mean values of Sciatic Notch Index of male and female hip bones was found to be statistically significant (p<0.05).¹²

Limitations of the study

- The degree of sexual dimorphism is population and region specific.
- Study with a larger number of specimens of both sexes might have yielded more accurate result.

Conclusion

The difference between mean depth and mean width of Sciatic notch were statistically significant among male and female. Sciatic Notch Index of female was found to be more than that of male. Depth of sciatic notch was found to be more in males. Replicative studies need to be performed using digital calliper measurements. Recommendations- Approach needs to be further worked out with a larger sample preferably in a multicentre study. Ample scope to examine the regional variations in Indian bones and its applicability in sexual dimorphism of skeletal remains.

Conflict of interest: Nil.

Ethical clearance: Ethical clearance and approval taken from the Institutional Ethics Committee of Medical College, Kolkata.

Source of funding: The study was conducted within the set-up of a state government medical college with the help of self-funding when and where required.

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Stature Estimation by Index and Ring Finger Length

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Abstract

Background: A series of systemized techniques of measuring quantitatively the dimensions of human body and skeleton is called as Anthropometry and it is often viewed as traditionally the basic tool for biological anthropology and it has a long traditional use in forensic sciences and its findings has increased its use in medical sciences specifically in speciality of Forensic Medicine.

Aim and objective: To find out correlation between Index and Ring finger length with stature of the individual and to devise a linear regression equation to determine stature from Index and Ring finger length.

Type of Study: Descriptive cross sectional study with analytical and comparative components.

Place of Study: Department of forensic medicine and Toxicology Narayana Medical College, Nellore District of Andhra Pradesh State.

Material and Method: Stature: using the stadio-meter, the subject was made to stand barefoot in the standard standing position on its baseboard. The length of the Index and ring fingers was measured fromproximal crease to the tip.

Observation and Discussion: The Mean±SD age of study samples was 21.41 ± 2.1 years. There was no significant difference between themean age of the two genders (P>0.001). Accordingly the Mean±SD height was 164.62 ± 8.56 cm intotal cases, 168.12 ± 7.6 cm in males, and 161.1 ± 8.01 cm in females, which differed significantly (P<0.0001). The Mean±SD lengths of index and ring fingers were 6.55 ± 0.48 cm and 6.6 ± 0.51 cm in total samples, 6.72 ± 0.52 cm and 6.78 ± 0.55 cm in males, and 6.37 ± 0.37 cm and 6.42 ± 0.38 cm in females, respectively.

Conclusion: In our study there exists a significant and positive correlation between stature and Index and ring finger length between both the sexes indicating strong and reliable relationship between the parameters.

Keywords: Index and ring finger length; Regression equation; Stature.

Introduction

A series of systemized techniques of measuring quantitatively the dimensions of human body and

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skeleton is called as Anthropometry and it is often viewed as traditionally the basic tool for biological anthropology and it has a long traditional use in forensic sciences and its findings has increased its use in medical sciences specifically in speciality of Forensic Medicine.¹

Determination of Individuality of person is Identification and it includes determination of sex, race, age, stature of a person and in this Stature and sex carries most importance.² It was Rollet in the year 1988³ who conducted a research in this field and in his research used 50 male and female corpses and showed the relationship between various body measurements and the stature. Later it was Pearson⁴ in 1899 that was a mathematician and used the data to derive regression equations and suggested that equation to be population specific. Henceforth numerous advancement had been made in this field,⁵ and had been used efficiently and applied in process of identification. As these measurements are population specific it becomes imperative to have a data from population and make a comprehensive data base based on geographical locations.

The stature of an individual in a given scenario where it cannot be estimated, for example in bedridden, old or frail patients or in an individual where limb or vertebral column deformity is present in such scenario indirect estimation can be achieved by correlating the stature with other skeletal parameters.⁶

Use of stature estimation by a forensic scientist can narrow down pool of possibilities of victim matches in any ongoing investigation. Stature is considered to be directly proportional to different body parts and it shows a definite biological and genetic relation with each other, in forensic cases stature is usually estimated by using both anatomical and mathematical techniques,⁷ various researchers have established a relationship between stature and various measurements of different body parts which are often represented using linear regression equation derived from them.² The present study was undertaken with an aim and objective to obtain a specific regression equation for stature estimation from Index finger and Ring Finger length among male and female population of Nellore district of state Andhra Pradesh.

Aim and Objective

The present study was undertaken with an aim and objective to obtain a specific regression equation for stature estimation from Index finger and Ring Finger length among male and female population of Nellore district of state Andhra Pradesh, To find out correlation between Index and Ring finger length with stature of the individual and to devise a linear regression equation to determine stature from Index and Ring finger length.

Material and Method

Present study was conducted at Narayana Medical College, Chinthareddy Palem, Nellore State Andhra Pradesh by the Department of forensic medicine and Toxicology on the Consenting volunteers of Nellore District of State Andhra Pradesh. The research was with the aim of estimation of stature from Index finger and Ring Finger length among male and female measurements collected in 300 adult volunteers with age of 18 to 25 years.

The subjects were confirmed to be descent from Nellore district and were specifically selected with residence of Nellore district only, irrespective of their caste, religion, dietary habits and socioeconomic status. The study was a predominantly descriptive cross sectional study with analytical comparative components. Sufficient and permissions and consents are procured before the measurements of the volunteers are taken and clearance from the Institutional Ethical committee is obtained in advance. Measurements taken by single investigator and with the same instrument to avoid any technical or inter observer error and to maintain reproducibility and measurements were taken thrice and their mean value were considered for stature estimation.

Stature: Using the stadio-meter, the subject was made to stand barefoot in the standard standing position on its baseboard. Both feet are in close contact with each other and head oriented in Frankfurt's plane. The height was then recorded in centimeter from the standing surface to the vertex in the weight bearing position of foot.

Index and Ring Finger Length: The length of the Index and ring fingers was measured from proximal crease to the tip. The fingers length was measured by a caliper with an accuracy of millimeters. Digital Vernier caliper. Technique: The measurement was taken in standing position with stabilization of hand on table. The caliper was horizontally placed along the ventral surface of the hand. The fixed part of the outer jaw of the caliper was applied to the proximal crease of Index and Ring finger and the mobile part of the caliper was approximated to the tip of the Index and Ring finger and measurement was taken and the measurement was obtained up to one decimal place. Any kind of error from Instrumental, all the instruments were verified at significant level and variation of + 0.01 cm was observed.

Exclusion Criterion: Those with any apparent disease, orthopedic deformity, morphologically showing the congenital malformations, Dwarfism / Achondroplasia, features of nutritional deficiencies and injuries to extremities, using medication thought to alter growth, neuromuscular weakness or abnormal tone or with any other major medical illnesses or growth disturbance were excluded from the study.

Statistical Part: Descriptive statistics like min., max., mean, standard deviation, and confidence interval etc. of stature and length of index and ring finger of male, female and combined group were done. Association between stature on Index and Ring finger length were positively correlated and it is shown by scatter diagram with a check on the significance of correlation between stature and index, ring finger length by using correlation t-test. So, on the basis of that we calculate the simple regression equations of stature on index and ring finger length, by using regression equation we can predict the stature value by using independent variable index and ring finger length. As well checking the significance at 5% level of significance, complete statistics was done in MS-Excel.

Results

As per Table 1 in our study the Mean \pm SD age of study samples was 21.41 \pm 2.1 years. There was no significant difference between the mean age of the two genders (P>0.001). Accordingly the Mean \pm SD height was 164.62 \pm 8.56 cm in total cases, 168.12 \pm 7.6 cm in males, and 161.1 \pm 8.01 cm in females, which differed significantly (P<0.0001). The Mean \pm SD lengths of index and ring fingers were 6.55 \pm 0.48 cm and 6.6 \pm 0.51 cm in total samples, 6.72 \pm 0.52 cm and 6.78 \pm 0.55 cm in males, respectively.

There was a statistically significant difference between genders in the length of the index and ring fingers (P<0.0001).

As per Table 2, Person's correlation coefficients of Stature and index finger length were 0.7, 0.611 in male, and in female samples 0.624 and 0.617 respectively. Moreover, Person's correlation coefficients of height and index finger length for male and female combined was 0.708 for index finger length and 0.66 for Ring finger length.

The correlation between height, and index and ring fingers length in male, female and total cases was significant (P<0.0001). On the basis of statistically significant correlation between height, and index and ring fingers length, the following formulas were estimated:

Stature of male (cm) = 99.75 + 10.16*length of index finger

Stature of male (cm) = 110.37 + 8.52*length of ring finger

Stature of female (cm) = 75.81 + 13.38*length of index finger

Stature of female (cm) = 78.28 + 12.91*length of ring finger

Stature of combined (cm) = 82.19 + 12.59*length of index finger

Stature of combined (cm) = 90.86 + 11.18*length of ring finger

Parameter		Minimum	Minimum Maximum Me		95% Confidence Interval	
					Lower bound	Upper bound
	Male	18	25	21.41 ± 2.1	21.01	21.82
Age	Female	18	25	21.33 ± 2.02	20.93	21.73
	Combined	18	25	21.37 ± 2.05	21.09	21.66
	Male	156	180	168.12 ± 7.6	166.63	169.62
Stature	Female	148	174	161.1 ± 8.01	159.54	162.68
	Combined	148	180	164.62 ± 8.56	163.43	165.8
	Male	5.69	7.69	6.72 ± 0.52	6.62	6.82
Index Finger Length	Female	5.8	7.3	6.37 ± 0.37	6.3	6.45
0 0	Combined	5.69	7.69	6.55 ± 0.48	6.48	6.61
	Male	5.79	7.77	6.78 ± 0.55	6.67	6.89
Ring Finger Length	Female	5.84	7.34	6.42 ± 0.38	6.34	6.49
	Combined	5.79	7.77	6.6 ± 0.51	6.53	6.67

Table 1: Descriptive Statistics of stature and finger length.

Table 2: Correlation of stature and finger length.

Gender	Correlated parameters	Correlation (r)	t-test	p - Value	Significance
M-1-	Index finger length	0.7	9.703446	0.000001	
Male	Ring finger length	0.611	7.640674	0.000001	
Formala	Index finger length	0.624	7.905161	0.000001	All are highly significance
Female	Ring finger length	0.617	7.761467	0.000001	All are highly significance
Combined	Index finger length	0.708	14.10686	0.000001	
Combined	Ring finger length	0.66	12.36184	0.000001	



Multiple regression analysis:

Stature of male (cm) = 99.43 + 9.78*Index finger length + 0.43*Ring finger length

Stature of female (cm) = 75.86 + 11.53*Index finger length + 1.83*Ring finger length

Stature of combined (cm) = 81.49 + 10.88*Index finger length + 1.8*Ring finger length

Discussion

Stature estimation is an important parameter in forensic investigation and anthropological research, anthropological measurements of fingers can be used to estimate stature hence the present study was carried out to investigate the relationship between index and ring finger length and Stature.

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The average stature of adult males within a given population is significantly higher than that of adult females⁸⁻¹⁰ and our observation in the present study correlate with the same findings.

In our study the correlation between stature, and index and ring fingers length in population of Nellore region of state Andhra Pradesh. The average height was 164.62 ± 8.56 cm in the total subjects, 168.12 ± 7.6 cm in males and 161.1 ± 8.01 cm in females, which was statistically significant (P<0.05). It was Akhlaghi et al. who reported the average height amongst Iranian student population between 21 to 26 years age group as 176 cm in males and 162 cm in females.¹¹ It is concluded that observation in our study related with average stature and the significant difference between male and female samples are in line with the earlier studies made by other researchers. Mean length of index finger in our study 6.72 ± 0.52 cm in males and 6.37 ± 0.37 cm in females, which was statistically significant (P<0.0001). The mean length of the index finger in males was similar to the results of Bardale et al.¹² and also same kind of observation was obtained for mean length of index finger in females. But the mean length of the index finger in male and female samples was lower in the studies by Akhlaghi et al.11

In our observation the mean length of the ring finger was 6.78 ± 0.55 cm in males and 6.42 ± 0.38 cm in females, which was statistically significant (P<0.001), similarly The mean length of the ring finger in males same in observation made by Krishan et al. but comparatively lower than those of Bardale et al. and Akhlaghi et al.^{12,11} The obtained results on the mean length of index finger in females were in line with the studies by Krishan et al.¹³ but lower than those of Akhlaghi et al.¹² Based on the results obtained from our assay and previous studies, the mean length of index and ring fingers were significantly higher in males (P<0.0001).

It was Krishan et al.¹³ who suggested a significant correlation between height and index finger length, which was higher among males than females. In Previous studies, they demonstrated similar results regarding the significant correlation between average ring finger length and height. Pearson's correlation coefficient between index and ring fingers length and height was higher in males than females (P<0.001), which was similar to the results of Krishan et al.¹³ Inconsistent with our results, Bardale et al. reported a higher correlation between height, and index and ring fingers length in females.¹² Our obtained data indicated 0.708 and 0.66 correlation coefficients between index finger length and stature, and between ring finger length and Stature, respectively. Results obtained by Oladipo et al. was in line with ours.¹⁴ On the other hand, Krishan et al.¹³ reported that index finger length had a higher correlation coefficient to estimate height, in comparison to the ring finger length.^{15,16}

Conclusion

In our study there exists a significant and positive correlation between stature and Index and ring finger length between both the sexes indicating strong and reliable relationship between the parameters. We conclude that the regression equations presented here can be used to estimate ante-mortem stature, with reasonable accuracy of unknown mutilated or dismembered human fingers remains from Index and Ring finger length in medico-legal cases, particularly from Nellore district of State Andhra Pradesh. However the formulae derived cannot be generalized to all population groups, hence it is necessary to derive regression equations which are region wise and population specific. Thus the data of this study are recommended in anthropological studies for stature estimation amongst the ethnic group under study.

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Congenital Malformations in Perinatal Autopsy with Special Emphasis on Syndromes: A Study of 100 Cases

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Abstract

Background: Perinatal autopsy is an important tool to look out for various congenital malformations and its impact on perinatal morbidity and mortality. Though radiological intervention has reduced the incidence, perinatal autopsy is essential for confirmation of diagnosis and to look out for additional information.

Objectives: To emphasize the importance of perinatal autopsy in diagnosing and confirmation of congenital malformations and to compare it with prenatal clinical findings.

Materials and Methods: The present study comprises 100 consecutive perinatal autopsies after approval from the Institutional Ethics Committee. Prior consent from parents were taken and autopsy was done using standard protocols. Prenatal radiological findings were compared with the autopsy findings wherever available.

Results: Out of 100 perinatal autopsies studied, 45 cases shows congenital anomalies, which included 26 males, 13 females and 6 cases with ambiguous genitalia. Among the 45 cases, 21 were therapeutic terminations, 15 still births and 09 cases of Intrauterine Deaths. The most common timing of therapeutic termination encountered was between 12–20 weeks. Out of 45 cases, anomalies were present in 16 cases of central nervous system (CNS), 5 of lung, 4 from kidney, 2 of heart, 7 cases of syndromes, 5 cases with multisystem involvement and 5 cases of miscellaneous group.

Conclusion: Perinatal autopsy is essential to confirm congenital malformations and to look for additional findings. Also, it helps to counsel the parents to prevent such complications in future pregnancy.

Keywords: Fetal autopsy; Still birth; Sirenomelia; Meningomyeloencephalocele.

Introduction

Congenital malformations remains one of the most common cause of perinatal morbidity and mortality accounting for approximately 10–15%, but actual numbers may vary widely due to under reporting of cases in India.¹

Congenital malformations is the least focused areas of disease surveillance as other important

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rampant issues like low birth weight, prematurity, sepsis and infections are the leading causes of perintal mortality in India. In western countries congenital malformations are the leading cause of infant mortality, due to high standards in accurate reporting, proper and regular antenatal check-ups and carrying out perinatal autopsy of demise fetuses.^{2,3}

The present study was carried out to emphasize the role of perinatal autopsies, which can be studied to prevent futher perinatal mortalities. In spite of recent advances in antenatal diagnostic modality, fetal autopsy plays a very vital role in the confirmation of clinical diagnosis and also to look for additional associated malformations or lesions and to report incidental findings. This helps in

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counselling of the parents and to prevent the fetal congenital anomalies in future pregnancies.³

Materials and Methods

This study was carried out in department of pathology, over a period of one year from January 2018 to December 2018 and 100 consecutive autopsies were studied. Approval from the Institutional Ethics Committee was obtained prior to commencement of studies. Informed consent from the parents were taken prior to autopsy.

All fetuses with gestational age of 12 weeks to 39 weeks were included in the study and all autolysed fetuses and fetus with gestational age less than 12 weeks and more than 39 weeks were excluded. Each fetus was examined according to standard protocol and external and internal examination was done. The autopsy protocol included the removal of thoracic, cervical, abdominal and pelvic organs en block and subsequently dissected into organ blocks.

Results

Out of 100 perinatal autopsies studied, 45 cases shows congenital anomalies, which included 26 males, 13 females and 6 cases with ambiguous genitalia. Among the 45 cases, 21 were therapeutic terminations, 15 were still births, 09 cases of Intrauterine Deaths. The most common timing of therapeutic termination encountered in this study was between 12–20 weeks (Table 1).

 Table 1: Gestational Age Wise Distribution of Congenital Anomalies Cases.

Gestational age (in weeks)	Number of cases	Percentage (%)
< 20	19	42.22%
21-25	11	24.45%
26-30	06	13.33%
31-36	07	15.56%
>36	02	04.44%
Total	45	100%

Table 2: Birth Weight Wise Distribution of Cases.

Birth weight (g)	Total cases	Percentage (%)
<500	20	44.44%
500-1000	13	28.89%
1001-2000	05	11.11%
2001-3000	06	13.34%
>3000	01	02.22%
Total	45	100%

Each case was classified on the basis of gestational

age and birth weight. Congenital malformations were common between 12–20 weeks and birth weight range was less than 500 gms (Table 2). Out of 45 cases, congenital anomalies was most common from CNS system which includes 16 cases. Other cases were 5 from lung, 4 from kidney, 2 of heart, 7 cases of syndromes, 5 cases with multisystem involvement and 5 cases were of miscellaneous group. Multiple congenital anomalies were seen in most of the syndromes (Table 3).

Table 3: System Wise Distribution of Cases.

Congenital anomalies	Associated anomalies	Number of Cases (n=45)
1. Central Nervous System Defects		16
Hypoplastic cerebellum with absent vermis		1
Absent corpus collosum with ventriculomegaly		1
Absent corpus collosum with colpocephaly		1
Corpus collosum agenesis with spina bifida	cleft lip	1
Anencephaly with spinabifida		1
Anencephaly	fused jaw and chest	1
Anencephaly		3
meningomyeloence phalocele		1
meningoencephalocele with dilated ventricle	lemon skull	1
meningocele		2
Meningomyelocele with spina bifida		1
Sacrococcygeal teratoma		1
2. Genito-Urinary Defects		04
Right Renal cystic dysplasia	Absent left kidney	1
Bilateral polycystic kidney	-	1
Left renal agenesis	Absent left adrenal	1
Bilateral renal agenesis	Absent ureter and bladder	1
3. Lung Defects		05
Congenital cystic adenoid malformation		
Type I	Multicystic renal dysplasia and low set ears	1
CCAM - Type II	Single umbilical artery	2
CCAM - Type III		1
Lung Atelectasis		1
4. Heart Defects		02
• Over-riding of aorta with pulmonary artery		1
Tetralogy of Fallot with achondroplasia		1

4. Multiple Congenital		05
Anomalies		
Low set ear and cleft lip	absent stomach	1
Absent left lung with hypoplastic left ventricle	mitral valve atresia	1
Anencephaly with encephalocele		1
Cleft palate with microtia and low set ears	polycystic kidney meningocele with hemangioma	1
Hydrocephalus with absent corpus collosum	club foot	1
5. Syndromes		07
Potters syndrome with sirenomelia		1
Edward syndrome		1
OEIS COMPLEX		1
Holoprosencephaly		1
with hypoplastic heart syndrome		
Dandy walker syndrome		1
Kleppel feil syndrome		1
Meckel gruber syndrome		1
6. Miscellaneous		05
Cystic hygroma		3
Omphalocele		1
CMV inclusions in Adrenal gland		1

In CNS, most common anomaly was an encephaly followed by meningocele. Rare case like absent corpus collosum with colpocephaly was also

encountered. Anomalies of lung includes congenital cystic adenomatoid malformation (CCAM) type I, II and III and lung atelectasis. Two cases of heart malformation includes pulmonary stenosis with over-riding of aorta and Tetralogy of Fallot. Renal anomalies includes polycystic kidney disease and renal cystic dysplasia. One case of bilateral renal agenesis associated with absent ureter and urinary bladder was also encountered.

Multi-system involvement with congenital malformations include cases like absent lung with hypoplastic left ventricle and mitral valve atresia and another case like anencephaly with encephalocele associated with polycystic kidney. One case of hydrocephalus with absent corpous collosum and clubfoot was also reported.

Interesting cases of syndromes include each case of Potter's syndrome with sirenomelia, Edward syndrome, OEIS complex, Dandy Walker syndrome, Holoprosencephaly with hypoplastic left heart syndrome, Klippel Feil syndrome and Meckel Gruber syndrome.

Miscellaneous cases includes three cases of cystic hygroma, one case of omphalocele and one case showing cytomegalovirus like inclusions in adrenal and calcification in foetal liver.



Large Yolk Sac

Hypoplastic Cerebellum





Hypoplastic Left Heart





Corpous Callosum Agenesis



X-Ray Showing Fused Lower Limbs **Fig 2:** Sirenomelia (Mermaid Syndrome).

Hypoplastic Lower Limbs

Umbilical Cord with two Vessels



X-Ray Showing Omhalocele with Curved Spine

Grossly Protusion of Abdominal Contensts



Hypoplastic Lower Limb and Imperforate Anus Fig. 3: OE is Complex.

Dextrocardia



Mri- Blake Pouch Cyst, Hypoplastic Vermis, Diaphragmatic Hernia and Depressed Nasal Bone

Gross-Pointed Frontal Bones, Flat Occiputlow Set Ears, Hyertelorism, Shield Chest and Rocker Bottom Foot



Diaphragmatic Hernia Fig. 4: Edward Syndrome.



Dilated Pulmonary Trunk

Hypoplastic Vermis



515







X-Ray showing Achondroplasia with Sqauring of Pelvis and Short Femur

Ventricular Septal Defect on Doppler and Gross



Over Riding of Aorta Fig 5: Tetralogy of Fallout with Achondroplasia

Pulmonary Artery Stenosis



Gross and Microscopy of Polycystic Kidney Disease

Anencephaly



Gross and Microscopy of Congenital Cystic Adenomatoid Malformation Type-III Fig 6: Various Congenital Anomalies.

Discussion

Congenital anomalies constitute a major cause of perinatal morbidity and mortality . Perinatal autopsy plays an important role in diagnosing and confirming the various congenital malformations. In this study CNS malformations constitute the majority of the cases.^{1,2}

One case of Dandy Walker syndrome was reported were 26 year female presented with 8 weeks of amenorrhaoe. On subsequent scans large yolk sac, cystic hygroma, cerebellum showing vermis agenesis, mega cistern magna, spina bifida and fetal hypoplastic left heart was noted. Grossly facial dysmorphic features, low set ears, congenital glaucoma, Cerebellar hypoplasia and ventricular septal defect was noted. (Fig. 1).

The Dandy – Walker complex is a rare congenital intracranial malformation that comprises a spectrum of abnormalities of the posterior fossa with cystic dilatation of the 4th ventricle, complete or partial agenesis of the cerebellar vermis and enlarged posterior fossa and mega-cisterna magna . The incidence being 1 in $30000.^4$

Another case of Mermaid syndrome / sirenomelia was reported were dead fetus of 26 weeks gestation with history of severe oligohydramnios and on USG, bilateral renal agenesis with hypoplastic lower limbs was observed and was confirmed on autopsy with umbilical cord showing two vessels.⁵ (Fig. 2).

Serinomelia or Mermaid syndrome is a deadly birth defect in which the two lower limbs of the newborn are fused together . Incidence is 1 in 1 lakh births. It represents a severe developmental defect of the posterior axis caudal blastema and associated with agenesis or hypoplasia of diverse organs.⁶

One case of OEIS complex was also reported. Carey et al; in 1978 gave the name OEIS complex to a combination of defects comprising omphalocele, exstrophy of the cloaca, imperforate anus, and spinal defects. Incidence is 1 in 2 lakh births. Usually cases are sporadic but can be multifactorial like teratogenic exposure to alcohol, diazepam, valproic acid, smoking, heparin, misoprostol, maternal history of diabetes and obesity. (Fig. 3) Chromosomal aberrations possibly associated are 47 XXX , 47 XXY , 45 XO / 46XX (mosaic) , Trisomy 18.^{1,7}

One case of Edward syndrome were also seen, where history of primigravida with 18 weeks of gestation and II degree consanguineous marriage. On ultrasonography Posterior fossa shows absent vermis, blake pouch cyst, absent nasal bone, diaphragmatic hernia, dilated pulmonary artery, Absent ductus venosus, bilateral club foot, syndactyly and rocker bottom foot. MRI of the foetus was done before autopsy which shows Cystic lesion seen in posterior fossa suggestive of blake's pouch cyst and hypoplastic vermis. Cardia shifted to right side, strawberry skull, rocker bottom foot with congenital talipes equino verus (CTEV) bilaterally, and diaphragmatic hernia. On autopsy, grossly pointed head with flat occiput, low set ears, micrognathia, hpertelorism, shielded chest and rocker bottom foot was noted. On internal examination hypoplastic lung, diaphragmatic hernia with stomach and bowel loops protruding into thoracic cavity, two spleens (polysplenia), dilated pulmonary artery with absent ductus venosus was noted . The diagnosis was confirmed by kayotyping.8

Edward syndrome first reported in 1960 by John Hilton Edwards et al; is common chromosomal disorder due to the presence of an extra chromosome 18, either full, mosaic trisomy, or partial trisomy 18q. Karunakaran and Pai reported the first case in the Indian literature in 1967. It is second most common autosomal trisomy syndrome after trisomy 21. The live born prevalence is estimated to be 1/6,000 - 1/8,000 births, but the overall prevalence is higher (1/2500–1/2600) due to the high frequency of foetal loss and pregnancy termination after prenatal diagnosis. The recurrence risk for a family with a child with full Trisomy -18 is about 1% and increases with increased maternal age.⁹ (Fig. 4)

One case of Tetralogy of Fallot with acondroplasia was seen where primigravida presented with 28 weeks gestation and on antenatal scan short limb dysplasia, Tetralogy- of –Fallot and hypoplastic nasal bone was noted. Components in Tetralogy- of- Fallot includes infundibular pulmonic stenosis, ventricular septal defects, aortic valve dextroposition (overriding of aorta), and right ventricular hypertrophy. It constitutes 10% of congenital heart diseases and most common cyanotic heart disease with incidence of 1:4000 births (Fig 5).¹⁰

Other cases encountered in our study includes bilateral polycystic kidney disease, congenital cystic adenoid malformations of Type I, II and III of lung. Also seen was cytomegalovirus like inclusions in the adrenal gland possibly suggestive of TORCH infections in the mother. (Fig 6).^{12, 13}

Conclusion

Perinatal autopsy plays a vital role in many ways. In a country like India where Government has taken many steps to decrease the perinatal morbidity and mortality, study of perinatal autopsies becomes more important for targeted approach.¹¹ The aim of perinatal autopsy is not only to confirm clinical and radiological diagnosis but to look for additional incidental findings. Autopsy findings along with genetic karyotyping will help in counseling the couples in future pregnancies and in minimizing the recurrences.

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A Clinico-Histopathological Correlative Study of Non-Infectious and Erythematous Papulosquamous Lesions of Skin in a Tertiary Care Hospital

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Abstract

Context: Papulosquamous lesions of skin are the most frequently seen conditions encountered by both dermatologists and pathologists. These conditions have a similar clinical picture; hence a definite histopathological diagnosis can solve the overlapping clinical features of various papulosquamous lesions of skin.

Aims: To study the histopathological features of various subcategories of papulosquamous skin lesions and to assess the correlation between clinical diagnosis provided and the histopathological diagnosis obtained.

Settings and Design: The study is done in a Tertiary care hospital which includes 150 skin biopsies received from Department of Dermatology.

Methods and Material: The skin biopsy specimens were subjected to formalin fixation and paraffin embedding followed by staining with hematoxylin and eosin. The histopathological features of various papulosquamous lesions were analysed and clinicopathological correlation was done for the 150 cases of skin biopsies which were clinically suspected/ diagnosed as papulosquamous skin lesions.

Statistical analysis used: Universal sampling done and this is a clinico-histopathological correlative study done for a period of 18 months.

Results: Out of the 150 skin biopsies of papulosquamous lesions, psoriasis turned out to be the most common lesion. The papulosquamous skin lesions were commonly seen in males. 28% cases were of psoriasis vulgaris and 25% cases were of Lichen planus occupying the top two commonest papulosquamous skin lesions and a positive correlation with histopathological diagnosis turned out to be 76%.

Conclusions: The complexity in diagnosing papulosquamous lesions due to features of clinical overlap can be overcome by the histopathological examination and findings which helps to diagnose the various subcategories of papulosquamous skin lesions.

Keywords: Papulosquamous lesions; Psoriasis; Lichen planus.

Keymessages: Histopathology which remains the gold standard for diagnosis of papulosquamous lesions of skin aids in overcoming cases having features of clinical overlap and correlation with clinical details is mandatory for accurate diagnosis.

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Introduction

Papulosquamous lesions of skin are the largest heterogenous group of dermatologic disorders which are important because of their frequency of occurrence.¹ These include a wide spectrum of conditions such as Psoriasis vulgaris,Psoriasiform dermatitis, Parapsoriasis, Psoriasiform

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planus, erythroderma, Lichen Lichenoid dermatitis,Lichen sclerosus et atrophicus,Lichen nitidus, Pityriasis lichenoides et varioliformis acuta (PLEVA), Lichen planopilaris, Lichen planus pigmentosus, Lichen striatus, Discoid Lupus Erythematosus, Erythema multiforme and Pityriasis Rubra Pilaris.² Histopathological examination is highly specific, sensitive and remains gold standard for papulosquamous skin lesions³ which are complex to diagnose based on clinical findings as there is clinical overlap. To overcome the difficulty in diagnosing, distinct histopathological features as well as clinical correlation helps in accurate diagnosis.⁴ The objectives of the study includes:

- To study the histopathological features of various subcategories of papulosquamous lesions of skin.
- To correlate the clinical diagnosis and the histopathological diagnosis of the various subcategories of papulosquamous skin lesions.

Materials and Methods

This study includes 150 skin biopsies from clinically diagnosed / suspected cases of papulosquamous skin lesions received in the department of pathology referred from dermatology department at a Tertiary care hospital during a period of 18 months.

The biopsy specimens were subjected to fixation by 10% formalin, processed and then embedded in paraffin blocks followed by preparation of tissue sections, staining with hematoxylin and eosin, followed by microscopic examination. Also studied is the correlation between clinical as well as histopathological diagnosis of 150 skin biopsies of papulosquamous skin lesions.

Inclusion criteria: The skin biopsies of cases clinically suspected / diagnosed as non-infectious, erythematous papulosquamous lesions of skin.

Exclusion criteria: The skin biopsies of cases with infectious papulosquamous lesions of skin and other skin lesions were excluded.

Results

Out of the 150 skin biopsies which were evaluated, 74 cases were diagnosed to be of psoriasiform lesions (Fig. 1) and 56 cases were diagnosed to be of lichenoid lesions (Table 2). Out of the 150 cases, 114 cases (76%) showed positive clinicohistopathological correlation and the remaining 36 cases (24%) showed histopathological findings which were different from that of clinical diagnosis which is shown in Table 5.



Fig1: Spectrum of non-infectious erythematous papulosquamous skin lesions.



Fig. 2: Histopathological features observed in Lichen planus in this study showing hyperkeratosis, hypergranulosis, irregular acanthosis, saw toothed rete ridges and dermal band like infiltrate (Hematoxylin and Eosin, 20x).



Fig. 3: Histopathological features observed in Psoriasis vulgaris in this study showing parakeratosis, suprapapillary thinning, acanthosis and attenuated granular layer (Hematoxylin and Eosin, 20x).

 Table 1: Age distribution of non-infectious erythematous papulosquamous skin lesions.

Age Group (Years)	Number	Percentage
<10	5	3
11-20	15	10
21-30	38	25
31-40	62	42
41-50	12	8
51-60	10	7
>60	8	5
Total	150	100

Lesions	Number	Percentage
Psoriasis vulgaris	42	28
Psoriasiform dermatitis	28	19
Parapsoriasis	2	1
Psoriasiform erythroderma	2	1
Lichen planus	37	25
Lichenoid dermatitis	11	8
Lichen sclerosus et atrophicus	7	5
Lichen planopilaris	3	2
Lichen planus pigmentosus	4	3
Lichen nitidus	2	1
Lichen striatus	2	1
PLEVA	2	1
Pityriasis Rubra Pilaris	2	1
Discoid Lupus Erythematosus	4	3
Erythema Multiforme	2	1
Total	150	100

Table 3: Histopathological features observed in Psoriasiform lesions in this study.

Histopathological findings	Number of	Percentage	
	cases	%	
Epidermal ch	anges		
Acanthosis	67	91	
Hyperkeratosis	60	81	
Parakeratosis	65	88	
Munro microabscess	39	53	
Psoriasiform hyperplasia	51	69	
Suprapapillary thinning	38	51	
Attenuated/absent granular layer	37	50	
Dermal changes			
Papillary edema	19	26	
Vascular changes	59	79	
Dermal inflammation	60	81	

Table 4: Histopathological features observed in Lichen planus in this study.

Histopathological findings	Number of cases	Percentage %	
Epidermal changes			
Irregular acanthosis 29		78	
Saw toothed rete ridges	30	81	

Hyperkeratosis	34	92
Hypergranulosis	30	81
Parakeratosis	2	5
Vacuolar degeneration of basal cells	36	97
Civatte bodies	27	73
Max Joseph Spaces	11	30
Dermal changes		
Band like dermal infiltrate	35	95
Vascular changes	1	2

Table 5: Clinico-histopathological correlation.

Disease	Clinico-histopathological correlation		
	Positive	Negative	
Psoriasis vulgaris	34 (81%)	8 (19%)	
Psoriasiform dermatitis	21 (75%)	7 (25%)	
Parapsoriasis	1 (50%)	1 (50%)	
Psoriasiform erythroderma	1 (50%)	1 (50%)	
Lichen planus	30 (81%)	7 (19%)	
Lichenoid dermatitis	7 (63%)	4 (37%)	
Lichen sclerosus et atrophicus	4 (57%)	3 (41%)	
Lichen planopilaris	2 (67%)	1 (33%)	
Lichen planus pigmentosus	3 (75%)	1 (25%)	
Lichen nitidus	1 (50%)	1 (50%)	
Lichen striatus	2 (100%)	0 (0%)	
PLEVA	1 (50%)	1 (50%)	
Pityriasis Rubra Pilaris	2 (100%)	0 (0%)	
Discoid Lupus Erythematosus	3 (75%)	1 (25%)	
Erythema Multiforme	2 (100%)	0 (0%)	
Total	114 (76%)	36 (24%)	

Discussion

The various subcategories of papulosquamous lesions of skin show overlapping clinical features as a result of which histopathological examination helps in obtaining the precise diagnosis in skin biopsies.⁵ The present study which included 150 skin biopsies was done to evaluate the histopathological features of various types of papulosquamous lesions of skin as well as to correlate with the clinical findings and presentation.

42 cases of psoriasis vulgaris were studied which showed male preponderance and the commonest age group affected is 31-40 years (Table 1). According to the study done by Dogra S and Yadav S, the incidence of Psoriasis is more common in the age group of 20 to 39 years.⁶ Another study done by D'Costa and Bharambe BM, the incidence of Psoriasis is more common in the age group of 30 to 40 years.⁷

The study done by Schon MP and Boehncke WH revealed that patients with psoriasis have chronic erythematous plaques which are sharply

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demarcated and are covered by white silvery scales are most commonly seen in knees, elbows, scalp and umbilicus.⁸ The present study reveals the most common site of psoriasiform lesions to be extremities followed by trunk and scalp region.

The study done by Karumbaiah K.P et al revealed the commonest sites of lesion to be extremities followed by trunk and back.⁴ The present study of papulosquamous skin lesions revealed the histopathological features of psoriasiform lesions (Table 3) to be hyperkeratosis (81%), parakeratosis (88%), acanthosis (91%), psoriasiform hyperplasia (69%), munro microabscess (53%), suprapapillary thinning (51%), attenuated or absent granular layer (50%). In cases of psoriasiform lesions, acanthosis, parakeratosis, hyperkeratosis, turns out to be the most common histopathological findings (Fig. 3).

In the present study, there were 37 cases of Lichen planus which accounted for 25% of papulosquamous lesions standing next to psoriasiform lesions. The histopathological features (Table 4) observed in lichen planus in this study include irregular acanthosis (78%) as shown in Fig. 2, saw toothed rete ridges (81%), hyperkeratosis (92%), hypergranulosis (81%), vacuolar degeneration of basal cells (97%), Civatte bodies (73%) and Max Joseph spaces (30%).

Male preponderance was observed in lichen planus biopsies. According to the study done by Younas M and Haque A, male preponderance was observed in lichen planus, similar to the present study.⁹ The commonest age group affected in cases of lichen planus in our study is 30 to 40 years (Table 1).

Two cases of parapsoriasis were diagnosed which accounted for 1% of the papulosquamous lesions showing features of parakeratosis, acanthosis as well as dermal perivascular inflammatory infiltrate. Also noted are spongiosis and lymphocytic exocytosis.

11 cases of lichenoid dermatitis were reported in the present study which accounted for 8% of papulosquamous lesions in this study. 2 cases of Pityriasis rubra pilaris were diagnosed in this study and the common age group affected include 15 to 25 years which showed features of orthokeratosis, follicular plugging as well as perifollicular parakeratosis.

Two cases of Lichen nitidus were diagnosed in this study which accounted for 1% of the papulosquamous lesions in this study which showed features of hyperkeratosis, basal vacuolar degeneration, ball-shaped lichenoid infiltrate composed of lymphocytes and plasma cells.¹⁰ Glorioso et al¹¹ conducted a study which revealed similar characteristic histopathological findings in cases of Lichen nitidus.

Two cases of PLEVA were diagnosed in this study which accounted for 1% of the papulosquamous lesions which showed features of edema, lymphocytic exocytosis, keratinocyte necrosis, dermal perivascular infiltrates of lymphocytes as well as histiocytes.

Two cases of Lichen striatus were diagnosed in this study which accounted for 1% of the papulosquamous lesions showed features of parakeratosis, acanthosis, spongiosis, perivascular and periadnexal dermal lymphohistiocytic infiltrate.¹²

Four cases of Discoid Lupus Erythematosus were diagnosed in this study which accounted for 3% of the papulosquamous lesions showed features of lichenoid band like infiltrate, perifollicular as well as peri infundibular inflammatory infiltrate noted. Thinning of the epidermis as well as keratotic follicular plugging noted.

Hence, histopathological examination helps in the diagnosis of papulosquamous lesions of skin and aids us in overcoming cases with clinical overlap and correlation with clinical details is mandatory for correct diagnosis.

Conclusion

Due to the overlap of clinical features in various papulosquamous skin lesions, the clinical diagnosis becomes difficult which can be supported by the histopathological diagnosis based on various characteristic features as histopathology is considered as gold standard for evaluation of papulosquamous lesions. Clinicopathological correlation is done which is always helpful in making the accurate diagnosis.

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Pattern of Filling Up of Medical Certificate of Cause of Death at A Tertiary Care Hospital during Covid Pandemic: A Matter of Concern

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Abstract

Medical Certification of Cause of Death- MCCD, plays an important role in deciding the direction of public health programs, provide a feedback system for future implementation of health policies, health planning and management of epidemiological studies, vital statistics, medico-legal investigations, census studies, health research, assessment of effectiveness of public health programs. As Covid- 19 produces so much confusion into the mind of treating doctor as how to give cause of death in MCCD. Certification and classification and coding of death related to Covid-19 is essential for smooth contact tracing afterwards. Our study focused on the analysis of MCCD proformas filled up by residents and faculty members and common mistakes committed while filling it while treating the Covid patient at isolation wards. This is a retrospective, cross sectional study carried out at Covid-19 dedicated hospital associated with a Medical College situated in Rajasthan. The period of this study is three month of early Covid-19 pandemic time from 1st April 2020 to 30th June 2020, in which a total of 199 deaths were reported. We could study a total of 152 certificates (76.38%) out of total 199 deaths as in rest of cases, the MCCD was not attached as deceased was brought dead to hospital. The analytical result of study revealed some major errors like immediate cause of death was Covid-19 positive with cardiovascular arrest. The conclusion of our study highlights an urgent need for imparting extra efforts towards awareness, importance to undergraduates as well as postgraduate training. Also emphasis training of senior and junior faculty with other treating doctors. Suggestions to government for impose strict rules over clinician so that they know the importance of MCCD in pandemic time also.

Keywords: Brought dead; MCCD; Covid-19; Certification; Pandemic.

Introduction

The mortality statistics are good indicators of demographic health trends and are provided on scientific basis of the system of MCCD- Medical Certification of Cause of Death.¹ The statistics regarding cause of death is very useful entity,

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as it helps in deciding the direction of public health programs, provide a feedback system for future implementation of health policies, health planning and management of epidemiological studies, vital statistics, medico-legal investigations, census studies, health research, assessment of effectiveness of public health programs. COVID-19 is the infectious disease caused by the most recently discovered corona virus (SARS-CoV-2) from Wuhan, China, in December 2019. The COVID-19 disease outbreak was declared a Public Health Emergency of International Concern (PHEIC) on 30 January 2020 by the World Health Organization, and later on 11 March 2020 as a Global Pandemic. During such situations, mortality surveillance becomes a very important public health tool to assess the impact of the viral infection. It is also

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important in insurance sectors the Government of India launched various mediclaims. In that scenario the number of insurance claims will increase many folds. For attending physicians, it is of paramount importance as they often find themselves at the centre of various litigations in future.² COVID-19 is a new disease and is a pandemic affecting all communities and countries. It's clinical presentation ranges from mild to severe, and fatality depends on the severity of the illness, associated comorbid conditions and age of patients. Patterns of disease and patterns of death can come from only standardised recording of clinical disease history and cause of death, and therefore epidemiological surveillance of disease and death are important. Robust data is needed from every district and state in India to measure the public health impact of COVID 19 and to plan for timely health interventions and protect communities. At the same time, other health conditions affecting populations need to be also monitored so that the health system is prepared for responding to the needs of the population. Standard cause of death report in India follows the recommendations of the WHO. The causes of death are classified according to the International Classification of Diseases (ICD) and the MCCD is as per the format presented in volume II of ICD-10.3 It originally came in to the existence in 1960 and India started to follow the system in 1969 along with incorporation in RBDA- Registration of Birth and Death Act, 1969 in subsection 3 of Sec.¹⁰ of the Act in the form of 4 or 4A.4,5 This document should be 100% correct and fool proof. But in reality, the MCCD proformas which are being filled up by most of the Registered Medical Practitioners are not correct.⁶ This study is undertaken to analyse the MCCD proformas filled up by residents and faculty members in Covid dedicated hospital.7

COVID-19 is reported to cause pneumonia/ acute respiratory distress syndrome (ARDS)/ cardiac injury / disseminated intravascular coagulation and so on. These may lead to death and may be recorded in line 'a' or 'b'. It is likely that COVID-19 is the underlying cause of death (UCOD) that lead to ARDS or Pneumonia in most of the deaths due to COVID-19 (test positive and symptoms positive). In these cases COVID-19 must be captured in the last line / lowest line of Part 1 of MCCD form 4/4 A. Acute respiratory failure is a mode of dying and it is prudent not to record it in line a/b/c. Patients may present with other pre-existing comorbid conditions such as chronic obstructive pulmonary disease (COPD) or asthma, chronic bronchitis, ischemic heart disease, cancer

and diabetes mellitus. These conditions increase the risk of developing respiratory infections, and may lead to complications and severe disease in a COVID-19 positive individual. These conditions are not considered as UCOD as they have directly not caused death due to COVID-19. Also a patient may have many co-morbid conditions, but only those that have contributed to death should be recorded in Part 2.

Aims and Objectives

- 1. To know if the MCCD format filled or not.
- 2. If used- is it filled up correctly?
- 3. Whether the Covid-19 was written as immediate and antecedent cause of death?
- 4. If not-what were the columns filled wrongly or left blank.
- 5. To know the causes behind these lacunae.
- 6. To point out the commoner mistake committed by faculty while filling up the MCCD.
- 7. To suggest the way to rectify the mistakes.

Materials and Methods

It is a retrospective study carried out at Covid-19 dedicated hospital associated with a Medical College situated in Rajasthan. Study period was three month of early Covid-19 pandemic time from 1st April 2020 to 30th June 2020. A total 199 deaths occurred at Covid dedicated hospital, which were died during treatment or brought dead to hospital and the body of deceased which were kept in mortuary for waiting of Covid-19 report from the microbiology. A proforma is prepared and relevant data is entered. After filling a proformas on the basis of the information obtained from the case records for all deaths, these proformas analysed and a conclusion was made. Strict confidentiality of the case papers has been maintained and no medical condition is revealed, disclosing the identity of the deceased. Various aspects of MCCD proforma were classified into sub headings like major errors and minor errors.6

Inclusion and exclusion criteria: Body of that deceased was kept in mortuary for waiting of Corona-19 laboratory report, which used to confirmed by microbiology department were included only. Dead Bodies and deceased which were not kept for waiting of Covid test report not included in this study. *Study Type:* Cross sectional study. *Ethical issues:* No ethical issues involved.

Results



Chart 1: Distribution of brought dead and died during treatment.

We studied a total of 152 certificates. As it shown that rest 47 (23.61%) were not attached with any MCCD as they were brought dead to hospital and only OPD slip was there with details.(Table 1, Chart 1). Analytical outcome of the study revealed that preliminary components of the certificate viz. deceased full name, age, sex, address, time of admission and time of death were not correctly entered in all the cases. It was very shocking that in 47 (30.92%) cases MCCD were blank except preliminary components and all were dully signed by doctors. In those case when we spoken to doctors they said, MCCD will be filled by them when Covid report released by the microbiology department. In 78 (51.31%) cases immediate cause of death was filled incorrectly. It was mentioned as CRA (Cardio Respiratory Arrest) with ? Covid-19. It is absolutely wrong that Covid-19 never ever be immediate cause of death. In MCCD physician has to write Covid suspect if history, symptoms and signs were present. Antecedent cause of death was filled incorrect in 82(53.94%) cases including they wrote ? Covid-19 in the said column.(Table 2)

Table: 1 Distribution of brought dead and died during treatment.

	No	%
Brought dead	47	23.61%
Death during hospitalisation and during treatment at hospital	152	76.38%
Total	199	100
Table 2: Type and frequency of errors in MC	CD (N= 1	52).
Type of Error	No.	%
Major errors		
Wrong form of MCCD	0	0%

Wrong form of MCCD	0	0%
Blank MCCD and duly signed	47	30.92%
Wrong immediate cause of death (including Covid-19 written as immediate	78	51.31%

cause of death)

Wrong antecedent cause of death (?? Covid-19 written as cause of death)	82	53.94%
Significant condition contributing to death	54	35.52%
Improper sequencing	56	53.94%
Lack of ICD -10 coding	152	100%
At least one major error	152	100%
Minor errors		
Absence of time intervals	152	100%
Use of abbreviations	100	65.79%
Illegible handwriting	3	1.97%
At least one minor error	152	100%

Followings are the other errors:

- 1. Immediate cause of death: in most of certificates cardio-respiratory arrest (often used as abbreviation- CRA) was written as immediate cause of death with ?? Covid.
- 2. Abbreviations are used frequently in almost 65.79% cases.
- 3. Significant condition contributing to death has been kept blank in 54 (35.52%) cases
- 4. Time interval between onset of the symptoms and death is vacant in 152 cases.
- 5. Signature of the hospital authority was in almost every MCCD but the name of doctor was not there in all 152 cases.
- 6. Improper sequencing of onset of symptoms to event causing death is not proper in 82 (53.94%) cases.
- ICD-10 coding of Covid-19 is missing in almost every MCCD
- 8. At least minor error was found in each and every MCCD.
- 9. Illegible handwriting was in 3 MCCD only.
- 10. The part which used to give to relatives was with incomplete filling in each and every MCCD.

Discussion

It is very important in our study that correct MCCD form was used by treating doctors it may be due to that our institute is government institute where format is already printed by senior authority and same has been provided to the doctors. As we know due to lack of forensic knowledge physician used to do mistakes while filling MCCD, during Covid-19 pandemic raised this kind of issues and more confusion found amongst the doctors. In our study we observed blank MCCD was found in 30.92% cases which shocked us how a doctor can send a blank certificate to us; in any other study it is not observed as the other study does not faced any pandemic like Covid-19. In our study as body was sent to covid-19 dedicated mortuary to keep it while in waiting of covid-19 report from microbiology department. The doctors who were doing that were informed as per WHO guidelines it is wrong method.

As far as concern wrong immediate cause of death we found that 51.31% MCCD were filled with incorrect immediate cause of death, Study done by Patel N et al⁹ observed that 79.24 % were had error and study done by Bamburia et al 97.16% cases immediate cause of death was incorrect.¹⁰ In our study we include the medical college related deaths and their MCCD, also done by Patel et al but study done by Bamburia et al includes general hospital, civil hospital deaths where doctors are untrained in terms of MCCD.¹⁰

In our study wrong antecedent cause of death observed in 53.94% cases in most of the cases treating doctors confused with Covid-19 reports. They were confused whether they have to write Covid-19 ?? or Covid-19 suspect. As per WHO guidelines doctor should not wait for Covid-19 confirm laboratory report. He has to write Covid-19 suspect if symptoms and signs were observed in patients. In study done by Bamburia et al they did not comment on antecedent cause of death10 study done by Patel et al observed that out of 50 cases column were left blank in 6 cases and incompletely filled in 28 cases almost 70% MCCD were with error.⁸ Lack of ICD-10 coding and at least one major error was present in almost in all MCCD while study done by Bamburia et al observed¹⁰ same findings also study done by Patel et al observed same.⁹ There are absence of time interval in 100 % cases and atleast one minor error in 100 % cases., Study done by Patel et al revealed that 92.5 % MCCD were not with time interval⁹ and study done by Bamburia et al said that they found absence of time interval in 98.11% cases.¹⁰ At least one minor error in 100% MCCD. It may be due to that many times patients referred from primary health centres when they were in terminal stage of disease.¹¹ In Covid 19 relatives not used to come with patient and rapid response team used to bring the patient to hospital it is very difficult to reveal the exact time interval of associated disease. MCCD will be a medical and legal document after covid era it is essential for doctors so they learn at least how to fill the MCCD correctly as per WHO guidelines. The main reason behind the deficiency is lack of proper orientation, training, changeable guideline by WHO in Corona day to day, fear of corona in doctors and lack of supervision by the unit heads.

Conclusion

MCCD always a important one to maintaining uniformity of issuing the cause of death certificate by doctors. MCCD is an essential and mandatory part of reporting of vital statistics of a hospital. In our study which is done at important corona era suggest that single MCCD was not perfect even if major error were also present. As we were dealing with Covid dedicated mortuary improper MCCD may lead conflict between treating doctor and us. Sometimes we confused whether dead body was corona positive or corona suspect. To avoid all of this, proper training, straight guidelines, proper supervision by seniors faculty and strict knowledge is essential.

Recommendations: The following guidelines are recommended:

- 1. After death, the attending doctor will play the role of pronouncing physician and hand over the death slip to the attendant of the deceased.
- 2.. The lower part of form 4 (death slip) should be signed by the concerned hospital authority with hospital seal.
- 3. The attending physician should seek the academic guidance from the concerned seniors
- 4. It's recommended that the undergraduates be highlighted the importance of MCCD during their training.
- 5. Interns posted in the wards dealing with the cases should be properly trained.

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Evaluation of Histopathological Spectrum of Hepatic Lesions in Liver Biopsies: A Two Years Prospective Study

Sagar Shah¹, Usha M², Clement Wilfred³, Rashmi K⁴

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Abstract

Introduction: Liver biopsy is an important diagnostic tool that assists determination of specific diagnoses and directs therapeutic decisions in patients with acute and chronic liver diseases. It can also be used to estimate the degree of liver damage to grade and stage hepatitis B and C, and to determine the best treatment for the damage or disease.

Material and Method: A two year prospective study was conducted on 78 liver biopsies in the Department of Pathology, M.S. Ramaiah Medical College and Hospital from January 2018 to January 2020. The sections were examined and the histopathological findings were recorded. Immunohistochemistry (IHC) was performed by using markerssuch as CK7, CK20, CDX2, CEA, Hep par 1, TTF-1, synaptophysin, chromogranin and AFP for increased diagnostic accuracy.

Results: In this study, age ranged from 3 months to 80 years. Mean age was 42.5 years. Out of 78 cases, 51 cases were males, 27 were females. Liver biopsy revealed that chronic hepatitis and metastasis were the commonest findings constituting 14.1% each. Hepatocellular carcinoma (HCC) and cirrhosis constituted 11.53% and 10.25% of total cases, respectively.

Conclusion: Liver biopsy continues to play an important role in modern clinical practice and remains the gold standard for the diagnosis of majority of the hepatic diseases. Histopathological examination of liver biopsy specimen is an essential, safe and reliable tool for the diagnosis, accurate assessment of severity and follow up of the various hepatic lesions.

Keywords: Histomorphological analysis; Hepatic lesions; Liver biopsy.

Introduction

Liver is the principle site of many metabolic activities and hence exposed to various metabolic, toxic, infectious and neoplastic insults. It is affected by a wide spectrum of primary and secondary diseases.¹ The common primary liver diseases are hepatitis, non-alcoholic fatty liver disease (NAFLD) and Hepatocellular carcinoma (HCC). Secondary hepatic involvement can be due to alcoholism, extrahepatic infections or metastatic spread of

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various primary malignancies, etc.² Liver biopsy is an essential tool in the diagnosis and management of liver diseases as liver function tests (LFT) alone are not entirely diagnostically specific.

A liver biopsy can also be used to estimate the degree of liver damage, to grade and stage hepatitis B and C, and to determine the best treatment for the damage or disease. Evaluation of liver biopsy has major clinical significance. The liver is frequently affected by wide spectrum of neoplasms including benign tumours as well as primary malignancies.^{3–5} In addition, due to the rich dual blood flow to liver, malignant tumours also often secondarily involve liver. At present, biopsy is the gold standard in oncology.⁶ Liver biopsy continues to play an important role in modern clinical practice where any significantly abnormal LFT and/or radiological finding with clinical findings of anaemia, jaundice, hepatomegaly, ascites and splenomegaly warrants

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a liver biopsy. The ease as well as it being a relatively safe procedure has made it a method of choice for diagnosis and subsequent management of hepatic lesions. Thus, histopathological study of liver biopsy is frequently done for diagnosis of different hepatic lesions. These diseases can be diagnosed by correlation of clinical, biochemical or radiological examinations. The main purpose of this study was to analyse different patterns of liver changes in various hepatic lesions.

Materials and Methods

The study was conducted on 78 liver biopsies prospectively in the Department of Pathology, M.S. Ramaiah medical college and hospital over a period of two years from January 2018 to January 2020. The clinical and radiological findings with LFT results were noted in all the cases. Liver biopsies were fixed in 10% formalin and processed through the routine standard procedure which is followed for all histopathology specimens and stained with Hematoxylin and Eosin (H&E) and were examined under microscope. Special stains like Reticulin, Periodic acid Schiff, Masson Trichrome and Prussian blue were employed wherever required. Immunohistochemistry (IHC) was performed by using markers like CK7, CK20, CDX2, CEA, Hep Par 1, TTF-1, synaptophysin, chromogranin A and AFP for increased diagnostic accuracy. The findings were recorded and analysed.(Fig. 9)

Statistical analysis

Statistical analysis was done by using SPSS software (Version 21). All values were given in mean±SD.

Result

In this study, age ranged from 3 months to 80 years. Mean age was 42.5 years. Out of the total 78 liver biopsy specimens, 51 cases were males and 27 were females. Mean alanine aminotransferase (ALT) for the entire cohort was 84 IU/L, and mean aspartate aminotransferase (AST) was 87 IU/L. Serum ALT was abnormally elevated in 30 (38.46%) subjects.

Liver biopsies revealed 19.23% cases of chronic hepatitis which constituted the majority of the cases. 14.10% of metastasis, 11.53% and 10.25% of hepatocellular carcinoma (HCC) and cirrhosis, respectively. Fatty liver was seen in 6.41% cases and 5.12% cases showed biliary atresia. Two cases each of tuberculosis, hepatoblastoma and giant cell hepatitis were seen. One case each of Dubin Johnson syndrome and autoimmune hepatitis were reported. The histopathological diagnosis are shown in (Table 1, Fig. 1).

Table 1: Sex-Wise Distribution of Liver Biopsies.

Histopathological Diagnosis	Male	Female	Number of Cases
HepatocellularCarcinoma	5	4	9
Positive for Malignancy	4	-	4
Acute Hepatitis	2	-	2
Storage Disorders	1	-	1
Metastasis	10	1	11
Giant Cell Hepatitis	1	1	2
Portal Triaditis	2	1	3
Cholestatic Hepatitis	4	2	6
Chronic Hepatitis	6	5	11
Biliary Atresia	1	3	4
Fatty Liver	3	2	5
Granulomatous Inflammation	-	1	1
Autoimmune Hepatitis	-	1	1
Acute On Chronic Inflammation	4	-	4
Cirrhosis	5	3	8
Hepatoblastoma	2	-	2
Tuberculosis	1	-	1
Chronic Cholestasis Liver Disease	-	3	3
Total	51	27	78



Fig. 1: Sex-Wise Distribution of Liver Biopsies. Table 2: Age and Sex-Wise Distribution of Various Hepatic Lesions.

Age Group	Male	Female	No. of Cases	Percentage of Total Case
0-10	8	11	19	24.35
11-20	2	1	3	3.84
21-30	3	2	5	6.41
31-40	7	6	13	16.66

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Fig. 2: Age and Sex-Wise Distribution of Various Hepatic Lesions.

Table 3: Spectrum of Various Histopathological Lesions.

Sr.No.	Io. Histopathological Diagnosis		% of Total
	1 0 0	Cases	Cases
1	Metastasis	11	14.10
2	Chronic Hepatitis	11	14.10
3	Hepatocellular Carcinoma	9	11.53
4	Cirrhosis	8	10.25
5	Cholestatic Hepatitis	6	7.69
6	Fatty Liver	5	6.41
7	Positive For Malignancy	4	5.12
8	Biliary Atresia	4	5.12
9	Acute On Chronic Inflammation	4	5.12
10	Portal Triaditis	3	3.84
11	Chronic Cholestatic Disease	3	3.84
12	Hepatoblastoma	2	2.56
13	Acute Hepatitis	2	2.56
14	Giant Cell Hepatitis	2	2.56
15	Storage Disorder	1	1.28
16	Granulomatous Inflammation	1	1.28
17	Autoimmune Hepatitis	1	1.28
18	Tuberculosis	1	1.28
	Total	78	100

Immunohistochemical analysis

Primary sites for metastatic tumors were from colorectal carcinoma in 2 cases, upper gastrointestinal tract (GI) tract in 1 case, pancreas in 2 cases and breast in 1 case. In cases of metastatic adenocarcinoma, primary malignancy being colorectal/pancreatic ductal origin the tumor cells were diffusely and strongly positive for CK20 and focally positive for CDX2, CEA, AFP. Whereas in cases of metastatic adenocarcinoma with primary tumor in upper GI tract/ pancreas tumor cells were positive for CK7. In cases of HCC, the tumor cells were diffusely and strongly positive for Hep Par-1. (Fig. 4).



Histopathological Examination

Fig. 3: Histopathological Examination of cases.



Fig. A showing Hep par-1 cytoplasmic staining and Fig. B showing CK20 membranous & cytoplasmic starining. Fig. 4: IHC Hep Par-1 & CK20 (200x).



Fig. 5: H&E Hepatocellular carcinoma (HCC) (200x).



Fig. 6: H&E Adenocarcinoma (200x).



Fig. A shows Cirrhosis H&E (100x); Fig. B shows reticulin stain. **Fig. 7:** H&E Cirrhosis with reticulin stain (200x).



Dubin Johnson syndrome. Fig. A showing diffuse deposition of coarse granular dark brown pigment in hepatocytes & Fig. B showing intranuclear cytoplasmic inclusions.

Fig. 8: H&E Dubin Johnson syndrome (200x).



Fig. 9: H&E Chronic hepatitis (200x).

Majority of the lesions were in the age group of 41–50 years consisting of 15 total cases of which 14 were males and one case was female and majority of the lesions in this age group were cirrhosis and HCC. Most common histopathology finding in the age group 0–10 years was cholestatic hepatitis in females and extrahepatic biliary atresia and hepatoblastoma in males. Increased cases of malignancy were noted after the age of 50 years which included both HCC and metastatic tumors. Age and sex-wise distribution of various hepatic lesions are shown in (Table 2, Fig. 2). Spectrum of various histopathological lesions are shown in (Table 3, Fig. 3).

Discussion

Liver being affected by various primary and secondary diseases warrants an accurate diagnosis for patient management. Therefore, liver histopathology has become a most important diagnostic tool.⁷ The spectrum of hepatic lesions varied from males to females as well as from infants to adults. In our study 25.31% of hepatic lesions were found in age group of 0–10 year.

In our study, the highest incidence of hepatic lesions were seen after age group of 30 years. This was probably due to increased alcohol intake, viral hepatic infections, obesity and other conditions during this period of life.^{8,9}

In our study metastasis were found to be 14.10% the most commonly observed hepatic lesions were hepatic tumors and these results were in agreement with the other Indian study.¹⁰ Hepatocellular carcinoma was found to be the most common hepatic lesion with the clinical features of abdominal pain, ascites, hepatomegaly. The common sites of primary tumours that frequently metastasizes to liver include lung, breast, gall bladder, stomach, pancreas, and large intestine.¹¹ Metastatic involvement of liver is more common than the primary hepatic tumours.¹⁰ In present study the Hepatocellular carcinoma was the most common primary hepatic malignancy encountered in our study seen in 11.53% (n=9) cases (Fig. 5).

In our study, metastatic adenocarcinoma was the most frequent observation with primary tumours in gall bladder, stomach, pancreas, large bowel and breast. Adenocarcinoma shows irregular glandular pattern and surrounding desmoplasia in (Fig. 6).

The various etiological agents that cause cirrhosis include alcoholic liver disease, hepatitis B infection, hepatitis C infection, Wilson disease, malnutrition, Primary biliary cirrhosis, Secondary biliary cirrhosis, and hemochromotosis. In present study the acute hepatitis was present in 2.56% of cases. Chronic hepatitis was present in 14.10% of cases. Our results were similar with the other studies.^{10,12}

Cirrhosis was the third most common hepatic lesion seen in 10.25 % (n=8) cases. Gall et al has found the incidence of cirrhosis to be 6%.¹³ Agarwal et al has found the incidence of cirrhosis were 12.3%.¹² The regenerative nodules of varying size from central to central portal of cirrhosis alongwith reticulin stain were shown in (Fig. 7).

Dubin-Johnson syndrome is caused by a mutation of ABCC2 encoding MRP2. Dubin-Johnson syndrome is characterized by conjugated hyperbilirubinemia without other serum enzyme abnormalities. One case of Dubin-Johnson syndrome was seen in 34 year old man. (Fig. 8).

The histologic findings are disease specific. However, in general, in hepatocellular causes of cholestasis, histology shows the presence of bile within hepatocytes and canaliculi spaces along with diffuse cholestatic injury pattern. While in the obstructive cholestatic pattern, histology shows bile plugging of interlobular bile ducts, portal expansion, and bile duct proliferation with mainly a centrilobular pattern of cholestatic injury. Retention of bilirubin (bilirubinostasis) can lead to stagnation of bile and bilirubin along cytoplasmic, canalicular, ductular or ductal regions, depending on the severity and duration of biliary obstruction.¹⁴ In present study Cholestatic Hepatitis was seen in 6 (7.69%) of population. Bile duct changes are atypical of autoimmune hepatitis. Liver biopsy specimens were reviewed. Patients who satisfied international scoring criteria for autoimmune hepatitis, and the findings were correlated with clinical features and outcome.

In present study, four cases of extrahepatic biliary atresia were observed who presented with persistent jaundice. Similar cases (6.15%) were shown by Aggarwal et al.¹²

Conclusion

Liver biopsy is an essential, safe, reliable tool for the diagnosis, accurate assessment of severity and follow up of the various hepatic lesions. Liver biopsy continues to play an important role in modern clinical practice and remains the gold standard for the diagnosis of majority of the hepatic diseases. Microscopic examination of liver biopsy yields a diverse range of pathological findings. They are the most sensitive and specific means of evaluating the degree of liver cell injury and hepatic fibrosis. Liver biopsy provides information on the severity and distribution of lesions (codified in the staging and grading of chronic liver disease), the presence of confounding patterns of injury such as steatohepatitis coexisting with chronic viral hepatitis, and the presence of additional findings. It is most important investigation in reaching accurate diagnosis, detect cause and severity of liver diseases and in providing better treatment options. This information provides immense help in the diagnosis and prognostication of a variety of liver diseases. With careful selection of patients, and performance of the procedure appropriately, the complications become exceptionally rare in current clinical practice. Furthermore, the limitations of sampling error and inter-/ intraobserver variability may be avoided by obtaining adequate tissue specimen and having it reviewed by an experienced liver pathologist.

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Awareness about Pre-Conception and Pre-Natal Diagnostic Techniques (PCPNDT) Act among The Married Women: An Observational Cross Sectional Study

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Abstract

Foetal sex determination and sex-selective abortions by medical professionals has grown today into a thousand crore industry. In the Pre-Natal Diagnostic Technique (Regulation and Misuse) Act, 1994 amendment was done and titled as Pre-Conception and Pre-Natal Diagnostic Technique (Prohibition of sex selection) Act (PC-PNDT ACT) 2003 for improvement in technology-related sex determination regulation.

Aims and Objectives: 1. To find out awareness about PCPNDT Act among the married women in the community and to determine their sociodemographic factors influencing this awareness. 2. To assess the reasons for gender Based family composition and violation of laws.

Materials and Methods: A hospital-based observational study was carried out among the married women in the reproductive age group attending Dr. Vithalrao Vikhe Patil Memorial Hospital in Ahmednagar District. The 100 study participants were administered a preformed questionnaire of about ten questions on the PCPNDT Act. The data obtained was analyzed and expressed in percentage, and statistical analysis was done.

Results: The majority of the participants (81%) were aware of the act amended by the Government for the prevention of female feticide. A large number of participants (60%) would prefer to know the sex of their unborn child, and also 9% of them would terminate the pregnancy if the sex was revealed to be a female. A large number of participants (85%) were aware that there is punishment for both doctors who facilitate and patients who seek pre-natal sex determination.

Conclusion: The study found that most of the participants were aware of the possibility and techniques of pre-natal sex determination. More than half of the participants were aware of the law enacted by the Government. Still, they should be educated about the importance of maintaining the falling sex ratio and prevention of female feticide.

Keywords: Pre-Conception; Pre-Natal; Female feticide.

Introduction

In recent years, the child sex ratio has fallen significantly. Census 2011 shown that the child

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sex ratio in India is about 933 females against 1000 males.¹ The falling sex ratio is signaling precipitation of demographic catastrophe in India. This ratio is not natural; it's man-made,done bydiscriminatory sex determination to get rid of the female child, early female child death due to purposeful negligence and infanticide. With the advances in technology, sex determination has become easier very early during pregnancy with fatal consequences for the girl child. Female feticide does not have any societal and financial boundaries. Even the educated, urban, and wealthy people too often nurture a desire for a male child and abort female fetuses.² To curb the sex-selective abortions and for controlling the falling sex ratio, the Government has implemented the Pre-Conception and Pre-Natal Diagnostic Techniques (PC-PNDT) Act, 2003. The Pre-Conception and Pre-Natal Diagnostic Techniques Act of 1994 and 2003 has been in place to regulate an age-old and persistent social problem of female feticide in India.³⁴

Considering the above background, the study was conducted among the married women in the community to assess their awareness regarding the PC-PNDT Act.

Materials and Methods

An observational cross-sectional study was carried out in a tertiary care hospital. A study with a sample size of 100 with the Proportional Quota Purposive Non-Random Sampling Method was carried out with a Questionnaire. The Questionnaire was specially designed for the study and validated by the Subject Expert.

Inclusion criteria:

1. Married women in the age group of 18 to 45 years.

2. Willing to participate in the study and given informed consent.

Exclusion criteria:

1. Women who are unmarried.

2. Married women below the age of 18 years and above 45 years.

The study was conducted in Dr. Vikhe Patil Memorial Hospital in Ahmednagar, Maharashtra. The study was started after the approval of the Institutional Ethical Committee (IEC). The data was collected by a preformed Questionnaire using Google Forms. The data obtained after the survey was analyzed statistically under expert guidance. The confidentiality of research data and the identity of an individual is maintained according to the ICMR Guidelines.

Result

A total of about 100 married women were assessed for their awareness and attitude about Pre-Natal sex determination and the PC-PNDT Act. The participating women were of the age group 15 to 45 years. Most of the participants taking part in the survey were from the rural areas (85%), out of which 58% of participants were educated and had completed SSC. Our study shows that the majority of the participants(80%)were aware of thepossibility of prenatal sex determination, and out of theremaining 20% participants, 12% of participants believed that pre-natal sex determination is not possible. (Graph 1)





Media was the primary source of information (63%), followed by friends or relatives (20%) and Healthcare Professionals (17%). About 54% of participants were aware of Ultrasonography (USG) as a method of prenatal sex determination. Out of the total participants, a considerable number of them (60%) prefer to know the sex of their unborn child, out of which 9% of them would terminate the pregnancy if the sex of the unborn child is revealed to be a female. (Graph 2)



Graph 2: Opinion about the sex determination of unborn child & termination of pregnancy if female child.

About 55% of participants believed that prenatal sex determination could be done in Private Hospitals. In comparison, the rest (45%) believed that it could be done in both Government as well as Private Hospitals.

^{1.} Are you aware about the Act for prevention of Female Feticide enacted by the Government?

- Yes 81%
- No 19%

2. Is Pre-Natal sex determination punishable?

- Yes 89%
- No 11%
- 3. Who will be punished?
 - Doctors who facilitate pre-natal sex determination 8%
 - Parents who seek pre-natal sex determination 7%
 - Both 85%

4. Punishment for Doctors?

- Imprisonment 64%
- Fine 28%
- Both 8%

Discussion

In India highest female infanticide incidents occur.At least 117 million girls around the world demographically go "missing" due to sex-selective abortions. Various theories have been proposed as possible reasons for sex-selective abortions. Culture is favored by some researchers,⁵ while some favordisparate gender-biased access to resources.6 Natural reasons may also explain some of the abnormal sex ratios.7,8 With the increasing availability of sex screening technologies in India, the PC-PNDT Act, 1994 (amended in 2003) prohibits sex-selection or disclosure of the sex of the fetus. It also prohibits the sale of "any ultrasound machine or any other equipment capable of detecting sex of the fetus" to persons, laboratories, and clinics not registered under the Act. However, the enforcement of the law is not that strong, and also the easy access to USG fails to curb this practice. Male child preference is deeply embedded in the culture of various countries like India. Son preference has led to post-natal discrimination as well against girls, which ranges from infanticide to neglect of healthcare and nutrition, often ending in the premature death of the females. But why should there be gender preferences in modern societies? When children are no longer a source of economic security, they no longer provide economic net utility, but rather lead to significant time and monetary costs?

Conclusion

Although the awareness about the PC-PNDT Act looks satisfactory in the current study, the fact that various regulations regarding the act and its amendments might not have been percolated into the community cannot be ruled out.The research shows that even though a majority of them were aware of the Act enacted by the Government and pre-natal sex determination is a punishable offense, more than half of them would like to know the sex of their unborn child and 9% of them would terminate the pregnancy if the sex is revealed to be a female. Female literacy, coupled with women empowerment, will pave a long way in changing the mindset of the people, thereby reversing the downward trend of sex ratio. Thus, the active involvement of media, along with the participation of the community, will eliminate this social pathology of female feticide and gender discrimination.

Author's Contribution-We declares that this research project was done by the Authors named in the present article, and the authors will bear all liabilities pertaining to claims relating to the content of this article. The Author no 1 mentioned is involved in guiding, constructing the questionnaire, refining the article, and Author no 2 is involved in conducting the study.

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Autopsy findings in Kidney- A Plethora of Lesions for A Histopathologist

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Abstract

Introduction: Autopsy studies aid to the knowledge of pathology by unveiling some of rare lesions which are a source of learning from a pathologist's perspective. Perinatal autopsies form an integral part in providing a clue to ascertain the cause of perinatal deaths and to study the congenital anomalies. Kidneys being important organs in maintaining the homeostasis, are affected by a variety of lesions like congenital anomalies, neoplasms and infections apart from being secondarily involved by diabetes, poisoning and other systemic diseases.

Aims and objectives:

1. To determine the spectrum of histopathological findings of kidney in medicolegal autopsies.

2. To study the congenital anomalies and other lesions of kidney in perinatal autopsies.

Materials and Methods: A retrospective study of medicolegal cases (269) and perinatal autopsies (100) for six years were included. The gross and microscopic findings of the specimens were taken into consideration.

Results: Acute tubular necrosis (ATN) (51.16%) was the commonest histopathologic finding with the next common being changes secondary to diabetic nephropathy (16.27%). Others include hydronephrosis (13.9%), pyelonephritis (9.3%), multilocular cystic renal cell carcinoma (MCRCC), adult polycystic kidney disease (ADPKD), a case of coexisting pulmonary tuberculosis with liver cirrhosis and renal cell carcinoma (RCC) and a case of tumor to tumor metastasis. Perinatal autopsies showed cystic renal dysplasia, renal agenesis, autosomal recessive polycystic kidney disease (ARPKD) and a hybrid lesion.

Conclusion: This study highlights the various incidental findings in medicolegal autopsies, which are imperative in academic and research purposes. Despite the growing complexity and dependence on newer diagnostic methodologies, the traditional role of histopathology in autopsy remains the gold standard.

Keywords: Autopsy; Cystic renal dysplasia; Hybrid lesion; Renal cell carcinoma; Tumor to tumor metastasis.

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Introduction

Post-mortem examination also known as autopsy, is a specialized surgical procedure consisting of thorough examination of a corpse to detect the manner and cause of death and also to evaluate any disease/injury if present. The purpose of autopsy is for either legal or medical reasons. Giovanni Morgagni first introduced the concept of clinicopathological correlation (CPC) and professor William Boyd in his unimitable style wrote

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"Pathology had its beginning on the autopsy table".¹ Post-mortem examination aid to the knowledge of pathology by revealing few of the rare lesions and kidneys being important organs in maintaining the body's homeostasis, are affected by a variety of lesions like congenital anomalies, neoplasms and infections apart from being secondarily involved by diabetes, poisoning and many other systemic diseases. Perinatal autopsies form an integral part of autopsy by providing a clue to ascertain the cause of perinatal deaths and also to study various congenital anomalies.^{2,3} This study describes the spectrum of kidney lesions encountered during medicolegal and perinatal autopsies.

Aims and objectives

- 1. To determine the spectrum of histopathological findings of kidney in medicolegal autopsies related or unrelated to the cause of death.
- 2. To study the congenital anomalies and other lesions of kidney in perinatal autopsies.

Materials and Methods

A retrospective study of medicolegal and perinatal autopsies for six years from 2008-2013 was conducted in the Department of Pathology, JSS Medical College, Mysuru, Karnataka. A total of 269 medicolegal autopsies and 100 fetal autopsy cases were received for histopathologic examination. Kidney specimens were received either as a part of examination of multiple viscera/fetus, or only kidney was sent for pathological examination in 10% formalin. Representative bits were processed in a routine manner. All sections were stained with hematoxylin and eosin (H & E) and special stains were used as and when required. The gross and microscopic findings of the specimens were taken into consideration to establish the presence of lesions and also to type them in relation to the age and sex of the cases.

Results

Our study included a series of 269 medicolegal and 100 perinatal autopsies from JSS Academy of Higher Education and Research, Mysuru, conducted over a period of six years. A total of 76 kidney specimens were studied, out of which 19 (25%) were normal and 14 (18.4%) were autolysed. Histopathological lesions were seen in 43 (56.5%) kidney specimens (Table 1), out of which 22 cases (51.16%) showed features of acute tubular necrosis, 7 (16.27%) cases showed changes secondary to diabetic nephropathy, 5 (11.6%) cases of hydronephrosis, 4 (9.3%) cases of pyelonephritis, one case each of renal cell carcinoma and multilocular cystic renal cell carcinoma, a case of coexisting pulmonary tuberculosis with liver cirrhosis, one case of adult polycystic kidney disease, one case of renal cell carcinoma and a case of tumor to tumor metastasis (adenocarcinoma of stomach metastasising to oncocytoma kidney).

Out of 100 cases of perinatal autopsies, 57 were normal, 35 were autolysed and 8 cases showed renal lesions. Among 8 cases with renal lesions 4 cases were showing features of cystic renal dysplasia, two cases of autosomal recessive polycystic kidney disease, one case each of renal agenesis and a case of hybrid lesion.

Among 43 cases with kidney lesions, 28 specimens were from males (65.1%) and 15 (34.9%) from females in adult autopsies (Table 2), and age group ranged from 19 years to 81 years.

Among perinatal autopsies, there were 5 male and 3 female fetuses with gestational age ranging from 20 weeks to 32 weeks. All 8 cases of perinatal autopsies were performed following pregnancy termination due to prenatal detection of congenital anomalies.

Causes of death in adult autopsies were road traffic accident (RTA) in 61 cases, poisoning in 13 and hanging in 11 cases. There were 1 case each of burns and myocardial infarction, 2 cases of unidentified bodies. Cause of death was not established in 2 cases.

Table 1: Showing various	kidney	lesions	in	medicolegal	and
perinatal autopsies.					

S. No.	Histopathological Findings	Indication for autopsy	No.of cases
1	Acute Tubular necrosis	RTA, poisoning, snake bite	22
2	Diabetic Nephropathy	RTA, hanging, myocardial infarction	7
3	Pyelonephritis	RTA, hanging, burns	4
4	Hydronephrosis	RTA, hanging, unidentified body	5
5	Tumor to tumor metastasis Gastric adenocarcinoma metastasizing to oncocytoma of kidney	Poisoning	1
6	Lungs- Tuberculosis Kidney - Clear cell RCC Liver cirrhosis	RTA	1
7	RCC	RTA	1

8	MCRCC	Organophosphorus Poisoning	1
9	ADPKD	RTA	1
Peri	natal Autopsy		
1	ARPKD	Termination of pregnancy	2
2	Cystic Renal Dysplasia	Termination of pregnancy	4
3	Hybrid Lesion	Termination of pregnancy	1
4	Renal agenesis	Termination of pregnancy	1

Table 2: Showing sex incidence of renal lesions.

	Male	Female	Total cases
Adult autopsy with kidney lesion	28 (65.1%)	15 (34.9%)	43
Perinatal Autopsy with kidney lesion	5	3	8

Discussion

The incidental renal masses in our study comprised of oncocytoma, adult polycystic disease of kidney, multilocular cystic renal cell carcinoma and two cases of renal cell carcinomas. The incidentally discovered oncocytoma was a rare case of tumor to tumor metastasis in a 68 year old male, with history of snake bite. The patient had nodular lesions of adenocarcinoma in the stomach metastasizing to oncocytoma of kidney confirmed by histopathology immunohistochemistry. Although and the coexistence of two or more primary neoplasms in the same patient is sometimes observed, tumorto-tumor metastasis is a rare phenomenon with less than 100 cases being reported in the English literature.⁴ Campbell et al., described four criterias for the diagnosis of a tumor-to-tumor metastasis: a) there should be more than one primary tumor, b) the recipient tumor should be a true benign or a malignant neoplasm, c) the metastatic neoplasm should be a true metastasis with established growth in the host tumor, not the result of contiguous growth (collision tumor), and d) neoplasms that have metastasized to the lymphatic system where lymhoreticular tumors already exist are excluded.⁴ The above case fits all the four criterias. Several properties of the host, such as its anotomical place, its vascularity and the local potential for immune reaction against the metastasizing cells, may play a significant role.⁵ (Fig. 1).



Fig. 1: a) Left kidney with a nodule on the surface(arrow), **b)** Cut section of stomach displaying grey white nodular lesions, **c)** Sections from kidney showing metastatic adenocarcinoma (H&E, x100), **d)** Sections showing oncocytoma (H&E, x 200).



Fig. 2: a) Showing cavitatory lesions in both the lungs, **b)** Showing nodular liver, **c)** Showing well circumscribed lesion in lower pole of Rt. Kidney, **d)** Showing caseating granuloma with Langhan's giant cell (H&E, x100), **e)** Showing cirrhotic parenchymal nodules with bridging septae (H&E, x100), **f)** Showing features of clear cell RCC (H&E, x 200).

Another case was a 40 year old male, admitted in a private hospital with the history of massive hemoptysis while riding a motor cycle. He died two days after admission and was subjected to postmortem examination in our hospital. On Autopsy, Cavitatory lesions were seen in both the lungs with a nodular liver and a right kidney with grey white well circumscribed lesion m/s 2.5 x 2.0 cm in the lower pole. Microscopy revealed tuberculosis of lungs with cirrhosis of liver and clear cell renal cell carcinoma of kidney.⁶ (Fig. 2). Tubercular changes in lungs are noticed in 8.89% cases on histopathology. Most of the chronic liver diseases even in advanced stages may cause no prominent clinical signs and symptoms and are diagnosed only during autopsy. The number of renal masses, both benign and malignant discovered only at autopsy is declining and the incidence is 1%.

Yellow phosphorus is a highly toxic substance found in rodenticides and fire crackers which mainly



Fig. 3: a) Proximal tubular epithelial cells showing diffuse cytoplasmic vacuolation (H&E, x200), b) Glomerular epithelial cells displaying cloudy swelling (H&E, x100).



Fig. 4: a) Cut section of kidney showing cysts of varying sizes, b) Microscopy showing cyst wall lined by flat to cuboidal epithelial cells ((H&E, x100).

affects the liver. However, its effects on kidney are not well documented in literature. Ingestion of phosphorus causes osmotic tubular injury, a non specific morphological pattern characterized by cytoplasmic vacuolation and associated with ingestion of hyper oncotic solutions. In addition, it can cause fatty degeneration of tubular epithelial cells, hyaline change in vessels and desquamation of glomerular epithelial cells.7 An 18 year old male under treatment for jaundice, was admitted with a history of consumption of rat poison. The patient expired after two days where the liver enzymes (SGOT & SGPT) were elevated and serum creatinine was 4%. On autopsy, yellowish discolouration was seen all over the body. Multiple bits of cerebellum, liver and kidney received showed yellowish discolouration with haemorrhagic areas. Microscopy of kidney displayed predominantly affected proximal tublular epithelial cells with diffuse cytoplasmic vacuolation and cloudy swelling of glomerular epithelial cells with no significant interstitial inflammation/tubulitis. (Fig. 3).

Toxic tubular injury can be caused by a number of exogenous and endogenous agents, which result in a more widespread form of injury than the ischaemic form.

A case of Autosomal dominant polycystic kidney disease was identified in the postmortem examination of a 45 year old male after death from road traffic accident who was asymptomatic during his life.(Fig. 4).

The case of MCRCC was identified in a 38 year old male autopsied after alleged consumption of organophosphorus compound where, the right kidney showed an expansile lesion comprising of multiple thick gelatinous fluid filled cysts and septae surrounded by fibrous pseudocapsule and on microscopy, cysts of varying sizes were seen separated by intervening septae, lined by aggregates of epithelial cells with clear cytoplasm characteristic of MCRCC. (Fig. 5)

Another very interesting case of our study was a hybrid lesion,noted in the perinatal autopsy of a fetus of 24 weeks of gestation where pregnancy



Fig. 5: a) Cut section of kidney showing multiple cysts filled with gelatinous fluid, b) Microscopy showing cyst wall lined by tumor cells with clear cytoplasm and moderately pleomorphic nuclei (H&E, x 200).



Fig. 6: a) USG abdomen showing vascular supply from aorta, **b)** Cut section of supra adrenal mass with tiny cysts, **c)** Normal looking kidney with a cystic lung (H&E, x200), **d)** Lung tissue with numerous cysts and dilated bronchioles (H&E, x100).

was terminated following detection of a left supra adrenal mass by anomalous scan, where it showed a solid homogeneous left supra adrenal mass. Microscopy displayed lung tissue with numerous uniform cystic spaces lined by cuboidal to columnar cells, dilated bronchi and bronchioles, with absence of cartilage and skeletal muscle. Lungs and other organs were normal in location, appearance and on microscopy. It was diagnosed as extralobar intra abdominal, broncho pulmonary sequestration with acystic adenomatoid malformation of the sequestered lung (Hybrid lesion). (Fig. 6).

Cystic adenomatoid malformation of the sequestred lung is defined as a developmental mass of nonfunctioning bronchopulmonary tissue that is separate from the tracheobronchial tree and recieves arterial blood from the systemic circulation that is



Fig. 7: a) Microscopy of kidney showing radiating cysts (H&E, x100), b) Microscopy of kidney with cysts lined by flattened to cuboidal epithelium (H&E, x200).

either from thoracic or abdominal aorta. They are of two types: Intralobar (75–85%), usually acquired rather than congenital and Extralobar (15–25%), prenatally diagnosed associated with congenital anomalies. It is a rare lesion with incidence of 0.15 - 6.4% of all congenital pulmonary malformations. Extra lobar sequestration is believed to result from abnormal budding of the primitive foregut. Intralobar sequestration occurs due to bronchial obstruction that results in distal infection and the recruitment of a systemic arterial supply through pleural granulation tissue. Arterial supply is from Thoracic / abdominal aorta and venous drainage is either to azygous system, inferior venacava or to pulmonary veins. Prenatal diagnosis can be made by sonography as early as 16 weeks of gestation, where it appears as solid well-defined triangular echogenic mass and Color Doppler is valuable in visualising the feeding artery. Hybrid lesions as mentioned above are a combination of congenital cystic adenomatoid malformation with bronchopulmonary sequestration and suggest that they share the same developmental ancestry and perhaps represent two ends of a broad spectrum of pathology.8 (Fig. 7)

Our study revealed five incidental renal masses accounting for 11.3 % of the histopathological findings. In a study of 650 cases of autopsy by Shah VB, 5 cases of renal masses were detected incidentally (less than1%), which included MCRCC.⁹ Incidence of MCRCC is very rarely reported in literature. These cases were asymptomatic and had no symptoms related to the masses and the causes of death were unrelated to the renal masses.⁹ In a study of incidental renal cell carcinomas (RCC), 110 tumors were diagnosed at autopsy with a rate of 7.1/1000 autopsies.¹⁰ We encountered 2 cases of incidental renal cell carcinomas with a rate of 2/269 autopsies. ADPKD, the most common hereditary kidney disorder, affects approximately 1/1000 living people with an incidence of 1:500 in autopsy series.¹¹ In our series incidence rate of ADPKD was 1:269.

Conclusion

From our study we conclude that acute tubular necrosis was the commonest histopathologic finding with the next common being changes diabetic nephropathy secondary to and hydronephrosis. Histopathology in autopsy plays a vital role in the study of some of the rare neoplastic lesions contributing to the knowledge of pathology. This study also highlights the various incidental rare cases in medicolegal autopsies, which are imperative in academic and research purposes. Histopathology would not have been necessary for some of these conditions during a life time but an incidental finding in autopsy has unveiled the histopathological changes that help in the understanding of disease processes which are otherwise rare for a pathologist to encounter in the day to day specimens. Such retrospective and prospective studies also provide an insight into the true prevalence of diseases or lesions. Despite the growing complexity and dependence on newer diagnostic methodologies, the traditional role of histopathology in autopsy remains as important as it had been in the past. A sound knowledge of gross changes in different diseases is essential to request for histopathological examination and a forensic trainee should have basic knowledge of histopathology so that histopathological examination can be asked wherever necessary.

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Reliability of Post Mortem Pericardial Fluid Troponins for Diagnosis of Myocardial Infarction

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Abstract

Introduction: The purpose of this study was to evaluate the diagnostic role of postmortem pericardial fluid cardiac troponins in cases of sudden cardiac death and to determine its significance.

Methods: This study included totally 30 cases, of which 23 were cases of sudden cardiac death and 7 were control cases. In the following cases, along with age, gender, as well as circumstance of death, level of cardiac troponin I In pericardial fluid, cytological analysis of the fluid as well as post mortem findings of the coronary arteries were all analyzed. Levels of troponin I were assessed with the help of a rapid card test which worked on the principle of sandwich immunoassay. It detects a minimum amount of 0.5ng/ml of cTnI in samples.

Results: In the 30 cases among which the study was conducted, the mean age was 44 years of age, with the majority of the cases lying between the ages of 41–50 (37%). It was also found that the majority of them were males (86.7%) as compared to females (13.3%). The mean time interval between death and sample testing came up to 11 hours, with the majority of the cases being between 16–20 hours time interval (37%). On correlation of rapid card test results and gross post mortem findings, the test showed a sensitivity of 86.7% and specificity of 20%.

Conclusion: From statistical analysis it could be inferred that the frequency of MI was more in males than females, and in the age group of 41–50. The rapid card test had an appreciable sensitivity, but the specificity inferred there could be various situations in which there could be elevated troponins in pericardial fluid. This infers that while a case of myocardial infarction has a higher chance of showing elevated levels of cardiac troponin in pericardial fluid, a case of sudden death can not be reliably diagnosed as AMI on the basis of elevated troponins alone. There must be correlation between clinical, histopathological and cardiac marker findings.

Keywords: Myocardial infarction; Pericardial fluid; Cardiac troponin; Post mortem.

Introduction

Sudden death is one of the most common cases received by any forensic department, in which the dead body is obtained almost immediately after death. The most common cause of this is MI, as

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its mortality rate is almost equal to or more than 50%. Sudden death is defined as a natural, rapid and unexpected event occurring in an hour or less than an hour from the onset of clinical occurrence in people with unknown or known illnesses in apparently healthy condition.

Myocardial infarction occurs when myocardial ischemia, a diminished blood supply to the heart, exceeds a critical threshold. If ischemia is maintained at this critical threshold level for an extended period, the result is irreversible myocardial cell damage or death. Critical myocardial ischemia can occur as a result of increased demand for the metabolic requirements of the myocardium, insufficient

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oxygen and nutrients supplied to the myocardium via the coronary circulation, or both.¹ Myocardial infarction is known to be most commonly caused by atherosclerosis and subsequent thrombosis of the coronary arteries supplying the myocardial muscle. Significant coronary artery stenosis, defined by invasive coronary angiography, is taken to be >50% decrease in lumen diameter in the left main stem, >70% in other arteries, or between 30–70% with fractional flow reserve <0.80.²

The development of an atheroma in the coronary arteries, the rupture of "vulnerable plaques" and the cascade of thrombotic events that follow result in the thrombosis of the artery thus compromising the blood supply to the heart leading to a state of infarction. A vulnerable plaque is defined as a plaque which as compared to other plaques, has higher chances of rupturing and triggering thrombotic events.³

Determining cause of death and proving with utmost certainty that the deceased had died of means other than natural causes, are the most important tasks a forensic specialist can perform during the course of an autopsy. There are certainly cases of sudden death which cannot be confirmed to be cases of MI due to lack of definite gross or histological evidence. On top of that, microscopically visible lesions require 6 hours of survival after the coronary event. And for changes to be appreciated macroscopically, minimum 12 hours of survival is required after the acute coronary event. In such cases, where cause of death cannot be determined, myocardial biomarker estimation can be utilised to confirm or exclude MI. There may even be scope for cardiac troponins in the determination of severity of MI as well as prognosis.4

Atherosclerosis of the arteries supplying the blood to the heart is what ultimately leads to ischemia and ultimately infarction. accordingly, looking at the degree of the blockage of the coronary arteries on gross examination constitutes a major part in the detection and diagnosis of MI. Studies have established that coronary microvascular disease (CMD)is an early form of atherosclerosis which ultimately builds up to lead to obstructive coronary artery disease.⁵

Cardiac biomarkers

It has been known for some time that troponins are a marker of myocardial necrosis. However, the exact mechanism behind their release is not yet exactly known. Various means of release have been suggested, such as myocyte necrosis, apoptosis, myocyte turnover, increased cell membrane permeability, intracellular release of degradation products or even via formation of blebs of the cell membrane.⁶ Selection of a biomarker: 1) it should be abundant in the myocardium and not present in other tissues. 2) it should have a low or undetectable concentration in the blood in the absence of disease.: 3) adequate and timely release when myocardial damage occurs 4) it should remain detectable in the circulation so as to give a convenient diagnostic window, but not so long as to prevent the detection of complications such as early re-infarction, and 5) high analytical sensitivity and specificity and a short turnaround time.7 (Fig. 1) Cardiac troponin T and troponin I are the most specific and sensitive laboratory markers of myocardial cell injury, and therefore are integral for the diagnosis of myocardial infarction.8 Studies have shown that along with electrocardiography and CK-MB levels, troponins can be a reliable measure of diagnosis as well as risk stratification in MI patients.



Fig. 1: Cardiac enzyme level variations over time (From "Biomarker of necrosis and cardiac remodelling").

Traditionally, for post mortem myocardial bio marker evaluation (when post mortem interval<48 hours),⁹ blood is used. However, significant clotting of the blood sample may occur in the post mortem interval, which may affect values. Using post mortem blood for biomarker analysis also presents its own practical problems, especially during aspiration of the samples. Previous studies have also indicated that cardiac troponin tests were made keeping in mind the utilization of live subject serum for the same, and is unsuitable for postmortem blood.¹⁰

Estimation of these markers in pericardial fluid, which does not clot over time, eliminates this factor of error. **Objectives of Study**

- to analyse the sensitivity and specificity of the rapid card test for cTnI
- to determine the reliability of rapid card test for post mortem diagnosis of MI in cases of sudden death

Materials and Methods

The source of data was 30 cases of sudden onset death of post mortem interval less than 48 hours from the mortuary of Victoria Hospital, attached to Bangalore Medical College and Research institute. A cross sectional study was conducted from the period of July 2017 to March 2019.

Inclusion criteria: cases of sudden death of unknown cause, with post mortem interval being less than or equal to 48 hours.

Exclusion criteria: cases where post mortem interval is more than 48 hours.

After obtaining clearance and approval from the Institutional Ethics Committee, the following study was carried out in Victoria Hospital Bangalore, a tertiary health center which is affiliated to Rajiv Gandhi Institute of Health Sciences (RGUHS). The samples were collected from the dead bodies at the Department of Forensic Medicine mortuary, where the bodies are subjected to autopsy, and the tests are conducted in the Department of Pathology, BMCRI.

Date of obtaining ethical clearance: 06.07.2017

Pericardial fluid samples were obtained by aspiration of the fluid from the pericardial sac of cadavers for which autopsy was done, by the following procedure;

After the ribs were cut and removed to expose the heart in the pericardium as part of the routine autopsy procedure, a small nick was made in the pericardial sac near the apex of the heart with a scissor. The pericardial fluid (about 30–50 ml will be present) was aspirated with a sterile needle and syringe. Around 10ml of pericardial fluid was aspirated.

The samples were subjected to the troponin I rapid card test immediately after extraction from the subject, and results were obtained within 5–10 minutes.

The rapid card test used is of the name "i-tell", a cTnI one step troponin device (mfd by Abo biopharm).

The "rapid card test" method is used to detect the cardiac troponin I in the pericardial fluid samples. This test can be conducted with plasma, serum and whole blood samples.

"Rapid card test" is based on the specificity of the immunochemical reaction between antigens and their corresponding antibodies, for the detection of substances in any fluid sample. Rapid troponin cards are based on the principle of sandwich immunoassay. This test can detect a minimum amount of 0.5ng/ml of cTnI in specimens.

The sample was added to the 'sample pad', which then moves through the conjugate pad. If there are sufficient levels of the cardiac troponins, it combines with conjugate containing the respective antibody (anti-cTnI). The mixture of conjugate and troponin moves towards the test region and reacts with the anti-cTnI antibody coating the test region, thus forming a colored band. A positive card test indicates a sufficiently raised level of cardiac troponin I, which is indicative of Myocardial infarction. A negative card test shows only the control line, (Fig. 2a). a positive test shows 2 lines, the control line and the test line. (Fig. 2b)



Fig. 2: (a) Negative rapid card test showing only "control" line. (b) Positive rapid card test showing both "control" and "test" lines.

Once the rapid card test was done with the pericardial fluid sample, the postmortem gross findings in the heart were noted. This was in terms of the percentage of blockage in the coronary arteries; and these findings were correlated with the rapid card test (RCT) results and analysed.

Results

Total number of cases: 30



Mean age of the study participants : 44.03 ± 15.49 *years (Fig. 3)*

Fig. 3: Mean age of the study participants.

Sex distribution of the study participants



Table 1: Sex distribution of the study participants.

Graph 1: Sex distribution of the study participants.



Mean time interval in hours = 16.5 hours

Fig. 4: Time interval in hours among the study participants.

Comparison with rapid card test with significant blockage in coronary arteries.

Out of 30 cases of sudden death, 25 of them showed troponin I elevation.

Out of these 25 cases, 13 cases showed gross evidence of coronary artery blockage. These make up the true positive findings of the study.

The remaining 12 cases which showed troponin I elevation but had no evidence of coronary artery blockage are the false positive findings.

Out of 30 cases, 5 cases showed no elevation of troponin I levels. Out of these 5 cases, 2 showed evidence of coronary artery blockage. These will be considered as the false negatives of the study. The remaining 3 cases which did not show evidence of coronary artery blockage are the true negative findings of the study. (Table 2)

Table 2: Comparison of rapid card test with significant blockage with vessels.

		Significan		
		Present	Nil	Total
Rapid Card Test	Positive	13 (a)	12 (b)	25
	Negative	2(c)	3(d)	5
Total		15	15	30

(a) would be the true positives (positive RCT in cases with evidence of significant coronary artery blockage).

- (b) would be the false positives (positive RCT with no evidence of significant blockage).
- (c) would be the false negatives (negative RCT with evidence of significant blockage.
- (d) would be the true negatives (negative PCR with no evidence of significant coronary artery blockage).

Pearson's Chi –*square* – 34.272 p = <0.0

- (a) Sensitivity -86.67%
- (b) Specificity 20%
- (c) Positive predictive value -52.00%
- (d) Negative Predictive Value 60.00%
- (e) Accuracy 53.33

Discussion

After collecting the pericardial fluid sample and post mortem findings of the patients fitting in the specified criteria over the designated time period, various features were observed. One was the clear gender predisposition, with approximately 87% of the cases being male. (Table 1) The mean duration of the time interval between time of death and time of sample testing came to around 16.5 hours (Fig. 4). The criterion used in this study fixed the ideal time limit as upto 48 hours from time of death. Studies done by Fox et. al, C. Barberi et. al, Alpert et. al have shown that the levels of cTnI (as well as that of cTnT) are most commonly raised from around 4–9 hours after MI, peaking at 12 to 24 hours.^{11–13} According to a study done by C. Barberi et al, it was concluded that after a post mortem interval of 48 hours, the cTnT levels in PCF and peripheral blood were not reliable as they showed slight post mortem elevation after that.12 According to a study by Zhu BL et al, post mortem time dependant increase of cardiac troponin was most evident in AMI and asphyxiation.¹⁴ The effect of time interval upon the level of troponins in serum emphasise the role it could play in post mortem diagnosis of MI and estimation of time and mechanism of death. It may also have implications in the area of ACS diagnosis and prevention.

After compiling and analysing the results of the rapid card tests for detection of troponin I in the given sample size, a sensitivity of ~86.67% and a specificity of 20% was obtained. This varies significantly from other studies conducted with rapid card tests for cardiac troponins in post mortem pericardial fluid. According to a study done by Zhipeng chao et. al, elevated levels of troponins have also been seen in cases such as hyperthermia, renal failure, cerebrovascular disease, drowning, carbon monoxide poisoning, as well as others, their study showed that statistically cTnT levels were higher in those with acute myocardial infarction.⁴

As such, elevated cardiac troponin levels solely cannot be relied upon to conform a diagnosis of AMI and needs to be substantiated with clinical/ histopathological evidence. Similarly, there may be cases in which all the evidence points towards Mi but without elevated troponin levels. The period between initiation of ischemia and time of death is also significant as it determines whether the troponins released from the cardiac myocytes reach the pericardial fluid after circulation and ultrafiltration of plasma or via direct diffusion into the pericardial fluid. However this data was difficult to retrieve due to the circumstances of the cases.

There are several contradictory findings regarding the positive correlation between detection of cardiac troponins in pericardial fluid, and incidence of MI. A majority of conducted related studies have reiterated the usefulness of troponin estimation in diagnosis of cardiac death, but are inconsistent with respect to the specificity and diagnostic value.^{4,6-8,14} In view of these contradictory findings, this study was an effort to obtain a result in this regard, in our community of Victoria Hospital, a tertiary care centre.

Conclusion

After conducting this study, the following conclusions were reached:

• While estimation of troponin levels in pericardial fluid has a reliable sensitivity, its specificity is such that it cannot be used for the exclusive diagnosis of AMI. If used it must be supplemented by clinical and histopathological evidence.

Limitations of Study

- Inability to retrieve data on the time interval between initiation of ischemia and time of death.
- Lack of data on the histopathological findings of the myocardial tissue so as to confirm presence of infarction as biopsies could not be carried out for all cases.

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Hematological Profile in Patients of Chronic Kidney Disease in a Tertiary Care Centre in South India

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Abstract

Background: Chronic kidney disease has increased rapidly in the world, especially in developing countries like India, due to increase in Diabetes mellitus, Hypertension etc. Besides, symptomatology in such patients, laboratory parameters like Hematological, Biochemical etc are important in establishing diagnosis in such patients. Often, importance is paid to Biochemical parameters and Hematological parameters are neglected. Hematological parameters play a pivotal role in prognosis of these patients.

Aim: The main aim of this study is to assess the hematological parameters in patients of Chronic Kidney disease and to assess their effect post dialysis.

Materials and Methods: This is a cross sectional study done on 64 patients of chronic kidney disease and on maintenance of dialysis. The study was carried out in Hematology section of Central Laboratory, Mahatma Gandhi Medical College and Research Institute,Pondicherry from January to July 2020.

Results: Out of 64 patients of Chronic Kidney disease, 47 (73.4%) patients were males and 17 (26.5%) patients were females. Majority of the patients were from the age group 41-60 years (76.5%), followed by the age group 21-40 years (18.7%). The major cause of Chronic Kidney disease was patients suffering from both Diabetes mellitus and hypertension accounting to 63 %, followed by Diabetes mellitus alone 25% and Hypertension alone 12%. (Graph 1) The hematological parameters before and after dialysis were anaemia, otherwise other parameters were within normal limits. The peripheral smear examination of all these patients, out of which 52(81.2%) patients showed Normocytic Normochromic anaemia and 12 (18.7%) patients showed (Graph 2) Microcytic hypochromic anaemia. Peripheral smear examination of Normocytic Normochromic anaemic patients showed evidence of hemolysis post dialysis in 28 patients. 12 patients showed fragmented red blood cells(schistocytes) alone, 7 patients showed microspherocytes alone and 9 patients showed both fragmented red blood cells and microspherocytes. Peripheral smear picture was more or less similar pre and post dialysis, except the parameters improved after the dialysis.

Conclusion: Chronic kidney disease is a serious health ailment, which requires careful monitoring of all the parameters, not merely the kidney function tests, but also the hematological parameters, which affect the prognosis of the condition of the patient.

Keywords: Hematological parameters; Chronic kidney disease; Anaemia.

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Introduction

Chronic Kidney disease has been a global health issue in the present world, especially in developing countries like India. Recent studies say that Chronic Kidney disease occupies the third place in the worlds disease burden. End stage renal disease is the grave stage of Chronic kidney disease ,where the kidney function is irreversibly damaged and there is loss of maintenance and fluid and electrolyte balance.¹ It is characterized by the decrease in GFR (Glomerular Function Rate) and less than 10% function nephrons. In such patients,treatement strategies like Hemodialysis are done,to maintain electrolyte balance.² Hemodialysis is a very meticulous treatement modality, where careful monitoring of electrolytes are warranted.³

In patients with chronic kidney disease, many changes in hematological and biochemical parameters occur. Anemia of chronic disease is one such sequalae occurring in such patients, as a result of diminished Erythropoietin secretion, which precipates diminished red cell production and thereby culminating in anaemia of chronic disease.⁴ Other causes may be due to blood loss, hemolysis and bone marrow suppression due to uremia. Hemodialysis itself can precipitate hemolysis in these patients. Besides, anaemia of chronic disease, other nutritional anemias like anemias due to vitamin B₁₂ and folate deficiencies also occur. Secondary hyperparathyroidism which is another sequela of chronic kidney disease, also precipitate anemia.⁵ Variations in total leucocyte count are seldom encountered in these patients, except when some underlying infection exists. Thrombocytopenia is commonly seen due to hemodialysis.6 Hypo and hypernatremia, Hypo and Hyperkalemia, Hypocalcemia etc are few other biochemical abnormalities seen in these patients.7 Studies also show some metal toxicity in these patients, as proximal convoluted tubule is responsible for reabsorption of such metallic ions. Hence, there are significant variations in hematological and biochemical parameters in these patients.8

There are very few studies on hematological and biochemical variations in such patients. The main aim of this study is to assess the hematological parameters in patients of Chronic Kidney disease and to assess their effect post dialysis.

Methodology

This is a cross sectional study done on 64 patients of chronic kidney disease and on maintenance of dialysis. The study was carried out in Hematology section of Central Laboratory, Mahatma Gandhi Medical College and Research Institute, Pondicherry from January to July 2020. The study was carried out on patients with established diagnosis of Chronic kidney disease. The blood samples were sent for Complete Blood Count and Peripheral smear examination and kidney function tests like serum urea, creatinine, levels of sodium, potassium and calcium. The blood samples for Complete Blood count were collected in EDTA vials, whereas, For the kidney function tests, serum was collected in red vial, which lacks any anticoagulant. The blood samples were collected by the routine technique of venepuncture in Outpatient, In patient and Dialysis units. The blood samples along with request forms were received in the respective sections like Hematology and Biochemistry. Request forms contained all the necessary details of patient, diagnosis, treating physician, name of the test required etc. Blood samples for complete blood count and run in Horriba Pentra DF Nexus and peripheral smears are made using Leishman stain. Kidney function tests like Creatinine, Urea and electrolytes are done by Jaffe method, Uricase and Isolyte methods. The hematological parameters are correlated with the peripheral smear findings and the reports are approved on the AOSTA (Laboratory Information System). All these data are maintained as a database in Excel sheet. Inclusion criteria included all patients above 15 years of age group. Exclusion criteria included those patients who had other diseases like malignancy, connective tissue diseases and congenital or acquaired blood diseases that could affect hematological parameters.

Results

Out of 64 patients of Chronic Kidney disease, 47 (73.4%) patients were males and 17 (26.5%) patients were females. Majority of the patients were from the age group 41–60 years (76.5%), followed by the age group 21–40 years (18.7%). Refer to the Table 1.

The major cause of Chronic Kidney disease was patients suffering from both Diabetes mellitus and hypertension accounting to 63%, followed by Diabetes mellitus alone 25% and Hypertension alone 12%. Refer to Fig. 1.

Effect of chronic kidney disease on hematological parameters and its relationship with hemodialysis: data presented in Table 2 shows that the RBC count, hemoglobin levels and platelets counts are significantly reduced in the patients of chronic renal failure and the process of hemodialysis further decreases the level of all the above mentioned hematological parameters.

All the 64 patients underwent peripheral smear examination, out of which 52(81.2%) patients showed Normocytic Normochromic anaemia and 12(18.7%) patients showed Microcytic hypochromic anaemia. Peripheral smear examination of Normocytic Normochromic anaemic patients showed evidence of hemolysis post dialysis in 28 patients. 12 patients showed fragmented red blood cells (schistocytes) alone, 7 patients showed microspherocytes alone and 9 patients showed both fragmented red blood cells and microspherocytes. Peripheral smear picture was more or less similar pre and post dialysis, except the parameters improved after the dialysis.(Fig. 4)

Table 3 shows biochemical parameters in patients of Chronic Kidney disease: pre-dialysis and post dialysis.

Table 1: Age and sex distribution of patients suffering from

 Chronic Kidney disease.

Age (N)	Male (N)	Female (N)	Total no. (N)
<20	02	01	03
21-40	09	03	12
41-60	30	11	49
>60	06	02	08
Total	47	17	64



Graph 1: Major cause of Chronic Kidney disease in the study.



Fig. 1: Microspherocytes in the peripheral smear.

 Table 2: Hematological parameters in patients of Chronic Kidney disease.

Parameters (N)	Control (Mean value) (N)	Pre- dialysis (Mean value) (N)	Post- dialysis (Mean value) (N)
Hemoglobin	12.5	7.4	8.1
Total RBC count	4.3	3.54	4.2
PCV	54	31.4	43.5
MCV	83.4	75.3	79.6
MCH	26.5	24.3	25.6
MCHC	28.4	26.4	27.4
Total Leucocyte Count	5.3	4.1	4.7
Neutrophils	63	62.2	62.7
Lymphocytes	26.7	24.3	25.4
Eosinophils	4.4	3	5
Monocytes	5.1	4.1	4.8
Basophils	0	0	1
Platelet count	2.31	1.45	2.21
ESR	21.4	16.3	21.2

Distribution of anaemia in Chronic Kidney disease patients on peripheral smear



■ Normocyic Normochromic anaemia Microcyic Hypochromic anaemia

Graph. 2: Distribution of anaemia in Chronic Kidney disease patients on peripheral smear.



Fig. 2: Normochromic Normocytic cells in the peripheral smear.

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Parameters	Control (Mean value)	Pre- dialysis (Mean value)	Post- dialysis (Mean value)
Blood Urea Nitrogen	4.4	4.2	4.36
Creatinine	0.3	0.26	0.29
Total Protein	4.3	4.06	4.27
Serum Albumin	2.3	2.1	2.3
Globulin	0.3	0.16	0.27
A/G Ratio	0.4	0.32	0.38
Sodium	124.5	113.4	123.7
Potassium	2.3	1.7	2.2
Chloride	82.4	76.7	81.8
Bicarbonate	15.6	12.4	14.7

Table 3: Biochemical parameters in patients of Chronic Kidney

Fig. 3: Microcytic hypochromic cells in the peripheral smear.



Fig. 4: Reticulocytosis in the supravital stain.

Discussion

In the present study, there has been decline in hematological parameters, which is also seen in all other studies. Many studies showed that Hemoglobin concentration, total red cell count and packed cell volume were decreased, which is seen in the current study too.⁹ This is because of reduced

erythropoietin production, thereby decreasing hemoglobin synthesis and red cell production.¹⁰ It is said that RBCs are decreased in uremic patients with proportion to the Blood Urea Nitrogen (BUN) and there is an improvement in the parameters post-dialysis.¹¹ With the increase in urea levels in serum, the expression of phosphatidyl serine on the outer cell surface in red blood cells are also increased and thereby causing phagocytosis of red blood cells by the macrophages.¹² Likewise, The red cell indices like MCV, MCH and MCHC are within normal limits in the study, denoting Normocytic Normochromic blood picture, although Microcytic hypochromic anaemias were also reported. Similar findings were seen in the study by Shastry I et al.13 (Fig.2)

Erythropoietin can decrease the platelet production also. Sometimes, dialysis can also cause thrombocytopenia.¹⁴ But in our study, platelet levels were not reduced-both pre and post dialysis. The present study more or less is in concordance with the study by Habib A et al.¹⁵

The total leucocyte count and the various cells in differential count were also almost within normal range in the current study. The present study more or less is in concordance with the study by Habib A et al.¹⁵ It is expected to have a spike in total leucocyte count with neutrophilic prepondereance, as Chronic kidney disease can trigger some inflammatory condition in such patients, triggering upregulation Tumor Necrosis Factor (TNF) and IL-6 levels, but with reduced lymphocyte count.¹⁶ But, in the present study,almost all the the cells in differential count are more or less within normal limits. This can be explained that, there are no any inflammatory conditions occurring in such patients.¹⁶

Peripheral smear findings were predominantly of Normocytic Normochromic anaemia with few smears showing schistocytes and microspherocytes, denoting some hemolysis due to dialysis. Few smears also showed Microcytic hypochromic anaemia too. Our study is more or less compatible with the study of Shastry et al and Sudhir et al.^{13,17}(Fig.3)

Conclusion

Chronic kidney disease is a serious health ailment, which requires careful monitoring of all the parameters, not merely the kidney function tests, but also the hematological parameters, which affect the prognosis of the condition of the patient.

disease.

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A Comparative Study of Expression of PTEN and p53 in Endometrial Hyperplasia and Carcinoma in a Tertiary Care Hospital

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Abstract

Context: A comparison of PTEN and p53 expression in endometrial hyperplasia and carcinoma.

Aims: To study the histomorphology and expression of PTEN and p53 markers in endometrial hyperplasia and carcinoma in histopathology samples.

Settings and Design: This is a comparative study done on 40 cases of endometrial hyperplasia and 20 cases of endometrial carcinoma.

Methods and Material: This is a 2 year study done on 40 cases of endometrial hyperplasia and 20 cases of endometrial carcinoma in a tertiary care hospital. Endometrial biopsies and resected specimens of uterus received at pathology department were grossed, processed and were stained by hematoxylin and eosin and examined by the pathologist. The expression of PTEN and p53 markers was evaluated on the diagnosed samples.

Results: Out of 36 cases of endometrial hyperplasia without atypia, 4 atypical hyperplasias and 20 endometrioid carcinomas, loss of PTEN expression was found to be 16.7%, 25% and 80% respectively, whereas expression of p53 was found to be 5.6%, 75% and 90% respectively in the same cases.

Conclusions: The loss of PTEN expression or positive expression of p53 in hyperplasias may be used as an early indicator of progression to carcinoma. The altered expressions of these markers are initiated in few cases of hyperplasia, which may progress to atypical hyperplasia, a premalignant lesion and ultimately develop into carcinoma.

Keywords: Endometrial hyperplasia; PTEN; p53; Endometrioid carcinomas; Immunohistochemistry.

Introduction

Endometrial carcinoma is the fourth most common malignancy in women. In the year 2018, in India, a total number of 13328 new cases of endometrial carcinoma and 5010 deaths were noted.¹ Endometrial carcinomas are classified as two types.

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Type I carcinomas account for 90% of endometrial carcinomas, are estrogen dependent and follow hyperplasia – carcinoma sequence²; whereas Type II carcinomas arise in an atrophic background.³

PTEN and p53 are the most commonly involved mutations which follow different carcinogenic pathways. The present study is to assess the expression of PTEN and p53 markers in endometrial hyperplasia and carcinoma.

Objectives

To diagnose endometrial hyperplasia and carcinoma on histopathology samples.

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To compare the expression of PTEN and p53 markers in endometrial hyperplasia and carcinoma.

Materials and Methods

This study includes 60 endometrial samples of which 40 were endometrial hyperplasias and 20 carcinomas. (Fig. 10)

The endometrial biopsies and resected specimens of uterus were received in the department of pathology in a Tertiary care hospital during a period of 24 months. The specimens received were subjected to tissue processing, section cutting and routine histopathology staining with hematoxylin and eosin, followed by examination by the pathologist. The samples which were diagnosed as hyperplasia and carcinoma of endometrium were subjected for immunohistochemistry and the expression of PTEN and p53 markers was assessed.

Inclusion criteria: The samples which were diagnosed as endometrial hyperplasia and carcinoma on routine hematoxylin and eosin staining were considered.

Exclusion criteria: The samples which were scanty or inadequate to perform immunohistochemistry and those for which blocks were not available were excluded.

Results

The results were interpreted in detail as the following. The PTEN nuclear and cytoplasmic expression was assessed based on Memorial Sloan Kettering Cancer Centre (MSKCC).4

Positive staining – Strong positive staining in the entire tumour.

Negative staining - No staining in entire/most tumour with strong positive staining of adjacent normal endometrium or stromal cells.

Heterogenous staining Tumour with _ convincingly positive staining and convincingly negative staining.

Out of the 60 cases which were evaluated, there were 36 cases of (Fig.2 and Fig.3)endometrial hyperplasia,(Fig.1) 4 cases of atypical (Fig.4 and Fig.5) hyperplasia, 20 endometrioid carcinomas (Type - I) and no Type - II carcinomas. Out of the 36 cases of endometrial hyperplasia, 24 cases (66.6%) showed positive PTEN nuclear staining, 6 (16.7%)

were negative and 6 (16.7%) had taken up the stain heterogeneously.(Fig.8 and 9) Out of 4 cases of atypical hyperplasia, 1 (25%) case showed positive PTEN staining, 1 (25%) showed negative staining and 2 (50%) showed heterogenous staining.

Out of 20 endometrioid carcinomas, 16 (80%) showed negative staining for PTEN, 2 (10%) were positive and other 2 (10%) were stained heterogeneously.(Table 1) Loss of PTEN expression is seen predominantly in endometrioid carcinoma, followed by atypical hyperplasia and then by hyperplasia without atypia.

p53 scoring was done by calculating the percentage of tumour cells with positively stained nuclei to total number of tumour cells along with the intensity of staining which can be negative, weakly positive or strongly positive.5

Grade - 1 :<5% of cells with nuclear staining.

Grade - 2: /=5% and < 50% of cells with nuclear staining.

Grade - 3 :> = 50% of cells with nuclear staining.

Out of 36 hyperplasia cases, 34 (94.4%) cases showed Grade-1 p53 staining, 2 (5.6%) cases showed Grade-2 staining. Out of 4 atypical hyperplasias, 1 (25%) case showed grade-1, 2 (50%) cases grade -2 and 1 (25%) case grade-3 p53 staining. Among 20 endometrioid carcinomas, 2(10%) cases showed grade-1, 14 (70%) cases showed grade-2 and other 4(20%) cases showed grade-3 staining. (Table 2)

Thus, in cases of hyperplasia without atypia positive staining for p53 was seen in 5.6%, in hyperplasia with atypia 75% and endometrioid carcinomas showed positive staining with p53 staining in 90% of the cases.((Fig.6 and Fig. 7)

Table 1: Expression of PTEN in endometrial hyperplasia and carcinoma.

PTEN Staining	Positive	Negative	Heterogenous
Endometrial Hyperplasia	24 (66.6%)	6 (16.7%)	6 (16.7%)
Atypical hyperplasia	1 (25%)	1 (25%)	2 (50%)
Endometrioid carcinoma	2 (10%)	16(80%)	2 (10%)

Table 2: Expression of p53 in Endometrial hyperplasia and carcinoma.

p53 staining/	Grade – 1	Grade – 2	Grade - 3
Hyperplasia	34 (94.4%)	2 (5.6%)	0
Atypical Hyperplasia	1 (25%)	2 (50%)	1 (25%)
Endometrioid carcinoma	2 (10%)	14(70%)	4 (20%)

Grade-1 : Negative staining, Grade-2 : weak staining, Grade-3 : strong staining.

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Fig 1: Endometrial Hyperplasia without atypia, {Hematoxylin & Eosin (H&E) stain,10X}.



Fig. 2: Endometrial Hyperplasia with atypia, { H & E, 40x}.



Fig. 3: Endometrial hyperplasia with Atypia showing loss of basal polarity {H & E, 40X}.



Fig. 4: Well differentiated endometrioid carcinoma,{H & E, 10X}.



Fig. 5: Well differentiated endometrioid carcinoma – villoglandular architecture {H & E, 40X}.



Fig. 6: Endometrioid Carcinoma showing p53 nuclear expression, {10X}.



Fig. 7: Endometrioid carcinoma showing p53 nuclear expression, {40X}.



Fig. 8: PTEN cytoplasmic and nuclear expression in Endometrial Hyperplasia – Heterogenous staining, Stromal cells also show expression which act as internal positve control, {10X}.



Fig. 9: PTEN expression in Endometrial Hyperplasia, 40X.



Fig. 10: Distribution of cases in present study.



Fig. 11: Age distribution in cases of Endometrial hyperplasia and Endometrial Carcinoma.

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Fig. 12: Comparison of PTEN expression in Endometrial hyperplasia without atypia, Atypical hyperplasia and Endometrial carcinoma.



Fig. 13: Comparison of expression of p53 in Endometrial Hyperplasia without atypia, Atypical hyperplasia and Endometrioid carcinoma.

Discussion

Endometrial carcinoma most commonly occurs in postmenopausal women and the incidence is 4.3 per 1,00,000 women. There are two well known types- Type 1 accounts for 90% of the endometrial carcinomas and is estrogen dependent-atypical hyperplasia is the precursor lesion. Type 2 are non-estrogen dependent and arises in an atrophic background. Endometrial hyperplasia, as per the latest 2014 WHO classification⁶ are divided into 2 types – Endometrial hyperplasia without atypia and endometrial hyperplasia with atypia. The pathogenesis of endometrial carcinoma and its precursor atypical hyperplasia is complex and involves PTEN inactivation and p53 mutation.

Yoshiaki Norimatsu et al. in their study stated that the median age of presentation of patients with endometrial carcinomas was 58.9 years (range 44–75 years). In the year 2017, Katarzyna et al. in their study stated that average age for endometrial hyperplasia and endometrial carcinoma was found to be 52 years and 63 years respectively. Supriya Sandeepa et al. in their study observed that 37% of hyperplasia cases presented in the age between 41 to 50 years. This correlated with the findings in our study. In our study, most cases of endometrial hyperplasia were seen in fifth decade and carcinoma cases were seen in seventh decade which correlated with the study findings of Katarzyna et al.

PTEN is a tumour suppressor gene identified in 1997- It is a phosphatase and tensin homologue present on chromosome 10. PTEN encodes a lipid phosphatase that antagonizes PI3K/AKT pathway by dephosphorylating PIP3(Product of PI3K). PTEN inactivation can be considered as the earliest event which is commonly seen in most of the endometrioid carcinomas.

The PTEN expression is seen in normal endometrium, it varies from a very high expression in proliferative endometriumto a gradual decrease by the end of secretory phase. The loss of PTEN expression has been correlated with both favourable and unfavourable prognosis as this gene inactivation is not only seen in early stage and well differentiated endometrial carcinomas, but also found in advanced, poorly differentiated and invasive carcinomas.

In a study by Tantbirojn et al. in 2008, loss of PTEN expression in endometrial hyperplasia without atypia, endometrial hyperplasia with atypia and endometrioid carcinomas was observed to be 24%, 60% and 60% respectively.⁷ Soheila Sarmadi et al. in the year2009, documented that loss of PTEN in endometrioid carcinoma and endometrial hyperplasia with atypia to be 52% and 25% respectively⁸. In the year 2017, Shanmugapriya et al. discussed that the loss of PTEN expression in endometrialhyperplasia without atypia, hyperplasia with atypia and endometrioid carcinoma was 11%, 50% and 70% respectively.⁹ In a study by Sitara S et al. in 2018, the PTEN loss in endometrial carcinoma and hyperplasia with atypia was found to be 61% and 37% respectively.

In our study, loss of PTEN expression in endometrial hyperplasia without atypia endometrial hyperplasia with atypia and endometrioid carcinomas was 16.7%, 25% and 80% respectively. (Fig.12) Hence, the loss of PTEN expression in endometrial carcinoma in our study was correlating with the other studies.

p53 is a tumour suppressor gene which is situated on the chromosome 17p13.1. It is found to

be the most frequent target for genetic alteration in human tumours including Endometrial cancer and plays a vital role in tumour progression. When a p53 mutation occurs, a non-functional protein is produced which is non-degradable and allows immunohistochemical detection. Normal endometrium does not show positive nuclear staining in glandular epithelial cells. The expression of p53 increases as the severity of the endometrial lesion increases from endometrial hyperplasia to carcinoma. Inaba et al. stated in their study that p53 expression is associated with high histological grade, advanced stage of the carcinoma and also with unfavourable prognosis.

Risinger et al. mentioned in their study that the expression of p53 is seen in 29% of Type-1 endometrial carcinomas¹⁰.Illie D et al. in their study on 30 cases of endometrial hyperplasia showed p53 expression in endometrial hyperplasia without atypia and hyperplasia with atypia to be 30% and 60% respectively. Boruban MC et al. in their study in the year 2008, stated that p53 gene mutation was present in 20% of endometrial carcinomas and was absent in cases of hyperplasia.¹¹ Nayar Musfera Abdul Masjeed et al. in the year 2017, observed the expression of p53 in endometrial hyperplasia without atypia, hyperplasia with atypia and endometrioid carcinomas to be 8.57%, 53.33% and 95.45% respectively.¹²

In our study, expression of p53 in hyperplasia without atypia was shown in 5.6% cases (weak staining), whereas among the cases of atypical hyperplasia, 50% showed weak staining and 25% showed strong staining. Endometrioid carcinomas showed 70% weak staining and 20% strong staining. ((Fig.13) Hence, in our study the expression of p53 was correlating with the study done by Nayar Musfera Masjeed et al.¹²

In our study significant differences in expression of PTEN and p53 was found in endometrial hyperplasia without atypia, hyperplasia with atypia and endometrial carcinoma.

An inverse relationship was found with expression of PTEN and p53 as lesions progress from hyperplasia without atypia to endometrial carcinoma.

Conclusion

In our study done on 40 cases of endometrial hyperplasia and 20 carcinomas, it was observed that the most common age of presentation of endometrial hyperplasias was in the 5th decade and

carcinomas was in the 7th decade. ((Fig.11) In most endometrioid carcinomas, it was observed that there was loss of PTEN expression and positive staining for p53. In endometrial hyperplasia without atypia, loss of PTEN expression and p53 positive staining was seen in 16.7% and 5.6% of cases respectively, whereas in atypical hyperplasia it was found to be 25% and 75% respectively.

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Conflict of Interest: Nil.

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Profile of Deaths Due to Drowning among Autopsies Conducted at Autopsy Center of Rajendra Institute of Medical Sciences, Ranchi

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Abstract

Introduction: Drowningis the 3rd leading cause of unintentional injury death, accounting for 7% of all injury-related deaths. The global burden and death from drowning is found in all economies and regions. In this study we aim to find out the demographic profile of drowning among cases brought for autopsy in the Department of FMT, RIMS, Ranchi.

Material and Method: This Observational study was carried out in the Department of Forensic Medicine and Toxicology, Rajendra Institute of Medical Sciences, Ranchi, during the period from January 2019 to December 2019, wherein a total of 3342 autopsies were conducted out of which 109 cases were of Drowning.

Results: Drowning was found to occur more commonly in rural areas (58.7%). Males are more prone to drowning (75.2%). Most common age group involved was found to be 31–40 years. Lakes were the most common place of occurrence (38.5%). Incidence of married females (66.7%) was slightly greater than married males (63.4%). Drowning was found to be most commonly accidental in nature (35.8%). Familial and financial problems (26.6%) along with depression (26.6%) accounted for most of the cases of drowning.

Keywords: Drowning; Lakes; Accidental; Familial problems; Depression.

Introduction

Drowning is a form of death in which the atmospheric air is prevented from entering the lungs by submersion of the body under water or other fluid medium. It is not necessary that there should be complete submersion. Death is sure to occur, even if the face alone is submersed so that air is prevented from entering the respiratory orifices.¹

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In 2016, an estimated 3,20,000 people died from drowning, making drowning a major public health problem worldwide. In 2015, injuries accounted for over 9% of total global mortality. Drowning is the 3rd leading cause of unintentional injury death, accounting for 7% of all injury-related deaths.

The global burden and death from drowning is found in all economies and regions. However, as per recent report of WHO that the low- and middle-income countries account for over 90% of unintentional drowning deaths. Amongst, over half of the world's drowning occurs in the Western Pacific Region and South-East Asia Region. The drowning death rates are highest in the African Region, and are 15–20 times higher than those seen in Germany or the United Kingdom, respectively.²

According to latest NCRB data of 2018, rate of drowning death is 82 cases per day in India. Out of 411,824 cases of unnatural deaths, 30187 cases (7.5%) died due to drowning in which 23,690

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cases (78.47%) were male, 6496 cases (21.5%) were females and only 1 case (0.0033%) was transgender. This was the second most common cause amongst the unnatural deaths after road traffic accidents (53.4%). Amongst the total number of drowning deaths, near about 11,884 cases (39.74%) died due to accidental fall in water, 7426 cases (5.6%) died due to suicidal drowning.³

Accidental drowning occurs often in India, nearly 40, 000 Indians die annually from drowning. It occurs occasionally among swimmers due to their rashness in swimming, but it occurs mostly in nonswimmers who venture to go beyond their depth in the sea, rivers, canals and lakes. Many lives are lost during floods, which are so frequent. It also occurs among persons at bathing places while bathing in deep water. Females may fall accidentally into a well while drawing water from it. Children may also accidentally fall into ponds or lakes while playing near their banks. They may even fall accidentally into domestic vessels of water, such as water tanks, bathtubs and buckets.⁴ Accidental drowning in shallow water is very rare, except when the individual happens to be intoxicated, insane or epileptic.⁵

Many studies have been conducted in the different parts of country. There is no any report available on the topic from this part of country therefore we have plan to conducted a retrospective study to know the profile of drowning cases in Ranchi.

Materials and Methodology

This observational study was carried out in the Department of Forensic Medicine and Toxicology, Rajendra Institute of Medical Sciences, Ranchi, during the period from January 2019 to December 2019, wherein a total of 3342 autopsies were conducted out of which 109 cases were of Drowning. Prior permission from the institutional ethical committee was taken for conducting the study. For the study, a drowning was defined as respiratory impairment resulting from hypoxia due to protracted submersion/immersion of the bare mouth and nose in a liquid, usually water. Fatal drowning of an individual typically occurs in solitude or in situations where others are either unaware of the victim's plight, or unable to lend assistance.

Inclusion criteria:

1. All cases of deaths due to Drowning coming for post mortem.

2. Cases considered for study will include subjects of all age group of all genders.

Exclusion criteria

- 1. Highly decomposed bodies.
- 2. Cases of Postmortem Drowning.

Data collection and Analysis

Data was collected in the form of information by inquest, police authority/ administration, relatives of the deceased, and post mortem reports of the deceased. Information gathered had been entered in MS Excel software in the form of data and it was analyzed by using SPSS-23 software.

Results

The present study was based on 109 medico legal autopsies of cases of deaths due to Drowning during period from 1st January, 2019 to 31st December 2019, conducted in the Department of Forensic Medicine and Toxicology, Rajendra Institute of Medical Sciences, Ranchi. Total numbers of autopsies conducted during the same period were 3342.

The observations on various aspects were recorded and are being presented here in form of various Tables.

Table 1: District wise distribution (n=109).

Native Place	Urban (%)	Rural(%)
Ranchi	42(38.5)	47(43.1)
Hazaribagh	2(1.8)	0(0)
Ramgarh	0(0)	6(5.5)
Giridih	0(0)	3(2.7)
Chatra	0(0)	2(1.7)
Lohardagga	0(0)	3(2.7)
Bokaro	1(1)	0(0)
Koderma	0(0)	1(1)
Khunti	0(0)	1(1)
Dumka	0(0)	1(1)
Total	45(41.3)	64(58.7)

Natives of Ranchi (involving both urban and rural areas) accounted for most of the cases of Drowning (89 out of a total of 109). Least number of cases was reported from Bokaro (1), Koderma (1), Khunti (1) and Dumka (1). (Table 1).

 Table 2: Age and sex wise distribution.

Age groups (in years)	Male (%)	Female (%)	Total (%)
0 to10	6(5.5)	2(1.8)	8(7.3)
11 to20	17(15.6)	4(3.7)	21(19.3)
21 to 30	13(11.9)	6(5.5)	19(17.4)
31 to 40	19(17.4)	3(2.8)	22(20.2)

41 to 50	11(10.1)	7(6.4)	18(16.5)
51 to 60	12(11.0)	2(1.8)	14(12.8)
>60	4(3.7)	3 (2.8)	7(6.5)
Total	82(75.2)	27(24.8)	109(100)

Most common age group involved was 31 to 40 years and the least common age group involved was >60 years. (Table 2).

 Table 3: Distribution based on place of Incidence/Occurance.

Place of Incidence/ Occurrence	Number of cases	Percentage
Lakes	42	38.5
Well	29	26.6
Dam	16	14.7
Pond	12	11.0
Waterfall	08	7.3
Gutter(nala)	02	1.9
Total	109	100

Lakes (38.5%) were the most common place of incidence of drowning followed by wells (26.6%) and the least common was gutter (Nala) (1.9%). (Table 3)

Table 4: Distribution based on Marital Status.

Gender	Marital Status		Total
	Yes(%)	No(%)	-
Male	52(63.4)	30(36.6)	82(100)
Female	18(66.7)	09(33.3)	27(100)
Total	70(64.2)	39(35.8)	109(100)

Married males and females accounted for 70 (64.2%) cases of drowning out of which males were 52 and females were 18 in number. (Table 4).

 Table 5: Distribution of study population according to manner of death.

Manner of Death	Number of Cases	Percentage
Accidental	39	35.8
Suicidal	22	20.2
Homicidal	03	2.8
Unknown	45	41.2
Total	109	100

Drowning was found to be most commonly Accidental in nature (35.8%) followed by Suicidal (20.2%) and then Homicidal (2.8%) in nature. (Table 5). **Table 6:** Distribution of cases as per Personal History.

Personal History	Male (%) N=82	Female (%) N=27	Total (%) N= 109
Familial and Financial Problems	23(28.1)	06(22.2)	29(26.6)
Depression	21(25.6)	08(29.6)	29(26.6)
Chronic Alcoholism	21(25.6)	03(11.1)	24(22)
Chronic Illness	10(12.2)	06(22.3)	16(14.7)
Psychiatric Illness	02(2.4)	02(7.4)	04(3.7)
Failure in Love	03(3.7)	02(7.4)	05(4.6)
Epilepsy	02(2.4)	00(0)	02(1.8)
Total	82(100)	27(100)	109(100)

Familial and financial problems (26.6%) along with depression (26.6%) were the reason behind the maximum cases of Drowning. Least common factor involved was Epilepsy (1.8%). (Table 6).

Discussion

The present study was undertaken during the period from January, 2019 to December, 2019 in the Department of Forensic Medicine and Toxicology, R.I.M.S., Ranchi to analyze the epidemiology of deaths due to Drowning.

While comparing the results of our study with other workers, many factors were taken into consideration. Firstly, this study was conducted in the Department of Forensic Medicine and Toxicology, Rajendra Institute of Medical Sciences, Ranchi. It is a tertiary Health Centre wherein cases are referred from many health centers. Hence, this study included medicolegal autopsy of deaths due to Drowning which came from various districts of Jharkhand at the mortuary of RIMS, Ranchi.

District wise distribution: As shown in Table I, a total 109 cases of Drowning were conducted in the department during the period of study and out of these,81.6% cases are from Ranchi. Other Districts like Ramgarh, Hazaribagh, Koderma, Chatra,etc contributed the remainder of the cases. It is due to the fact that local cases are autopsied in most of the Sadar Hospitals of their respective Districts and only few were referred to RIMS, Ranchi for autopsy.

Age and sex wise distribution: As shown in TABLE II, the highest incidence of deaths due to Drowning was found in the age group of 31 to 40 years (20.2%), closely followed by the age group of 11 to 20 years (19.3%) and 21 to 30 years (17.4). Predominance of male was seen in all age groups in drowning death. Among the total cases, 75.2% victims were male and 24.8% were female. The male: female ratio was 3.04:1. These findings are consistent with that of Auer,⁶ Quan,⁷ Suresh Kumar Shetty and Shetty,⁸ Pathak and Mangal⁹ and Saberi Anary et al.¹⁰ Considering other references in same field, Prabir et al in their study in 2015 had maximum cases (13 cases) of drowning between 11-20 years of age,¹¹ Manjunath S (2010) in their study at Manipal found that the age group commonly involved in drowning was 11-20 years,¹² Davoudi-Kiakalayeh A et al (2008) in their study in Iran also found that more than one third of the victims were less than 20 years of age.¹³ Results of these studies corroborated with our findings. The probable reason behind preponderance of 31 to 40 years age group in drowning may be due to

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familial and financial problems arising in life and their inability to deal with them. This is followed by the age group of 11 to 20 years and 21 to 30 years which may be due to carelessness and adventurous nature usually seen in youngsters while swimming or doing recreational activities in or around water source leading to accidental deaths.

Distribution based on place of Incidence/Occurrence: In our study it was seen that 65.1% of Drowning cases occurred in Lakes (38.5%) followed by wells (26.6%), and then followed by Dams (14.7%) and Ponds (11%). Least common places of occurrence were waterfalls (7.3%) and gutters (1.9%). In other studies done by Chidanand C et al, the commonest place of submersion was lakes (37.6%) followed by wells (17.8%)14which is in consistence with our study. Study done by Prabir et al, showed maximum cases drowned in ponds 21(35%), followed by rivers 17(23%) and lakes 13(22%).¹⁵

Distribution based on Marital Status: As per the marital status is concerned, 64.2% victims were married and 35.8% were unmarried. Among the females 66.7% were married and 33.3% were unmarried, and among the males 63.4% were married and 36.6% were unmarried. The reason behind this could be over exposure of married and working people in and around water sources leading to accidental deaths. Also they prefer to commit suicide by drowning due to inability to handle familial and financial problems. Gorea and Singh¹⁶ and Ranga Raoet al¹⁷ in their study found 38% and 50% married victims respectively who died of drowning.

Distribution of study population according to manner of death: Since manner of death was inspected from documents for many of which investigation procedure was still in progress, manner was unknown for most of the cases (41.2%). For those of known mechanism 35.8% were accidental and 20.2% cases were suicidal in nature. Only 3 cases (2.8%) were confirmed as homicidal drowning. Similar observations were made in study done by Mukherjee AA et al, wherein 26 cases (37.14) were accidental and 19 cases (27.14%) were suicidal and in 25 cases (35.72%) police did not ascertain the manner of death.¹⁸ The probable explanation to the above may be that as drowning deaths are mostly accidental and suicidal in nature, the age group 11– 50 yrs. are more vulnerable as this age is more prone to accidents in water during adventure sports, travels and swimming. The challenges and struggle for livelihood in adolescents, frustrations due to failure of high ambitions and failure in love affairs makes them more prone for suicide.

Distribution of cases as per Personal History: In our study, we found that 26.6% of victims of drowning death had familial and financial problems. Same was the incidence of depression (26.6%). This is followed by chronic alcoholism in 22% cases and chronic illness in 14.7% cases. Male predominance was seen in almost all the associated histories of drowning deaths. The present study is in accordance with Dietz and Baker,¹⁹ Auer,⁶ Fralick et al²⁰.

Conclusion

In the above study we concluded that, Male predominance seen in drowning deaths with highest incidence seen in second fourth decades. Drowning deaths are most common in rural region followed by urban region. Drowning deaths are most common in married people as compared to unmarried people. Familial and financial problems is the most common history seen in drowning deaths followed by depression, chronic alcoholism, chronic illness and psychiatric illness. Lakes are the most common place from where the bodies were retrieved followed by wells, dams and ponds. Most cases of Drowning are accidental in nature followed by suicide.

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Healthcare Policies and Judicial Regulations for Disposal of Unclaimed Dead Bodies: A Current Review

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Abstract

India leads the world in the number of registered medical institutions and produces the largest number of medical doctors in the world. Not with standing this, India struggles the concerns of cadaver shortage, patient unavailability (in hospitals), lack of medical equipment's/ instruments, shortage of medical personnel and medicines which is largely due to the malfunctioning of Indian Regulatory bodies and flawed Educational, Healthcare and Judiciary policies. Few authors have written on the prevailing deficiencies in the Indian policies especially the 'Anatomy Acts' but failed to correlate them with the 'Indian Judiciary Regulations' and provide radical solutions to ensure an uninterrupted supply of cadavers to medical institutions for academic and research purpose. The objective of our article is to review the policies and acts enacted by the Indian Educational, Healthcare and Judiciary policies pertaining to the disposal of unclaimed dead bodies both, prior to COVID-19 and during COVID -19 pandemic period.

Keywords: Unclaimed bodies; COVID-19 pandemic; Anatomy acts; Health care policies; Judiciary policies; Cadaver shortage; Medical education; Medical ethics; Regulatory bodies.

Introduction

India continues to produce largest number of doctors in the world. India witnessed an irrational and abrupt surge in medical institutions, in last decade. Cadaver shortage, patient unavailability (in hospitals), lack of medical equipment's/ instruments, shortage of medical staff and medicines are the key concerns in Indian medical institutions largely due to the Government's tendency to formulate educational, health-care and judicial policies based on public pressure, and short-term concerns. Out of these several issues, cadaver shortage in the medical institutions has become a common visual which hinders

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conventional medical education through cadaveric dissection and also restricts cadaver related research activities/workshops.

The COVID-19 pandemic, brought medical education system to a standstill and exposed the deficiencies in the infrastructure available in the Indian medical institutions. With the conventional classroom teaching-learning methods drastically shifting to online mode, 'Ministry of Health and Family Welfare', 'Ministry of Human Resource Development', 'Indian Judicial System' attempts to modify the policies of medical education, health care and judiciary.

Few authors have written on the prevailing deficiencies in the Indian policies especially the 'Anatomy Acts' but failed to correlate them with the 'Indian Judiciary Regulations' and provide radical solutions to ensure an uninterrupted supply of cadavers to medical institutions for academic and research purpose.

The objective of our article is to review the policies and acts enacted by the Indian Educational, Healthcare and Judiciary policies pertaining to

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the disposal of unclaimed dead bodies both, prior to COVID-19 and during COVID -19 pandemic period.

Medical education in India

The Medical Council of India (MCI) was established by 'Ministry of Health and Family Welfare' as a statutory body under the provisions of the Indian Medical Council Act (IMC Act), 1933, which was later, replaced by the Indian Medical Council Act (IMC), 1956 and was subsequently amended in 1964, 1993 and 2001.1 By its powers, the establishment of a new medical college requires mandatory recognition by MCI, but during the inspection, MCI focuses only on documentation of infrastructure and human resources. There is no inspection of infrastructure proposed for research activities by the institution neither evaluation nor monitoring of student admission procedures, training, provision for cadaver supply, teaching-learning strategies, assessment system, student facilities and faculty adequacy, is conducted. (Establishment of Medical College Regulations, 1999: Amendment: July 2018).

Anatomy Acts of India

In India, the Bombay Anatomy act was enacted in 1949, underwent several amendments and later renamed as the Maharashtra Anatomy Act (Bombay Anatomy Act, 2018). Most other states followed by enacting their own Anatomy Acts based on the Bombay Act. The Maharashtra Anatomy Act, is the only act among all the states which allows the use of unclaimed bodies or the donated bodies for the purpose of both Anatomical examination (for medical education or research purposes) and for therapeutic purposes.²

Deficiencies in Anatomy Acts

A body of the deceased person who has no near relatives, or whose body has not been claimed by any of his near relatives in a given time period is defined as an unclaimed body.³ All Anatomy Acts defined unclaimed bodies, but failed to clearly specify the time period during which a near relative may come forward to claim the body. They also failed to specify the method of preservation of the body during this time period.⁴ Bharambe et al. (2019) reviewed various anatomy acts and stated that the authenticity of the claimant needs to be established by legally competent authority.

Many Anatomy Acts failed to cover voluntary body donation which is a very important source of obtaining cadavers hence various acts need amendment to cover voluntary body donation. In addition to it, ambiguity existed in all the Anatomy Acts about exact meaning of terms such as "Approved Institution" and "Authorized officer".

Delhi and Kerala Anatomy Acts also offer the right to claim a body to the friends and religious bodies but failed to define the parameters of the friend/religious organization who may also claim the body. Most of the existing anatomy acts fail to address the issue of transfer of unclaimed dead bodies from one Institute, to other teaching Institutes and the legalities involved in such a transfer. This is an important issue taking into consideration the grave shortage of cadavers for dissection in medical institutions of India.⁴

Methods of disposal of unclaimed bodies

The Criminal Procedure Code, 1898 and 1973

The police officer in case of doubt as to the cause of death of the deceased and in any other case in his opinion it is expedient so to do, dispose of the unclaimed dead body in the manner as provided in Section 104^5 (Section 5(3)(a)) but after the repealing of this Act of 1898, by the new Act of 1973,⁶ the, procedure should beas per Section 174.⁷ Rules must clearly mention about disposal of dead body in the scenario in which unclaimed dead body is not required by the authority in charge of a medical institution for anatomical examination or dissection. Rules must also mention about the period after which the medical, institution for prolonged preservation and use for anatomical examination and dissection may use the unclaimed dead body. Preferably this period should be within 72 hours after the death in ordinary case.

Police regulations, Paragraph 135-A

As per the regulations, there is a provision of providing unclaimed human dead bodies to recognized medical institutions which is as follows:

a. If the police receives a dead human body, which remains unclaimed and unidentified, then according to Section 174, investigating police officer shall arrange to give the fact of discovery the widest possible publicity with a view to its identification as also to the tracing out of the deceased's relations, friends or acquaintances to whom it can be handed over
for disposal. In rural areas such publicity shall be made by beat of drum and in urban areas the police officer may also take the help of the local press, broadcasting station, if any, and voluntary organizations like the Sewa Samiti.⁸

- b. The police officer making the enquiry shall also as far as possible' endeavours to ascertain correctly the faith to which the deceased belong in order to ensure proper disposal, if eventually necessary, of the corpse according to the customary rites of the faith to which the deceased belonged. With this end in view the officer concerned shall, besides .making other enquiries, carefully examine the corpse to see if it has got any distinguishing features, such as might held to establish the deceased, denomination and make an entry to this effect in the general diary and the inquest report.⁸
- c. If after due publicity a dead body remains unclaimed the Superintendent of Police of the district may hand it over to recognized Medical College for the purposes of anatomical examination and dissection at their own expense. The officer-in- charge of such college shall furnish to the Superintendent of Police a certificate to the effect that after anatomical examination and dissection the corpse was disposed of according to the customary rites of the faith to which the deceased belonged.⁸

In cases, where there is need for conducting postmortem

It is generally difficult for the police to maintain the unclaimed body in a good condition till the deceased is identified or the relatives/friends of the deceased are found. Hence, the police is directed to hand over the body to the Anatomy department of local recognised medical institution through proper channel for preservation in cold storage for minimum of 15 days to facilitate the effective police enquiry to identify the claimant of the deceased. If during this period, the claimant of the deceased is identified, then police will contact the medical institution and will hand over the dead body to the concerned relatives; and in case, if the claimant of the dead body is not identified then the investigating police officer with due permission of the police superintendent will permanently hand over the unclaimed body to the Anatomy department of recognised medical institution with the condition that the responsibility of disposal of the deceased according to the customary rites of the faith will rest on the medical institution.

In cases, where there is no need for conducting post-mortem

In bodies, where conducting post-mortem is compulsory, it is difficult to keep such dead bodies in a good condition for a long time, in such cases, a written certificate is supposed is acquired from the Anatomy department of local recognised medical institution stating the duration till which the dead body can be preserved in good condition so that during that period the police enquiry for identifying the relatives, friends and acquittances of the deceased can be conducted. If in case, no claimant for the dead body is identified then the investigating police officer after acquiring proper permission from the superintendent pf police will permanently hand over the unclaimed body to the anatomy department of local recognised medical institution with the condition that the responsibility of disposal of the deceased according to the customary rites of the faith will rest on the medical institution.8

Policies for disposal of unclaimed bodies in other states

In Punjab, police rule state that if a body is unidentified, the investigating officer shall record a careful description of it, giving all marks, peculiarities, deformities, other distinctive features and shall take the finger impressions and have it photographed. In cases where such action appears desirable, a description should be published in the Criminal Intelligence Gazette. Unidentified body should be handed over to any charitable society which is willing to accept them, and if no such society comes forward, they should then be buried or burnt. The investigating officer is empowered by law to waive off the post-mortem in case he thinks that there is no foul play and death is due to natural cause.⁹

In Delhi, the police sends telegram message called "Hue and cry notice' to various police headquarters of the country. The "Hue and cry notice' contained brief description of the identification features of the deceased. The body is preserved in the mortuary for 72 hours from the time telegram message is sent. If there is no one to claim the body after 72 hours the police is legally authorized to dispose of the body. But if the police think that the body may be identified by the relatives, it should be preserved for longer time till relatives comes and claims the body. The expenditure on the disposal of body in unidentified case are born by the police department. This is applicable in medicolegal cases expired outside hospital or inside the hospital. In Delhi, the Assistant commissioner of police is authorized to waive off the post-mortem on the recommendation of the investigating officer. However autopsy surgeon can recommend investigating officer for waiving off the case if he think it is a case of natural death, but the final authority rests with the Assistant commissioner of police.⁹

Disposal of unclaimed bodies in hospital

In case of unclaimed bodies in hospital, died due to the natural cause, the hospital authority is lawfully in charge of the body. The hospital authority will send telegram messages to whatever address is available. If the body is unclaimed after 72 hours, it is legally authorized to dispose of the body bearing it's expenditure. As per human transplant act 1994, the hospital authority is authorized to give permission for removal of any human organ from the unclaimed body after 48 hours. However if the hospital has reason to believe that some near relative might object, the permission to remove the organ must not be given. The unclaimed M.L.C. bodies in hospital should be handed over to the police who shall dispose of the body after post-mortem.⁹

Guidelines for disposal of unclaimed bodies of COVID-19 patients

In the exigency of death of COVID-19 patients, the concerned hospital will prepare the dead body by following the protocol of disposal of dead body as per the guidelines. (Government of India, 2020). A separate area should be earmarked in every isolation centre for this activity.¹⁰

- a. In case of Government Medical Colleges, the doctor on duty will inform the forensic doctor who will call on duty mortuary workers in the hospital to receive the wrapped and disinfected dead body and will shift it on a disinfected shifting trolley for loading on the closed vehicle and shift to the mortuary. Mortuary workers to be given safety equipment's as per the protocol. The hospital will inform the district administration about such deaths along with all the details.¹⁰
- b. In case of isolation centres other than medical colleges, the hospital authorities will move the sealed disinfected dead body to the mortuary of the hospital. In case mortuary is not a part of the isolation facility, the mortuary will be identified by the Health Authorities and the dead body will be moved to that mortuary.¹⁰

The medical facility as soon as possible will inform the Deputy Commissioner about any such death. This information must be given to both the Deputy Commissioner of the district where such a facility is located and the Deputy Commissioner of the district to which the person belonged (if the two are different).¹⁰

Dead body from the mortuary will be shifted to cremation ground where the last rites of the body are to be done in a vehicle which shall be arranged by the concerned district administration where the last rites are to be performed. The local Municipal Committee/Panchayat will make arrangements for cremation.¹⁰

Policies for disposal of unclaimed dead bodies of COVID-19 patients

Depending on the following situations, further necessary action shall be taken by local district administration:

When relatives are there and ready for doing the last rites, the district administration should provide them all the help required. Dead body disposal protocol has to be followed.

When relatives are there but not willing to carry out the last rites, district administration should carry out the last rites in the presence of the relatives as per the protocol.

When the body remains unclaimed for 48 hours after the information is provided to the relatives about the death, the body should be declared unclaimed under Epidemic Control Act, 1897 and the district administration should carry out the last rites as per the religious belief known to the district administration as per protocol. All the expenses on transportation of the dead body, required manpower and expenses of such a funeral will be a valid charge on National Disaster Mitigate Fund (NDMF).¹⁰

As per the guidelines, embalming of such dead bodies should not be allowed (Government of India, 2020). Similarly, autopsy may be avoided and in case if it is to be performed for special reasons, the recommended infection prevention and control practices should be followed (Government of India, 2020).

Conclusions

a. Anatomy Acts of different states of India warrants urgent reanalysis and reformulation

after considering the suggestions and rectification of all the existing deficiencies.

- b. Centralization of all Anatomy Acts in India should be contemplated to ensure its uniform enactment in all Indian states diverse in religion, caste, and culture.
- c. Significant a synchronization exists in the functioning of Healthcare and Judicial system, due to disparity in their respective policies, which can be resurrected by designing a Board/ Panel of members comprising of Healthcare, Education and Judicial system authorities with a goal to govern the disposal of unclaimed bodies and voluntary body donation activities.
- d. Deficiencies in the Infrastructure provided to the medical institutions and police stations should be rectified like constructing mortuaries in government hospitals and medical institutions, providing cold storage facility at police stations and medical institutions, conducting regular training of medical officers in post-mortem techniques, etc.

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[9] National Statistics Online – Trends in suicide by method in England and Wales, 1979–2001. www. statistics.gov.uk/downloads/theme_health/HSQ 20.pdf (accessed Jan 24, 2005): 7–18. Only verified references against the original documents should be cited. Authors are responsible for the accuracy and completeness of their references and for correct text citation. The number of reference should be kept limited to 20 in case of major communications and 10 for short communications.

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