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Original Article

Trends of Violent Asphyxial Deaths in Southern Marathawada Region of Maharashtra

M.E. Bansude*, R.V. Kachare, C.R. Dode***, Rahul Umbare******

Abstract

Asphyxia is a condition caused by interference with respiration, or due to lack of oxygen in respired air, due to which the organs and tissues are deprived of oxygen (together with failure to eliminate co2), causing unconsciousness or death.[1] Mechanical asphyxia is broad term in which enough external pressure is applied to the neck, chest or other parts of the body is positioned in such a way that respiration is difficult or impossible.

To know the magnitude and pattern of violent asphyxial deaths in Latur district, we have conducted an autopsy based analytic study on 94 cases of asphyxial deaths in the department of Forensic Medicine during the period 01 August 2010 to 31 July 2012. All data related to age, sex, marital status, religion and cause of death with manner were recorded with detailed autopsy examination and subsequently the cases were analyzed on various parameters to find the trends and other significant features of pattern of unnatural deaths in Latur district.

In present study total 94 violent asphyxial deaths were analyzed. Majority of deceased were males (73.40%) as compared to female (26.60%). Out of 94 cases 86.17% were Hindu and 13.83% were Muslim and 58.51% were married. Majority of cause of death were due to Hanging (60.64%), Drowning (35.11%), Strangulation (03.19%), Choking were (01.06%).Most common material used for hanging was found jute rope. Most common motive behind the hanging was domestic problems or quarrel between family members. Most common manner of death in violent asphyxial death is suicidal followed by accidental in nature.

Keywords: Violent asphyxia; Related factors.

Introduction

Violent deaths are resulting from asphyxia, includes death due to hanging, strangulation, suffocation and drowning (immersion).[1] Causes of mechanical asphyxia are A) Closure of the external respiratory orifices, as by closing the nose and mouth with the hand or a cloth or by filling the openings with mud or other substance, as in smothering B) Closure of the air passages by external pressure on the neck, as in hanging, strangulation, throttling, etc. C) Closure of air passages by the impaction of foreign bodies in the larynx or pharynx as in choking. D) Prevention of entry of air due to the air passages being filled with fluid, as in drowning E) External compression of the chest and abdominal walls interfering with respiratory movements, as in traumatic asphyxia.[2]

Such study was not carried out in Latur district till today. So the present study was carried out to know the magnitude of the different causes of unnatural deaths. It reviewed the unnatural deaths in district with reference to age, sex, cause, manner of death, place of incidence, material used for hanging, motive behind the act.

Material & Methods

The present retrospective cross-sectional

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study was conducted in the Department of Forensic Medicine at Government Medical College & General Hospital Latur. All the cases brought to post mortem center for medico legal autopsy during 01 August 2010 to 31 July 2012 with alleged history of violent asphyxial death were studied. Detailed information regarding the circumstances of death was sought from inquest papers, investigating officer, relatives. Data was collected and analyzed as per age, sex, marital status, causes of death, manner of death. Causes of death grossly classified as hanging, strangulation, suffocation, drowning and choking.

Results & Observations

The present study was conducted during the period 1 Aug 2010 to 31 July 2012. During study period 1469 autopsies were conducted, out of which 94 autopsies were of death due to violent asphyxia which constitutes 6.40%. In present study out of 94 total autopsies of violent asphyxial death, 57 deaths were due to hanging, 33 were due to drowning, 03 were due to strangulation and 01 case was of choking. From Table No.-01, it was clearly revealed that most of the cases were of males (n=69, 73.40%). Male to female ratio was 2.76:1. Hindus were more (n=81, 86.17%) than Muslims (n=13, 13.83%) i.e. ratio being 6.23:1. Table No.-03 shows that most of the cases were from age group 21-40 years (n=57, 60.64%), most common being 21-30 age group (n=34, 36.17%), however Table No. 2 shows that most of the cases were from married group (n=55, 58.51%) while unmarried were (n=39, 41.49%). Hanging (n=25, 26.60%) was commonly found in age group 21-30 years age group however drowning was (n=10, 10.64%)

Table 1: Distribution of Cases According to Sex and Religion

Types of Asphyxia	Sex			Religion		
	Male	Female	Total	Hindu	Muslim	Total
Hanging	43 (45.74%)	14 (14.89%)	57 (60.64%)	49 (52.13%)	08 (8.51%)	57 (60.64%)
Strangulation	01 (1.06%)	02 (2.13%)	03 (3.19%)	03 (3.19%)	--	03 (3.19%)
Choking	01 (1.06%)	--	01 (1.06%)	01 (1.06%)	--	01 (1.06%)
Drowning	24 (25.53%)	09 (9.57%)	33 (35.11%)	28 (29.79%)	05 (5.31%)	33 (35.11%)
Total	**69** (73.40%)	**25** (26.60%)	**94** (100%)	**81** (86.17%)	**13** (13.83%)	**94** (100%)

Table 2: Distribution of Cases According to Marital Status

Types of Asphyxia	Marital Status		
	Married	Unmarried	Total
Hanging	32 (34.04%)	25 (26.60%)	57 (60.64%)
Strangulation	02 (2.13%)	01 (1.06%)	03 (3.19%)
Choking	01 (1.06%)	00	01 (1.06%)
Drowning	20 (21.28%)	13 (13.83%)	33 (35.11%)
Total	**55** (58.51%)	**39** (41.49%)	**94** (100%)

Table 3: Distribution of Cases According to Age in Years

Types Of Asphyxia	Age In Years							Total
	0-10	11-20	21-30	31-40	41-50	51-60	Above 60	
Hanging	–	10 (10.64%)	25 (26.60%)	12 (12.77%)	07 (7.45%)	01 (1.06%)	02 (2.13%)	57 (60.64%)
Strangulation	–	01 (1.06%)	02	–	--	--	--	03 (3.19)
Choking	–	--	--	01 (1.06%)	--	--	--	01 (1.06%)
Drowning	01 (1.06%)	08 (8.51%)	07 (7.45%)	10 (10.64%)	05 (5.32%)	01 (1.06%)	01 (1.06%)	33 (35.11%)
Total	**01** (1.06%)	**19** (20.21%)	**34** (36.17%)	**23** (24.47%)	**12** (12.77%)	**02** (2.13%)	**03** (3.19%)	**94** (100%)

Table 4: Distribution of Cases According to Area and Site

Types Of Asphyxia	Urban /Rural			Indoor /Outdoor		
	Urban	Rural	Total	Indoor	Outdoor	Total
Hanging	37 (39.36%)	20 (21.28%)	57 (60.64%)	42 (44.68%)	15 (15.96%)	57 (60.64%)
Strangulation	01 (1.06%)	02 (2.13%)	03 (3.19%)	01 (1.06%)	02 (2.13%)	03 (3.19%)
Choking	01 (1.06%)	--	01 (1.06%)	–	01 (1.06%)	01 (1.06%)
Drowning	17 (18.09%)	16 (17.02%)	33 (35.11%)	–	33 (35.11%)	33 (35.11%)
Total	**56** (59.11%)	**38** (40.43%)	**94** (100%)	**43** (45.74%)	**51** (54.26%)	**94** (100%)

Table 5: Distribution of Cases According to Seasonal Variation

Sr. No.	Types of Asphyxia	Season			Total
		Rainy	Winter	Summer	
1	Hanging	11 (11.70%)	23 (24.47%)	23 (24.47%)	57 (60.64%)
2	Strangulation	--	02 (2.13%)	01 (1.06%)	03 (3.19%)
3	Choking	--	--	01 (1.06%)	01 (1.06%)
4	Drowning	07 (7.45%)	21 (22.34%)	05 (5.32%)	33 (35.11%)
	Total	**18** (19.15%)	**46** (48.94%)	**30** (31.91%)	**94** (100%)

commonly found in age group 31-40 years.

Table No. 1 also shows that Hanging was the most common cause of death (n=57, 60.64%) followed by the drowning (n=33, 35.11%). Hanging (n=43, 44.74%), drowning (n=24, 25.53%) and choking (n=01, 1.06), commonly found in male than in females. There was not a single case of hanging, strangulation and choking from age group 0-10 years, but one case of drowning in swimming pool was found in age of 06 years. It was revealed that Hanging (n=49, 52.13%), drowning (n=28, 29.79%) and choking (n=01, 1.06%), commonly found in Hindu than in Muslims. Table No.-02 shows that Hanging

Table 6: Distribution of Material Used for Hanging

Sr. No.	Material used	Number	Percentage
1	Jute Rope	21	36.84%
2	Nylon Rope	06	10.53%
3	Dupatta	05	8.77%
4	Scarf	02	3.50%
5	Sarree	07	12.28%
6	Electric Wire	03	5.26%
7	Resin Tape	01	1.75%
8	Cable Wire	02	3.50%
9	Chaddar	01	1.75%
10	Shawl	02	3.50%
11	Curtain	01	1.75%
12	Gamja	01	1.75%
13	Unknown	05	8.77%
	Total	**57**	**100%**

Table 7: Distribution of Cases According to Sites of Drowning

Sr. No.	Sites Or Places	Number (N)	Percentage (%)
1	Well	17	51.52%
2	River	07	21.21%
3	Tank	01	3.03%
4	Talav/ Lake	04	12.12%
5	Khani Pond	02	6.06%
6	Sweaming Pool	01	3.03%
7	Municipal Gutter	01	3.03%
	Total	**33**	**100%**

(n=32, 34.04%), drowning (n=20, 21.28%), strangulation (n=02, 2.13%) and choking (n=01, 1.06%), commonly found in married than in unmarried peoples.

Table No. 4 shows that most of the cases of violent asphyxial death were from urban region (n=56, 59.11%) and most of the cases were outdoor (n=51, 54.26%). Table No.-05 shows that most of the violent asphyxial deaths were occurred in winter season (n=46, 48.94%) followed by in summer (n=30, 31.91%). Table No.6 shows that 12 different types of materials were used for hanging as a ligature material. Among that Jute rope was commonly used for hanging followed by nylon rope and Dupatta. Table No.7 shows that the most common place where drowning take place was well fallowed by river and lake. Table No.8 shows that the commonest motive behind the hanging was due to domestic problems and the quarrel between the family members. Motives like the incurable disease, unemployment, failure in business and in academics were also noticed prominently. Table No.9 shows that the most common manner of death in violent asphyxial death is suicidal followed by accidental in nature. In the study only (n=3, 3.19%) cases were of homicidal in nature i.e. strangulation.

Table 8: Distribution of Cases According to Motive behind Hanging

Sr. No.	Motive Behind Hanging	Number (N)	Percentage (%)
1	Domestic Problems/ Quarrel between family members	28	49.12%
2	Incurable diseases	05	8.77%
3	Unemployment	03	5.26%
4	Failure in Exam/ Academics	03	5.26%
5	Failure in business	03	5.26%
6	Post-traumatic stress	01	1.75%
7	Failure in love affairs	01	1.75%
8	Psychiatric disorder	01	1.75%
9	Alcohol Addiction	03	3.26%
10	Old age	01	1.79%
11	Unknown	08	14.04%
	Total	**57**	**100%**

Table 9: Distribution of Cases According to Manner of Death in Violent Asphyxial Deaths

Sr. No.	Cause of Death	Manner Of Death			Total
		Accidental	Suicidal	Homicidal	
1	Hanging	00	57 (60.64%)	00	57 (60.64%)
2	Strangulation	00	00	03 (3.19%)	03 (3.19%)
3	Choking	01 (1.06%)	00	00	01 (1.06%)
4	Drowning	24 (25.53%)	09 (9.57%)	00	33 (35.11%)
	Total	**25 (26.60%)**	**66 (70.21%)**	**03 (3.19%)**	**94** (100%)

Discussion

It is revealed that majority of deceased were males (73.40%) as compared to female (26.60%). Out of 94 cases 86.17% were Hindu and 13.83% were Muslim and 57.45% were married. Majority of cause of death were due to hanging (60.64%) fallowed by Drowning (35.11%). Similar findings were noted by Bhupal Ch Majumder.[3] He also noticed that Hanging outnumbered the other methods of violent asphyxial deaths and most of the hanging took place at indoor and the most of the cases were of suicidal in nature and we also have the same results. Kachare R. V. *et al*[4] concluded that the violent asphyxial death commonly found in male, hanging was the common method of death, common age group of death was between 21-30 years. Majority of the cases were of suicidal in nature and all the cases of hanging were of suicidal in nature and we also have the similar findings. Kachare R. V.[5] were observed that in common method violent asphyxia is hanging and most common age group of death is 21-30 years and male outnumbered the female in violent asphyxial deaths. Srinivasa Reddy P. *et al*[6] noted that the incidence of death due to asphyxia death was most common in males (59.14%) as compare to female. He also noticed that hanging (61.19%) was the most common cause of death followed by drowning (31.96%). He revealed that the most common age group was 21-30 years (34.93%) same was noticed in present study.

We also noticed that most of the cases were from urban area (59.11%) as our hospital is tertiary care center and located in urban region. We revealed that winter months (Oct-Feb) were the most choiceable time for committing of violent asphyxial deaths-46 cases (48.94%) fallowed by summer season, however Bhupal Ch Majumder[3] found that Summer months (March-May) were most choice able time for committing of this incidence-36 cases (29.50%) and victim also choose rainy season (June-August) in 33 cases (27.04%). Ahmad M, Hossain MZ[6] revealed that out of 145 cases, 85 (58.62%) were female and 60 (41.37%) were male and most common material used for hanging was dopatta (35.17%) fallowed by jute rope where as we found that the Jute rope (36.84%) fallowed by saree (12.28%) was the most common material used for hanging. But he concluded that the most common motive behind hanging was Quarrel between couples (n=45, 31.03%) and we also revealed that most common motive of hanging was domestic problems or quarrel between family members (49.12 %). However Chormunge *et al*[8] found that the drowning was the commonest type (73.53%) followed by hanging (20.59%) which is different finding from our study. We noticed that in cases of death due to drowning most common site of drowning was the well (51.52%) followed by river this might be due to the fact that this region is poorly irrigated and having less network of rivers and cannels etc. Most of the water supply is from well

other than municipal corporation water supply.

Prjapati Pranav *et al*[9] found that the prime motive behind violent asphyxial death was financial problems/disputes in hanging however we concluded that domestic Problems/ Quarrel between family members was the common motive behind death. In our study we found that most of the asphyxia deaths are suicidal in nature (70.21%) followed by accidental (26.60%). We also found three cases of strangulation i.e. homicidal in nature. In suicidal cases most common cause was hanging. In accidental asphyxia deaths drowning was most common cause of death. Srinivasa Reddy P.[6] noted that 90.42% cases were of asphyxia deaths were suicidal in nature and 9.58 % cases were homicidal in nature. Azmak D.[10] revealed that the most frequent method of asphyxiation death is hanging (41.8%), followed by drowning (30.5%) and suicide was found to be the most common manner of death in majority of cases and we also revealed the similar findings.

Conclusion

- Hanging (66.64%), Drowning (35.11%), Strangulation (03.19%), and Choking (1.06%).
- Most commonly involved age group was 21-30 yrs.
- Male to female ratio was 2.76:1
- Violent Asphyxia Deaths in Hindus were more compared to Muslims and ratio was 6.23:1.
- Married were most commonly involved.
- Most common material used for hanging was Jute rope followed by Nylon rope & Dupatta
- Most common Motive behind the hanging was domestic problems & quarrel between the family members.
- Most common place where drowning take place was well.
- Most of the violent asphyxial deaths were suicidal in nature followed by accidental nature.

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Original Article

Stature Estimation from Forearm Length

Nishat Ahmed Sheikh*, T. Venkata Ramanaiah**

Abstract

Stature is one of the most important and useful anthropometric parameter and its estimation hold a special place in the field of Forensic Anthropometry. It has been stated that a variety of factors such as race, gender and nutrition play an important role in determining the height of an individual. There is a relation between the axial growth and the skeletal growth which can be reflected in the growth of the forearm length. The relation appears to be a positive proportion. The present study is made on the students in puberty age with axial growth in at its peak, to estimate the stature of 170 subjects, 88 Girls and 82 Boys from forearm length of individuals having age group of 11-16 Years, in Department of Forensic Medicine, Kamineni Institute of Medical Sciences Narketpally. The subjects were selected irrespective of their caste, religion, dietary habits & socio-economic status. Students having significant growth disorders, deformities, bony anomalies were excluded to rule out any gross anomaly in reconstruction of stature. All individuals were measured for height and forearm length. The data thus obtained has been subjected to statistical computation. It is obviously seen that length of a person can still be made out by the length of the fore arm even in the puberty age group, where there growth is yet not completed.

Keywords: Stature; Age; Height; Fore arm length; Regression formula.

Introduction

Anthropometry is a series of systemized measuring techniques that express quantitatively the dimensions of human body and skeleton. Anthropometry is often viewed as a traditional and perhaps the basic tool of biological anthropology, but it has a long tradition of use in forensic sciences and it is finding increased use in medical sciences especially in the discipline of forensic medicine. Relationships that exist between different parts of body and height have been of great interest to anthropologists, forensic and medical scientists for many years.[4,13] In forensic anthropology, living (forensic) stature is among the four major categories of the basic biological profile: sex, age, ancestry and stature.[1,6] one critical role of stature estimation today lies in the forensic identification of crime victims and missing persons.[15]

Identification of a human being is one of the important exercises in Forensic Medicine. Identification is defined as 'Recognition of an Individual' or 'Determination of Individuality of a person'. The earlier one establishes absolute identification; whereas the later defines partial or incomplete identification.[14,16] The Forensic Expert, with his scientific knowledge makes only a partial identification.[16,18] The parameters involved in identifying a person have 'Stature' as one of them.

Height is the measured vertical span between the vertex and heel[18], whereas 'Stature' is the calculated span between the vertex and the toe. There may be a little variation exist between these two measurements, but estimating the stature is an important step in medico-legal work, especially when a medico-legal autopsy is conducted on unknown dead body.

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The process of stature estimation has undergone a complex course of development involving researchers who have developed different means of achieving the desired goal.[17] Thomas Dwight (1884) suggested the following methods for stature reconstruction i.e. anatomical method and mathematical method. The anatomical method invariably requires complete skeleton for stature estimation whereas the mathematical method is one workable even with a single bone.[12] It is not unusual to get mutilated and dismembered dead bodies for autopsies. It becomes difficult to measure the height of those bodies. Stature should be calculated in them, from the available extremities or long bones.[5,7,11] Several studies are made in the aspect on adult persons. The present is made on the children in the age of their skeletal growth.

Aims and Objectives

The present study is conducted on the children in the secondary school, who are aged between 11 and 16 years to:

- Establish the relation between the forearm length and height
- Get regression formula in this relation

Material and Methods

Present study is made on the children who are studying in Sixth standard to Tenth standard in the Local schools at Narketpally. The subjects were selected irrespective of their caste, religion, dietary habits & socio-economic status. Students having significant growth disorders, deformities, bony anomalies were excluded to rule out any gross anomaly in reconstruction of stature. Sufficient permissions and consents are procured before the measurements of the children are taken and clearance from the Institutional Ethical committee is obtained in advance. Height is measured on the 'Steado-meter' in centimetres with decimals up to millimetres.

Forearm length is measured on a board, which is modified from the 'Osteometric board'. Care is taken in measuring the forearm length. The stretched forearm is kept on the measuring board in supine position, with the tip of the middle finger touching the fixed flank of the board. The mobile flank of the board is approximated to the tip of the Olecrenon process after bending the elbow to 900. The span is measured in centimetres with decimals up to millimetres. 170 subjects are examined and their measurements are made. The values are entered in to excel sheet to get the ratio between the forearm and the height in each individual. The values are analysed, microsoft Office Excel 2003 was used for data Evaluation and chart design.

Inclusion Criteria

All children, both boys and girls studying in sixth to tenth classes from the local government schools are selected, irrespective of their socio-economic standards. The ages of these children are falling between 11 years and 16 years.

Exclusion Criteria

Children morphologically showing the congenital malformations, Dwarfism / Achondroplasia, features of nutritional deficiencies and injuries to extremities are not included in the present study.

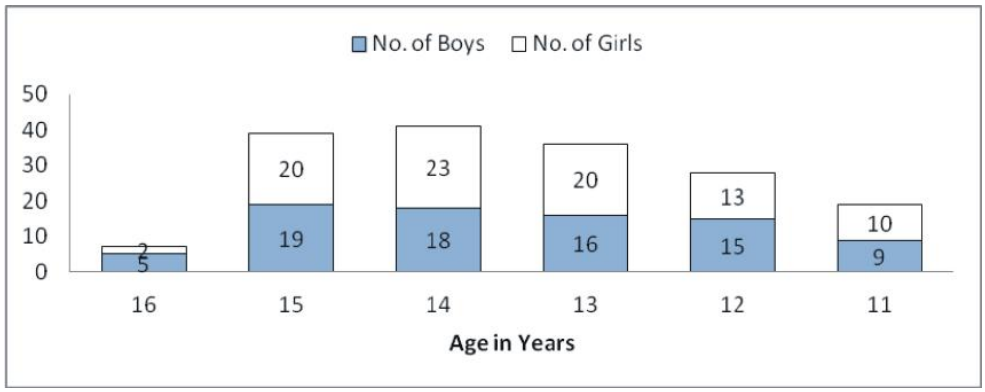
Observations

Total 170 children are measured in various age groups starting from 11 years to 16 years who are school going children. Girls are 88 and Boys are 82 among them. Heights of individual are varying irrespective of age and sex.

The ratios between the height and the forearm length are calculated for each individual. An average to the age and sex is calculated among them. (The ratio also can be taken as

Fig 1: Class-wise Strength of Students

Fig 2: Age and Sex Distribution of the Students



multiplying factor to the forearm length to calculate the height of a person.)

The ratio between the height and the forearm length is falling between 3.49 and 3.88 for Boys with a mean of 3.67 and SD 0.090; and between 3.45 and 3.88 for girls with a mean of 3.68 and SD 0.093. The graph plotted against the age and the average ratios of height to the forearm is declining as the age advances both in Boys and Girls. The 'p' value is coming to 0.0001 which is < 0.05 which is very significant.

Table 1: Average ratios of Height to Forearm lengths (Age and Sex wise)

Age (in Years)	Boys	Girls
11	3.7531	3.7378
12	3.6631	3.6857
13	3.7108	3.6598
14	3.6379	3.6627
15	3.6346	3.6896
16	3.6624	3.6539

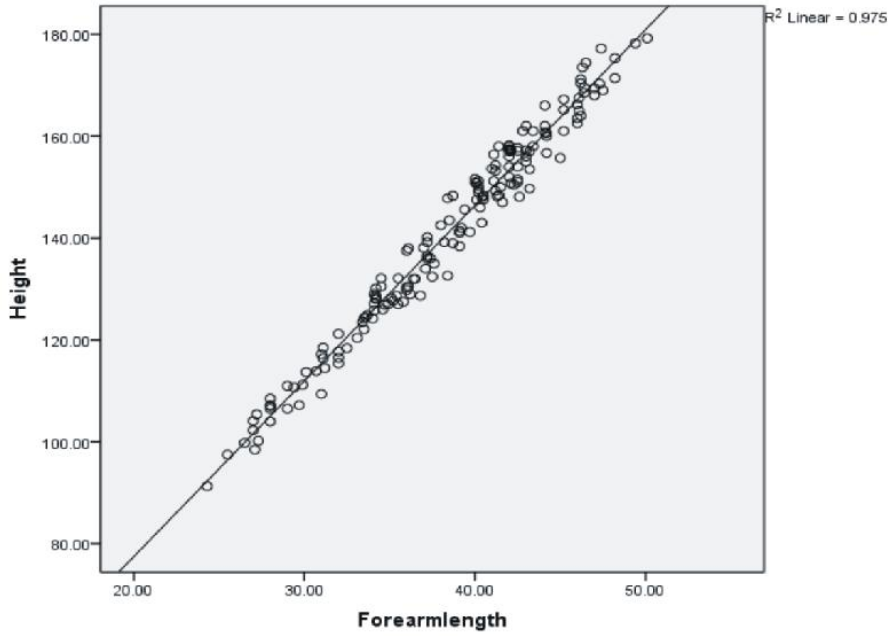
Discussion

The forensic anthropologists and medical experts generally encounter a complication while dealing with dismembered bodies or those recovered in extremely decomposed or skeletonised form. Thus estimation of stature is an important parameter in medico-legal examination and anthropological studies.[10] Morphology of forearm length helps in estimation of stature therefore the study was carried out to investigate the relationship between stature and forearm length.

The average height of males within a population is significantly higher than that of females 2, 3, 8. The results obtained in this study also show the same result. Variety of factors such as, age, race, gender and nutritional status affect human development and growth and therefore, different nomo-grams are required for different populations.[9,19]

It is observed in the present study that, the axial growth is proportion to the growth of

Fig 3: Scatter Plot and Regression Line Demonstrating the Relationship between Measured Height and Measured Forearm Length



the upper limbs, especially to the forearm. The values are not following any particular pattern but, there is a range of 3.6 to 3.7; which is coming as multiplying factor to the measured fore-arm length to estimate the stature of a person in the puberty age group. In our study, the correlation coefficient was found be statistically significant indicating a strong relationship between hand length and stature for Males and females respectively. It is recommended that similar studies on different age groups should be carried out to complement the results of the present study.

Conclusion

Estimation of stature is of paramount importance to forensic experts and anthropologists. There is a strong relationship between stature and forearm length. In this study there is a definite relation existing between the height and the forearm length. Axial and skeletal growths go hand in hand, provided there are no significant factors coming in the way of physical development. Some words of caution should be given when estimating stature. Human's of the same population vary in body proportions, even individuals are known to have same stature. This means that for every given stature, there are individuals with long trunks and short extremities or short trunks and long extremities, although the proportions are centered on mean population values. In general, higher the correlation between the measurements and the stature, the more accurate an estimate of the stature may be. There are lot of variations in estimating stature from fore-arm length measurement of people of different regions and races. So, there is a need to conduct more studies among people of different regions and ethnicity so that stature estimation becomes more reliable and identity of an individual is easily established.

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Journal of Cardiovascular Medicine and Surgery	2	5500	238
Journal of Orthopaedic Education	2	2500	190
Journal of Pharmaceutical and Medicinal Chemistry	2	3000	350
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Original Article

Delayed Deaths in Hanging: An Autopsy Review

R. Ravikumar*, Punitha R.**

Abstract

Hanging is one of the most common methods of suicide in India in which death of the individual occurs almost immediately. It is a widely practiced suicidal method in all cultures and has a very effective killing potential with a mortality of 80 percent. Death in hanging occurs immediately, however, a few cases have been reported in literature in which death has occurred after a certain period of time or the patient has survived after prolonged resuscitative measures. We report those cases of delayed death in hanging, for its rarity, for the discussion of the possible delayed causes of death in case of hanging and to emphasize the complications associated with delayed hanging. Present study is conducted on 76 cases of hanging deaths brought to mortuary of RRMC & hospital, Bangalore for postmortem examination from Jan 2013 to Dec 2013. The present study is conducted to analyze the cause of death in immediate & delayed cases of hanging.

Keywords: Hanging; Asphyxia; Delayed deaths; Encephalopathy; Pulmonary edema.

Introduction

Hanging is a form of asphyxia death due to constriction of the air passage at the neck, as a result of suspension of the body by a ligature in the form of a noose, applied in such a manner, when weight of the body acts as a constricting force.[1] Weight of the head (5kg-6kg) is enough to act as constricting force. Hanging is one of the commonest methods of suicide especially amongst the Asian countries. The incidence of hanging in India is approximately 25% of total cases of suicide. Hanging is known as a painless mode of death with a very narrow failure rate. Hanging is seen at all age groups. Hanging is always suicidal in nature until proved otherwise. Hanging usually ends in death, and about 80% of victims are found dead at the scene of the hanging. However, sometimes the hanging victims over live for some time, and sometimes even survive the hanging. A person can be saved by aggressive resuscitative measures if rescued within a few minutes of suicidal hanging. Only few persons survive this episode, if rescued promptly and usually die at a later stage, which more precisely can be called delayed hanging death. Here we report 3 cases of delayed deaths out of 76 cases of suicidal hanging with the victims eventually succumbing to one or more of the fatal complications after surviving for different time duration.

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Results

In 76 cases, death occurred immediately in 73 cases after hanging, in remaining 3 cases death occurred after few days of hanging. The post mortem examination and histo-pathological reports confirmed the causes of death in these cases.

Case 1

Deceased was a 22 year old male who

survived for 3 days following hanging with mechanical ventilator support. He was clinically diagnosed to have suffered hypoxic ischemic encephalopathy and aspiration pneumonia due to hanging. The patient was on a mechanical ventilator for 3days. On postmortem examination the external features were unremarkable except the presence of faint ligature mark over the neck. On internal examination brain was edematous, the lungs were edematous, features of consolidation were noted, and on cut section of lung pus mixed froth was noted. Histopathology of brain showed features of hypoxic encephalopathy with pulmonary edema. Death is due to hypoxic encephalopathy and pulmonary edema consequent upon hanging.

Case 2

Deceased was a 30yr old female who survived for 6days following hanging. She was on mechanical ventilator. After 5days of intubation, she developed seizures & died of cardiac arrest. On postmortem examination external features were unremarkable except for the presence of ligature mark over the neck which was partially healed. On internal examination blood stained froth present in the larynx & trachea. Both the lungs were edematous & features of consolidation present. Brain was edematous. On cut section blood mixed pus present. Stomach showed presence of 50ml of blood. Histopathology confirmed the pulmonary edema of lungs with hemorrhage. Death is due to pulmonary edema and hemorrhage consequent to hanging.

Case 3

Deceased was a 53yr old male who survived for 36hrs following hanging. He was intubated & finally died due to Hypoxic encephalopathy & aspiration Pneumonia. On postmortem examination ligature mark was present over the neck. Both lungs were edematous and had consolidation features. On internal examination fracture of superior horn of thyroid cartilage & greater cornu of thyroid cartilage was noted. Death is due to complications consequent upon hanging.

Discussion

Hanging is a form of asphyxia death due to constriction of the air passage at the neck, as a result of suspension of the body by a ligature in the form of a noose, applied in such a manner when weight of the body acts as a constricting force.[2] Death occurs within 2-3 minutes in majority of hanging cases. In our study, instantaneous death occurred in 73 cases, most commonly due to asphyxia and venous congestion. Death usually occurred immediately after constriction of neck due to obstruction of the airway either through compression of the trachea or displacement posterior of the tongue and floor of the mouth resulting in asphyxia and associated venous congestion in most of the cases. Ischemic cerebral damage due to neck compression caused by compression of the blood vessels of the neck resulting in insufficient amount of oxygenated blood reaching the brain is seen in most of the cases.[3] While the remaining 3 cases showed delayed death following hanging. Prinsloo and Gordon, Sapiro and Meritz described late causes of death in hanging a few decades ago and Narayan Reddy has thrown some light on the same.[2]

In the present study delayed death is mainly seen in male which is consistent with existing literature on delayed hanging deaths which is predominantly seen in male, with an average age of 40 years.[4,5] The clinical features of a patient of hanging involve respiratory and central nervous system signs and symptoms.[6] The common respiratory signs are respiratory distress, hypoxia, pulmonary edema etc; and signs related to CNS are like restlessness, unconsciousness, muscular rigidity, convulsions, amnesia, hemiplegia etc.[7]

Delayed death for several days is usually rare. Delayed death occurs due to aspiration pneumonia, infection, edema of lungs, edema of larynx, hypoxic encephalopathy, infarction

in the brain, abscess of brain, & cerebral softening.[2] Delayed death can occur after any number of days. Most of the studies show that delayed death is most commonly due to hypoxic encephalopathy and pulmonary edema which is consistent with our study.

Hypoxic ischemic encephalopathy is an important complication in a patient who survives an attempt of hanging. Hypoxic brain injury or global cerebral ischemia occurs due to reduced cerebral blood flow over the entire brain. At the time of hanging, oxygen supply is decreased to brain because of pressure on carotid, severe enough to damage brain cells. This hypoxia ultimately leads to encephalopathy which is consistent with our case. Necrosis of brain cells leads to inflammatory reactions, which ultimately causes swelling and edema. Brain edema together with postural lung congestion and infection leads to respiratory failure.[8] Decreased perfusion of the brain occurs when blood flow to it is partially or completely restricted, when blood pressure is very low, or when circulation ceases entirely. These conditions deprive the brain not only of oxygen but also glucose and all other nutrients as well as the nutrient/waste exchange process required to support brain metabolism, resulting in the development of a hypoxic-ischemic state and resulting in death of the individual.[6] Most often it is the inadequate oxygenation and cerebral perfusion that result in the death of the patient.[9]

Next common cause in delayed hanging death is development of pulmonary oedema. Development of pulmonary edema has played a major role as one of the causes of death in delayed hanging. The pathophysiology of type I post-obstructive pulmonary edema as in post hanging is thought to be influenced by both hydrostatic forcesand increased permeability of alveolar epithelium following sudden upper airway obstruction.[10] Pulmonary capillary membrane damage leads to increased capillary permeability, hyperemia in the lungs due to abrupt fall in intrapulmonary pressure following sudden removal of airway obstruction and pulmonary vasoconstriction mediated by vasoactive substances like histamine, serotonin and kinins; the release of which is triggered by cerebral hypoxia.[11] If patient is rescued within few minutes of hanging, may be saved from pulmonary edema by applying specific resuscitative measurements.[12]

The other rare causes for death in delayed hanging are aspiration pneumonia, brain absess, septicemia.

Victims of hanging usually die within period of three to five minutes.[13] In our study 3 cases succumbed to delayed death, after variable durations ranging from 3 days to 6 days. Pulmonary edema and hypoxic encephalopathy are the most common complications. If patients rescued within few minutes of hanging, may be saved by applying specific resuscitative measurements and usually die at a later stage. In our study all the 3 cases were in unconscious state till the death which is consistent with study by maxeiner where he reported delayed hanging death in six cases of suicides who were all unconscious throughout till death.[14] In another study from Delhi, an uncommon accidental hanging of an adult male was reported who got trapped in the lift of a building and was accidentally hanged. He also survived for 39 days in the hospital and died.[15] Aggarwal *et al* from Delhi (India) reported a similar case where a 20 year old female survived for nine days in the hospital being unconscious throughout, after a hanging episode and died ultimately due to cerebral anoxia.[6] So delayed death can occur after any number of days following hanging.

Conclusion

Hanging is a painless method of committing suicide and death is instantaneous. Only few persons survive this episode and usually die at a later stage. Most of the delayed death is due to hypoxic encephalopathy and pulmonary edema which is consistent with our study. If above complications are promptly treated patient may be saved from delayed deaths due to hanging.

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Original Article

Profile of Road Traffic Accident in Rural Areas of Salem: 4 Year Retrospective Study

S. Sasi Kumar*, Pavanchand Shetty, Selvam V.*****

Abstract

The present study was conducted at Vinyaka Mission Kirupananda Variyar Medical College Hospital, Salem. Hospital records of the road traffic accident cases admitted in our hospital from 2008 to 2012 were studied. In our study we observed that men out numbered women. Highest incidence of Road Traffic Accident was in the age group of 21-30 years (29.3%) followed by 31-40 years (23.3%). Maximum number of cases occurred during between 6 pm to 12 pm followed by 6pm to 12 pm. Maximum number of cases were seen in spring season followed by summer season. Maximum number of victims were Two Wheeler Riders (126 cases), followed by pedestrians (52 cases). Maximum number of Injuries were Fractures (124 cases**)** followed by Laceration (116 cases) and Abrasion (110 cases). There was alcohol smell in their breath in 6.6 % of cases.

Keywords: Road traffic accident; Pedestrian; Two wheeler.

Introduction

In developed countries, RTA is the most common cause of death below the age of 50 years. Worldwide, the number of people killed in RTA is almost 1.2 million each year, while the number Injured could be as high as 50.[1] In India, over 80,000 persons dies of Road Traffic Accident annually and over 1.2 million get Injured seriously and about 3,00,000 get disabled permanently.[2] With increasing population, increasing registration of automobiles every month, rampant encroachment of roads and chaotic traffic system has taken rapid strides in road traffic accidents. Road traffic accident constitutes one of the most frequent serious problems in management for emergency room surgeons. Most of them are preventable with strict implementation of road safety measures. The present study has been carried out regarding the various epidemiological factors, pattern and distribution Injuries and thereby to plan successful measures against it.

Materials and Methods

This is a Retrospective study conducted at Vinyaka Mission Kirupananda Variyar Medical College Hospital, Salem. Hospital records of the road traffic accident cases admitted in our hospital from 2008 to 2012 was studied. Information regarding Patients age, sex, occupation, Type of Injury, Place of accident, and Type of vehicle and Cause of death was taken from the hospital cases sheets. Statistical analysis was done using SPSS software.

Results

In our study we observed that men out numbered women (Table 1). Highest incidence of Road Traffic Accident was in the age group of 21-30 years (29.3%) followed by 31-40 years

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Table 1: Gender Distribution (n=300)

Gender	Number of cases	Percentage
Males	226	75.3
Females	74	24.7
Total	300	100

Table 2: Age Incidence (n=300)

Age in years	Number of cases	Percentage (%)
<10	22	7.3
11-20	26	8.7
21-30	88	29.3
31-40	70	23.3
41-50	34	11.3
51-60	32	10.7
61-70	22	7.3
71-80	6	2
Total	300	100

Table 3: Time of Accident

Time of burn	Number of cases	Percentage (%)
6am-12 pm	80	26.7
12 pm-6 pm	90	30
6 pm-12 pm	106	35.3
12 am-6 am	24	8
Total	300	100

(23.3%) (Table 2). Maximum numbers of cases occurred during between 6 pm to 12 pm (Table 3) followed by 6pm to 12 pm. Highest numbers of cases were seen in spring months (Table 4) followed by summer months. Maximum number of victims were Two Wheeler Riders (126 cases), followed by Pedestrians (52 cases) (Table 5). Maximum number of Injuries were Fractures (124 cases**)** followed by Laceration (116 cases) and Abrasion (110 cases) (Table 6). There was alcohol smell in their breath in 6.6 % of cases & in 93.4 % of cases there was no alcohol smell in their breath (Table 7).

Discussion

Maximum number of road traffic accident victims were males (75.3%) compared to females (24.7%).These findings are in concurrence to the studies reported by Harish *et al*[3],Tirpude BH *et al*[4], Biswas *et al*.[5] The reason could be most of the outside work is carried out by male. Male is using vehicles most frequently than females.

Table 4: Seasonal Variation in Hospital Admission

Season	Number of cases	Percentage (%)
Winter (Dec - Feb)	106	35.1
Spring (Mar - may)	140	46.4
Summer (June - August)	14	4.6
Autumn (Sep – Nov)	40	13.9
Total	300	100

Table No. 5: Type of Vehicle

Type of Vehicle	Number of cases	Percentage (%)
Pedestrian	52	17.3
Two Wheeler Rider	126	42.0
Pillion Rider	26	8.7
3 or 4 Wheeler Rider	48	16
Passenger	48	16
Total	300	100

Table 6: Type of Injury

Type of Injury	Number of cases	Percentage (%)
Abrasion	110	36.5
Contusion	104	34.4
Laceration	116	38.4
Fracture	124	41.3

Table 7: (n=300)

	Number of cases	Percentage
Alcoholic	20	6.6
Non-Alcoholic	280	93.4
Total	300	100

Table 8

Type of Victim	Injuries present over the body region				
	Head and face	chest	Abdomen	Upper limb	Lower limb
Pedestrian	28	4	0	15	30
Two wheeler rider	54	12	6	40	42
Pillion rider	44	4	4	20	6
3 or 4 wheeler rider	34	2	5	15	14
Passenger	20	8	5	10	12
Total	180	30	20	90	104

The Highest numbers of accidents were noted in the age group of 21-30 years (29.3%), followed by 31-40 years (23.3%). This is in accordance with findings observed by Jha *et al*[6][6], Chandra *et al*[7], Satyasi *et al*.[8] The reason for above is in this age group people are the bread winners of the family and remain outdoors most of the time. Persons in old age and children are confined to the residential premises only.

Maximum incidence of Road Traffic Accidents was reported to have happened during between 6 pm -12 pm (35.3%). This is similar to studies done by Biswas[5], Ghangale. [9] This time travelling will be at its peak. Majority of the people after completing the work, school they travel to the destinations with sense of urgency.

Highest numbers of cases were seen in spring months (46.5%) (Table 4) followed by summer months (35.1%). This is in contrast to studies done by Hetal *et al*[10], Kachre *et al*[11],where highest number of cases was seen in monsoon months.

Maximum number of victims were Two Wheeler Riders (126 cases), followed by pedestrian (52 cases). This is in contrast to studies done by Munawwar *et al*[12], Pradeep Kumar Singh *et al*[13], Singh H and Dhattarwal SK[14] where highest number of victims were pedestrians. The reason could be drivers fault by consuming alcohol and driving, rash and negligent driving. Another reason could be bad road and ignorance of traffic rules by drivers.

Maximum number of Injuries were Fractures (124 cases**)** followed by Laceration (116 cases) and Abrasion (110 cases). In our study there was alcohol smell in their breath in 6.6 % of cases. There was no alcohol smell in their breath in remaining 93.4% cases. It is well known that consumption of alcohol has adverse effects on the driver in the form of visual blurring, increased reaction time, motor co-ordination and Impairment of Judgement. We had distributed the Injuries according to the presence on various body regions in relation to type of victim. Many persons have Injuries over single, double or more body regions. Maximum number of victims had Injuries over head region (180 out of 300 victims). Among the victims two wheeler riders had maximum number of Injuries over head region.

Conclusion

Road traffic accident was high among younger age group. The incidence of road traffic accident was more in males. Maximum numbers of cases occurred during between 6 pm to 12 pm. Highest numbers of cases were seen in spring months. Maximum number of victims were Two Wheeler Riders. Maximum number of Injuries were fractures. Alcohol smell was present in breath of 6.4 % victims.

Helmets on all riders of bicycle, motorcycles are to be made compulsory to prevent head Injuries. Seat belts are to be made compulsory for all drivers and passenger of cars and other four wheelers. Greater awareness about traffic rules and proper care while crossing. Proper legislation to avoid drunken driving and in repetitive offender license could be cancelled. There should be good road lighting and segregation of slow moving vehicles, pedestrians from highways and use of

subways for pedestrians.

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Original Article

Study of Various Bites among Agricultural Workers at a Tertiary Care Hospital of Maharashtra

Manwani Vijay Kumar*, Singh Bhoopendra, Pandey Sachin*****

Abstract

Background: Agricultural work is subject to the health risks inherent to a rural environment and at the same time to those deriving from the specific work process involved. It appears that a large number of people die from snakebites every year, with many cases in the south and southeastern regions of Asia. Most bites occur in rural areas where the work place (forest and field) is the most likely site. Scorpion bites & Spider bites too are a relatively frequent concurrence. **Objectives:** The main objective is to find out the magnitude and seasonal variations of various bites among agricultural workers in this area. **Mathodology:** *Type of Study*: It is a Cross-Sectional study . The study was conducted from the period of June 2009 to December 2011. **Data Collection:** Data collection was done through asking questionnaire from the patients/relatives; clinical examination and clinical case records of the patients. **Analysis of Data:** Data was analyzed in the form of percentage (%) and presented in the tabular form. **Results:** Total 301 patients of agriculture related biological health hazards were studied, out of these maximum number of patients were males (58.47%), followed by females (41.53%). Majority of the patients (30.57%) were belonging to age group of 20 to 35 years. Majority (81.72%) of the victims were from rural area followed by 18.28% of patients were from urban area. The maxium cases were due to snake bite (46.18%) followed by unknown bite (22.60%), scorpion sting (19.93%), insect bite (8.97%) & others (1.99). Among the majority cases (46.04%) of snake bites were during rainy season followed by winter (35.97%) and least (17.99%) cases were found during summer.

Keywords: AWs: Agricultural Workers; Snake bite; Scorpion sting.

Introduction

Agriculture is considered to be one of the oldest occupations, perhaps as old as human civilization. Approximately 2 billion people are engaged in agriculture and related work in the developing countries of Asia, whereas the developed countries contribution is merely 100 millions.[1] In a country like India, large workforce is employed in diverse settings. Today we have 360 million workforce, of which 225 million in agriculture & 120 million are in industrial sector.[2] 50% of our Gross Domestic Product is being contributed by agriculture sector.[3]

It appears that a large number of people die from snakebites every year, with many cases in the south and southeastern regions of Asia. Most bites occur in rural areas where the work place (forest and field) is the most likely site.[3] It is estimated that about 2,000,000 people are bitten by snakes annually in India out of which about 15000 to 20000 are fatal. This constitutes the majority of the fatal cases occurring due to snake bites worldwide.[4] Insect stings usually produce one of the two reactions; a local irrigative reaction and an allergic one. Prophylaxis will consist of adequate hypo sensitization of person who is hypersensitive to insect stings.

Spider bites too are a relatively frequent concurrence. The poison of spider bite has hypertensive action as well as action on central and peripheral nervous system resulting in muscle spasm. All the scorpion

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bites are not poisonous. The sting from species with a lethal poison produces general symptoms, as a result of the neuronal action.[3]

India being a country of agriculture, majority of its population is engaged in agriculture based activities in a varied manner either directly or indirectly. This sector of activity being most unorganized, very little attention has been given to the occupational health problems of these workers; though the need of investigation and intervention towards these problems has repeatedly been mentioned.[5]

Objectives

1) To find out the magnitude of various bites among agricultural workers.
2) To find out the area wise distribution of various bites.
3) To find out the seasonal variations of various bites.
4) To give the necessary recommendations for the prevention of various bites.

Material & Methods

Study Design

It is a Cross-Sectional study. The study was conducted from the period from June 2009 to December 2011.

Study Area

Pravara Rural Hospital of Rural Medical College Loni falls under Ahmednagar District of Western Maharashtra, which is a tertiary care teaching hospital chiefly catering the demands of Ahmednagar and adjacent districts of Maharashtra and thus acts as an apex referral institution. The Ahmednagar district has 80.34% rural population and 19.66% urban population. Majority of the people in study area are engaged in agricultural activities.

Data Collection

1) A pilot study was conducted on 30 patients. Data collection was done through asking questionnaire from the patients/relatives; clinical examination and clinical case records of the patients.

Analysis of Data

Data was analyzed in the form of percentage (%) and proportion and presented in the tabular form. Chi- square($\div^2$) test was applied as a test of significance with the help of statistical software SPSS statistics (version-17).

Results

Out of total 301 cases, the maximum number of patients were males (58.47%), followed by females (41.53%). Majority of the patients (30.57%) were belonging to age group of 20 to 35 years. Males (30.57%) were preponderant in the age group of 20 to 35 years followed by females (20.94%), in the same age group (Table 1). Male:Female ratio was 1.40:1. Mean age was 30.36 with SD of 15.19. This highlights that majority of the respondents were between age group of 20 to 35 years which is physiologically active and most commonly engaged age group in agricultural activities. The Majority (81.72%) of the respondents were from rural area followed by urban (18.28%) (Table 2). Further more a significant number of patients were from urban area it cpould be due to it is a tertiary care teaching centre and patients also came from urban area. Males were more (48.17%) as compared to females (33.55%) in rural area similar pattern is observed in urban area. Amongst the cases there were majority cases of snake bite (46.18%) followed by unknown bite and sting (22.60%), scorpion stings (19.93%), insect bite (8.97%) & others (1.99) (Table 3). Where the majority of the cases (46.04%) of snake bites were during rainy season followed by winter (35.97%) and least (17.99%) cases were found during summer

Table 1: Age and Gender-wise Distribution of Cases

Age group	Male No. (%)	Female No. (%)	Total No. (%)
< 20	15(04.98)	09(02.99)	24(07.97)
20-35	92(30.57)	63(20.94)	155(51.51)
36-50	48(15.95)	36(11.96)	84(27.91)
>50	21(06.97)	17(05.64)	38(12.61)
Total	176(58.47)	125(41.53)	301(100)
Mean/ SD	30.53/15.47	30.10/14.75	30.36/15.19

Table 2: Area-wise Distribution of Cases

Area	Male No. (%)	Female No. (%)	Total No. (%)
Rural	145(48.17)	101(33.55)	246(81.72)
Urban	31(10.30)	24(07.98)	55(18.28)
Total	176(58.47)	125(41.53)	301(100)

Value of $\chi 2 = 4.224$, df=1, $p<0.05$, significant

Table 3: Distribution of Cases according to Types Various Bites and Stings

Hazard	Male No. (%)	Female No. (%)	Total No. (%)
Snake bite	71(23.59)	68(22.51)	139(46.18)
Scorpion stings	39(12.96)	21(06.97)	60(19.93)
Insect bite	18(05.98)	09(02.88)	27(08.97)
Unknown bite/sting	42(13.95)	26(08.65)	68(22.60)
Others	06(01.99)	01(0.33)	07(02.32)
Total	176(58.47)	125(41.53)	301(100)

Value of $\chi 2 = 7.469$, df=5, $p>0.05$, not significant

Figure 1

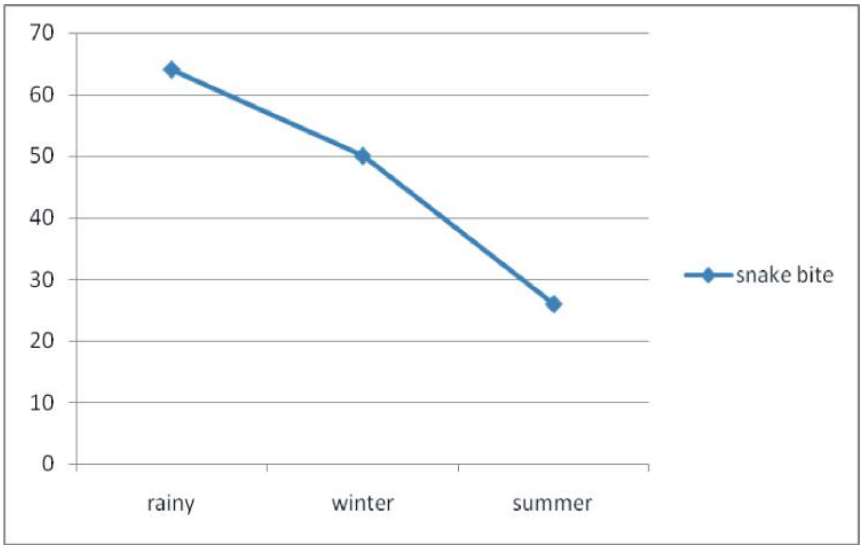

Table 4: Association between Cases of Snake Bite and Other Bites and Stings Versus Seasonal Variations

Hazards	Season			
	Rainy	Winter	Summer	Total
Snake Bite	64 (46%)	50 (36%)	25 (18%)	139
Other Bites	53 (33%)	65 (40%)	44 (27%)	162
Total	117 (39%)	115 (38%)	69 (23%)	301

Value of $\chi 2 = 6.406$, df=2, $p<0.05$, significant

Table 5: Seasonal Variation of Cases of Nnake Bite (N=139)

Season	Male No. (%)	Female No. (%)	Total No. (%)
Rainy	30(21.58)	34(24.46)	64(46.04)
Winter	27(19.42)	23(16.55)	50(35.97)
Summer	14(10.07)	11(07.92)	25(17.99)
Total	71(51.07)	68(48.93)	139

Value of χ2= 0.866, df=2, p>0.05, not significant

(Table 4). It may be due to logging of water in the hiding places of snakes and they are forced to come out during rainy season.

Discussion

In the present study majority (81.72%) of the respondents were from rural area. It could be due to this hospital is situated in rural area and there is less awareness, less facilities, less acess to safe technology, more number of AWs and farming is a major occupation in rural area. Similar findings reported by B.N. Gupta *et al*[6] (78.84%) of agricultural workers were from rural area and 21.16% from urban area. Sharma *et al*[7] also found that the majority (78.7%) of the patients were belonging to rural area and rest 21.3% from urban area similar to present study. Findings of the present study were different from study of Nayak CS *et al*[8] (N=138) in which majority of the cases were belonging to urban area because they conducted their study in a urban area. Phalke D.B. *et al* (2009)[9] study also revealed that the majoirity (64.90%) were males followed by females (35.09%) in the age group of 21 to 30 years. Majority of the snake bite cases (74.50%) were amongst those directly involved in the agricultural work. Kwan LEE and Hyun Sul LIM[10] also found that prevalence of snake bite as compare to other biological hazards. In contrast to present study it was observed that majority of the cases of snake bites were seen in summer, because in their study area due to different geographical and environmental conditions, pit vipers bites were commonest occurrence and pit viper appear in late april and go into hibernation in mid november and this snakes are most active in summer. Similar findings were revealed by Bawaskar HS *et al*[11] (53.8%) , Hati AK *et al*[12], Brunda G *et al*[13], Batra AK *et al*[14] (70%) and Kirte RC *et al*[15](35.5%), where they found high incidence of cases of snake bites in the rainy season. However in contrast to our findings, Suleman MM *et al*[16] found 75% of the cases of snake bites in the summer season beause they have studied in a desert area and pit viper bites were most common in their study area.

Recommendations

1. Snake bites, scorpion stings and other bites are the preventable events and can be prevented by simple protective measures like wearing gumboots, hand gloves and wearing protective clothes and carrying flashlight at night, need to be popularize amongst the agricultural workers.
2. One of the most important and simple components of the control programme is health education to agricultural workers.
3. There is need of further exploratory research in direction of prevention and control of incidence of various bites amongst agricultural workers.

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Original Article

Electrical Burns: 5 Year Retrospective Study

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Abstract

It was a 5 year retrospective study from January 2005 to December 2009. We analysed patients, who sustained electrical burns, admitted in the burns Ward under department of plastic surgery in Kasturba Medical College hospital, Manipal. Total of 303 cases were admitted during that period. Out of 303 patients 51 (16.8%) patients were admitted due to electrical burns. In our study Electrical burn was high in males (92%), as compared to females (8%). Majority of the patients were in the age group of 21-30 years (50%). followed by 41-50 years (19%) and 31-40 years (15%). Most common occurrence of electrical burn was work place (58%) in our study followed by outdoor (27%). In Electrical burns deep burns (33%) were common as compared to superficial burns (15%). Majority of the case happened during day time (86%).

Keywords: Electrical burns; Deep burns; Day time.

Introduction

Electricity is the main part of the life. Electrical Injuries still produce significant morbidity and mortality. Approximately 1000 deaths per year are due to electrical Injuries in United States, with mortality rate of 3-5 %. Electrocution remains one of the top five leading occupational killer in united states.[1,2] The spectrum of electrical injuries are very broad, ranging from minimal complication to severe multi organ dysfunction to death. Though Electrical Injuries are occurring mainly in the work place, It still occur in home and outdoors. The etiological factors for electrical injuries are vary in different places. Electrocution is usually accidental, of course suicidal cases of electrocution are also on record but this is a rare and unusual method. The majority of the electrical burns are as a result of ignorance, misuse or carelessness[3] while there is plenty of scope to reduce the incidence of burn. The aim of this study is to analyze the epidemiological characteristics in manipal and to prevent such incident in future.

Materials and Methods

It was a 5 year retrospective study from January 2005 to December 2009. We analysed patients, who sustained electrical burns, admitted in the burns Ward under department of plastic surgery in Kasturba Medical College hospital, Manipal.

The information regarding age and sex of patients, type of burn, place of electrical burn, timing of electrical burn, depth of burns and cause of electrical burns were extracted from patients hospital files and was incorporated into our proforma.

Statistical analysis was done using SPSS software

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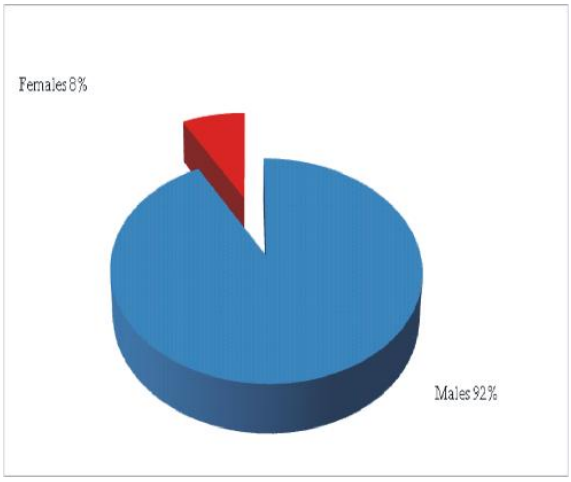
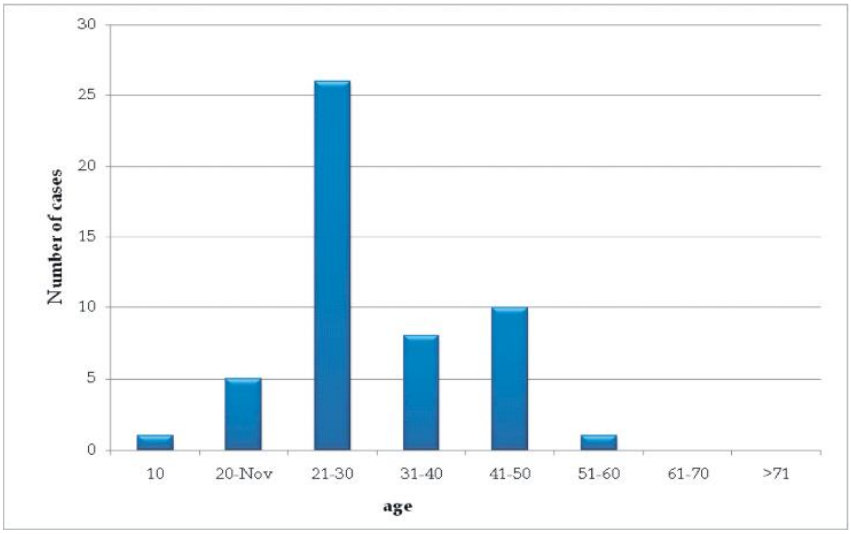
Graph 1: Gender Distribution



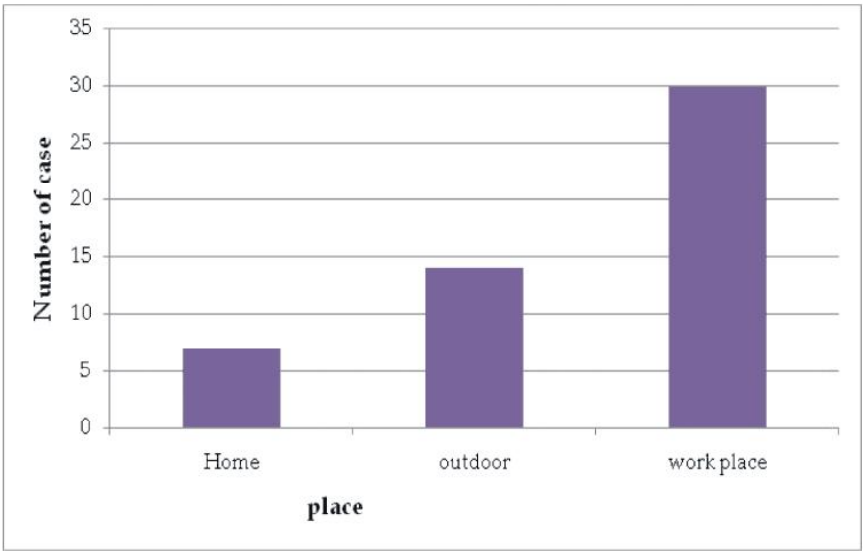
Results

Total of 303 cases were admitted in the burns ward under the Department of Plastic Surgery, Kasturba Medical College, Manipal, during the period of 5 years from January 2005 to December 2009. Out of 303 patients 51 (16.8%) patients were admitted due to electrical burns. In our study Electrical burn was high in males (92%), as compared to females (8%) (Graph 1). Majority of the patients were in the age group of 21-30 years (50%). followed by 41-50 years (19%) and 31-40 years (15%) (Graph 2). Most common

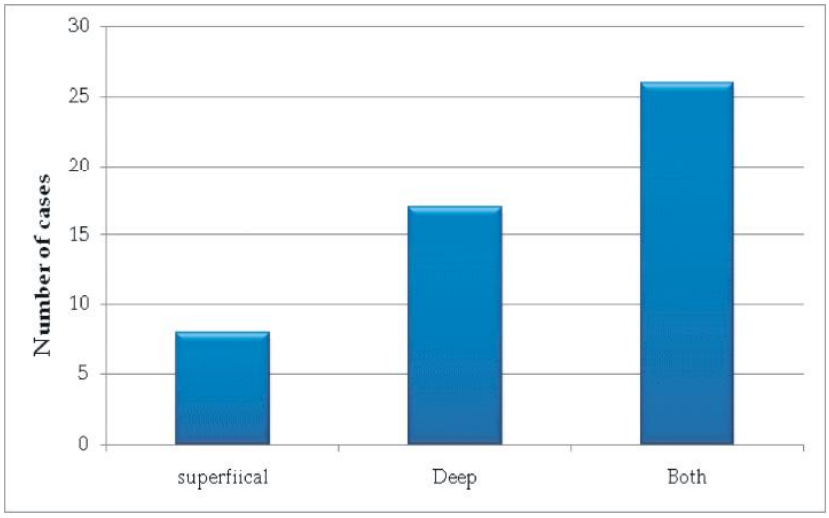
Graph 2: Age Incidence



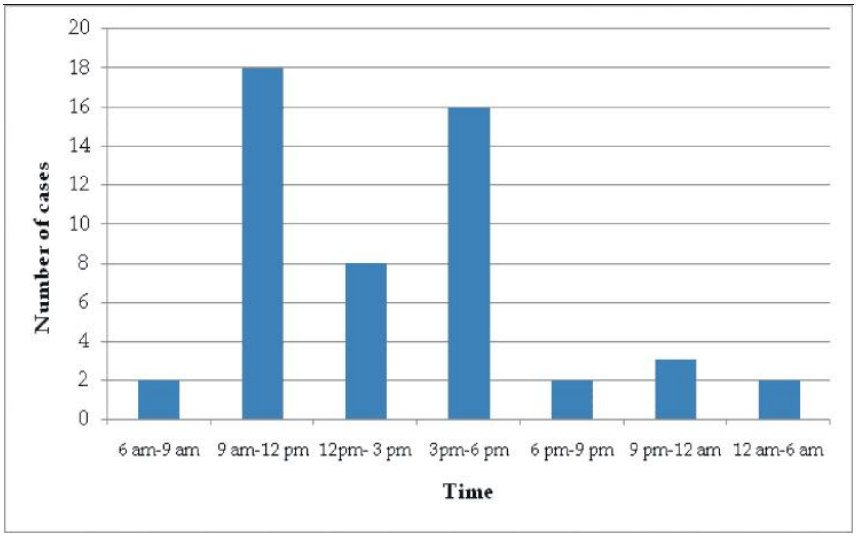
Graph 3: Place of Burn



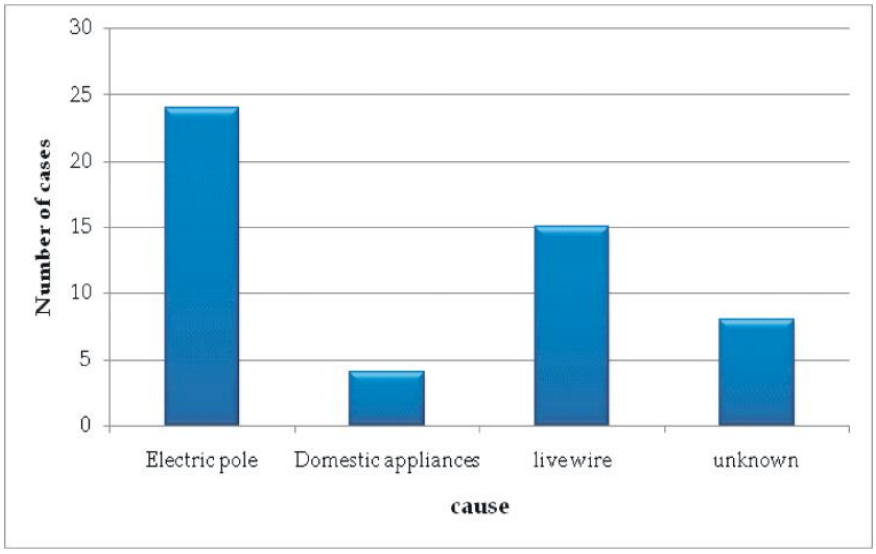
Graph 4: Depth of Burn



Graph 5: Timing of Electrical Injuries



Graph 6: Cause of Electrical Injuries



occurrence of electrical burn was work place (58%) in our study followed by outdoor (27%) (Graph 3). In Electrical burns deep burns (33%) were common as compared to superficial burns (15%) (Graph 4). Majority of the case happened during day time (86%) (Graph 5). The common source responsible for electrocution was electric pole (47%) (Graph 6), followed by wires and domestic appliances.

Discussion

Out of 303 patients 51 (16.8%) patients were admitted due to electrical injuries.

Our results also showed a higher rate of electrocution in males (92%) as compared to females 98%) these findings are similar to studies conducted by Regula wick R *et al*[5] Preetinder singh *et al*[6] Manish shrigiriwar *et al*[7] which suggest that males are more exposed to the risk of electrical injuries, and hazardous situations both at home and at work place. Males are likely to use variety of electrical equipments in the work and domestic environment. This may be because many time in Indian scenario males are the only bread winners for the family.

In our studies cases were predominantly in the age group of 21-30 yrs (51%) which is consistent with studies done by kusa kumar shaha *et al*[8] and sheikhazadi *et al*[9] Rautji *et al*.[10] This age group people are actively involved in contact with the electric instruments like wires and accessories and attempt to repair the sudden failure of the instrument.

Most common place of occurrence of electrical injury is at work place (58%) in our study which is against study conducted by Yasar Tirasci *et al*[3] Abdolaziz Rastegar Lari *et al*[11] where home is the most common occurrence of place. The reason could be attributed to the fact that Electricians and builders who are working on electric lines or poles or on transformers are susceptible to the electrical injuries.

Eighty six percent of the electrical burns were reported between at 9am-12 pm, as against 14 % who sustained during night time which can be explained by work related burns during day time. We observed in electrical burns, deep burns (33%) were common as compared with superficial burns (15%). Which were also reported by Analacti *et al*[13], Hadjiiski[14] and Mostafa hemada *et al*[15] who were required to stay for longer time and had severe complication because of deep burn injuries.

The most common source responsible for electrocution was electric pole (47%) followed by wires and domestic appliances which is against the study conducted by Preetinder singh et al[6] where electrocution was mostly from electric wires followed by switches.

Conclusion

In our study male outnumbered female. Majority of the patients were in the age group of 21-30 years. Most common place of occurrence of electrical burn was at work place in our study. Most of the electrical burns were deep burns followed by superficial burns. Majority of the case happened during day time.

The first step towards a successful prevention of Electrocution at work place is to educate and create awareness among the high risk groups comprising of the Electrician and workers who are at risk of exposure.

In Home young children should not be allowed to play with electrical equipments. Recent advances in the electrical safety equipment in the home and Industries will prevent from electrocution Injury.

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Case Report

Sirenomelia: Mermaid Syndrome – A Rare Autopsy Case Report

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Abstract

Sirenomelia, the Mermaid Syndrome is a rare and lethal congenital anomaly with an incidence of one in 60,000 pregnancies. Sirenomelia is characterized by fusion of the lower limbs, commonly associated with renal agenesis, absent external genitalia and other gastrointestinal defects. We report a case of sirenomelia in a stillborn 26 wks fetus received for autopsy. Apart from the characteristic features it was also associated with single umbilical artery, potter's facies and hypoplasia of various internal organs. Ultrasound may be useful in the early antenatal detection of this anomaly however coexisting oligohydramnios as in this case makes the visualisation of caudal extremity difficult. Early prenatal diagnosis should be the aim to minimize the trauma related to the termination of pregnancy at advanced gestation.

Keywords: Sirenomelia; Mermaid syndrome.

Introduction

Sirenomelia is a rare birth defect also known as 'Mermaid syndrome' due to characteristic fusion of both lower extremities which look like Mermaids tail, found only in one in 60,000 live births.[1] Up till now, only 300 live births have been reported and only two of them are alive at present.[2] It is more frequent in males and in one of identical twins.[1] Sirenomelia is usually associated with severe anomalies like bilateral renal agenesis which is incompatible with life in majority of cases. The presence of oligohydramnios due to bilateral renal agenesis usually hinders adequate ultrasonographic exploration of caudal extremity of the fetus hence diagnosis is usually made at autopsy.[3] Here we present a rare case of sirenomelia with multiple associated anomalies diagnosed on autopsy.

Case History

A 24 yrs old primigravida presented with complaints of abdominal pain and history of 5mths amenorrhoea. There was no prior antenatal checkup or ultrasonography. There was no significant medical history. Emergency ultrasound revealed oligohydramnios and bilateral renal agenesis. She delivered a dead fetus of 26 wks of gestational age weighing 700 gms, which was received for autopsy.

Post-mortem X-ray revealed sacral agenesis,

Figure 1: X-Ray Showing Single Femur and Redundant Tibia

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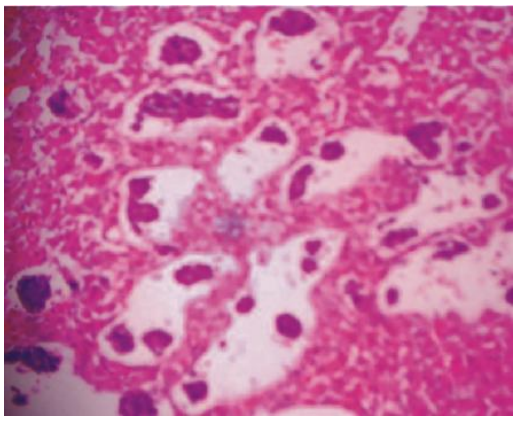
Figure 2: External Examination Revealed Fusion of Both Lower Limbs Forming One Segment without Feet (Sirenomelia Apus)

single femur and redundant tibia (Figure 1). External examination revealed fusion of both lower limbs forming one segment without feet, looking like a tail of 12 cms length. The above findings were consistent with the diagnosis of Sirenomelia apus (Figure 2). Single umbilical artery (Figure 3), potter's facies, cutis laxa, imperforate anus, external genitalia agenesis were also noted.

Figure 3: Single Umbilical Artery

Figure 4: Blind Pouch of Rectum

Figure 5: Microscopy Showing Abortive Tubules in Adrenals (H&E 400x)



In situ examination revealed non-aerated hypoplastic lungs, intestinal diverticulum, blind pouch of rectum (Figure 4), bilateral renal agenesis and urinary system agenesis. Testis like structures found in lower abdomen (confirmed microscopically). Microscopically adrenal tissue revealed few abortive tubules (Figure 5).

Discussion

Sirenomelia Sequence or Mermaid Syndrome was originally described by Rocheus in 1542 and Palfyn in 1553 and named after the mythical Greek sirens4. It is a severe developmental field defect of the posterior axis caudal blastema, resulting in apparent fusion of the lower limb buds1. Around 300 cases reported in the world literature, of which 13 have been from India.[2]

Sirenomelia is classified depending on extent of fusion of lower extremities as 1) sirenomelia apus: no feet, only one tibia and one femur, 2) sirenomelia unipus: one foot, two femora, two tibiae, two fibulae and 3) sirenomelia dipus: two feet and two fused legs.[5] This case was of sirenomelia apus. Stocker and Heifetz classified sirenomelia into type I to type VII, according mainly to the presence of skeletal elements in the thigh and leg. In type I, the mildest form, all bones in the two fused limbs are present, and the fusion only affects superficial tissues. In type VII, the

most severe form, only a single bone is present, with no indication of legs or feet.[6]

Various theories have been postulated to explain the etiology of sirenomelia. Theories range from intrauterine force, failure of development of caudal somites, injury to the caudal mesoderm between 28-32 days of fetal development, neural tube overdistension in the caudal area to the more recent vascular steal theory.[7] Vascular stealing due to presence of single large umbilical artery leading to abnormal ischaemic development of caudal end of the embryo is one of the most favoured theory. Single umbilical artery was also noted in this case.

Other anomalies in the present case included potter's facies (large, low-set ears, prominent epicanthal folds, hypertelorism, flat nose, and receding chin)8, cutis laxa, imperforate anus, external genitalia agenesis, non-aerated hypoplastic lungs, intestinal diverticulum, blind pouch of rectum, bilateral renal agenesis and urinary system agenesis.

Sirenomelia was earlier thought to be a form of caudal regression syndrome, however it is reclassified to be considered a separate condition. There is a strong association of Sirenomelia and Caudal Regression Syndrome with maternal Diabetes. Although in this case the mother did not have evidence of this risk factor but should be counselled about early screening in the subsequent pregnancy. Several anomalies are common to both conditions, but presence of an aberrant abdominal umbilical artery/"persistent vitelline artery" has been invoked as the chief anatomic finding that distinguishes Sirenomelia from Caudal Regression Syndrome.[4]

The sirenomelia is diagnosed by sonography as early as 9 weeks. Diagnosis is difficult during the second trimester because of the severe oligohydramnios.[2] In our case, the diagnosis was primarily of bilateral renal agenesis and oligohydramnios during scan. The lower limbs were not seen properly due to severe oligohydramnios.

Survival depends on the associated anomalies, especially renal function. Treatment includes supportive care and multidisciplinary surgical approach. Owing to visceral abnormalities, sirenomelia is usually incompatible with life; death occurs in the perinatal period.[2] At present only two have survived for years since birth with the oldest one being 25 yrs old now.

Conclusion

Sirenomelia is a rare multisystem congenital malformation of unknown etiology. This is a rare autopsy case of sirenomelia apus with associated agenesis and hypoplasia of diverse internal organs. Early diagnosis of this fatal anomaly is useful so that the option of pregnancy termination may be given to the parents and to minimize the trauma related to the termination at advanced gestational age.

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Corporate (collective) author

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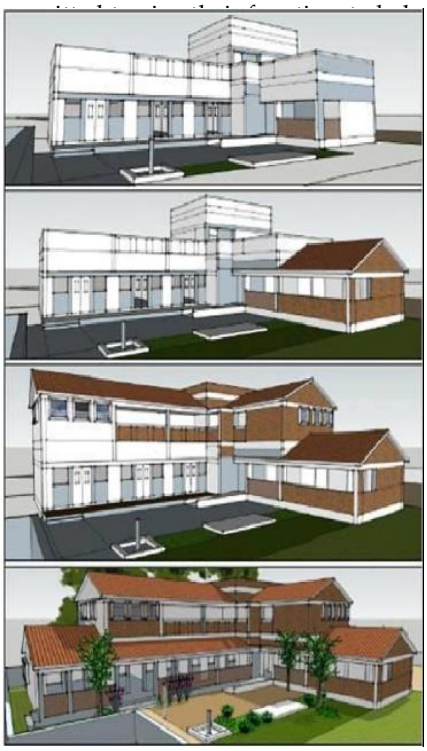
Over 250 children in Belsar village in India, in the backwards rural District of Gonda in Uttar Pradesh (see map) will be without a school building by the end of this school year… unless we help them to pay for building materials for a new school building. Parents who are masons, carpenters and others are c and construct the building. World Without Obstacles – a registered NGO enabled this initiative.



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In total we need about INR 52 lakh to realise the complete multi-functional school building with 10 class rooms. One class room on average costs around INR 4 lakh. Phase 1 was partly financed via a global online crowd funding campaign. To allow the children continuity of education in the next school year we need to complete construction