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Compression Injuries of Neck: A Microscopic Analysis of Skin and Subcutaneous Tissues

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Abstract

Background: Amongst all the mechanical asphyxial deaths "compression of neck" forms the biggest chunk of the pie. In deaths due to compression of neck, faint ligature mark or absence of ligature mark poses limitations in arriving at conclusion of mechanical asphyxia due to compression of neck. Further limitation is posed in cases of decomposed bodies where the ligature mark may not be obviously appreciable. **Material & Method:** A retrospective analysis of deaths due to mechanical asphyxia by compression of neck was conducted at the department of Forensic Medicine and Toxicology, JSS Medical College, Mysore, Karnataka, India. A total of 40 cases, subjected to forensic autopsy formed the cohort of study. The details were retrieved from the autopsy reports including histopathology, done from January 2005 to December 2010. Gross and microscopic findings of the compression marks were analyzed. **Result:** The ligature mark was completely encircling the neck in 50% of cases. Microscopic findings were remarkable with varying degrees of vital reactions. Thinning of epidermis, crowding and compression of keratinocytes were seen in 67.5% of the cases which were the most consistent microscopic features. The importance of microscopic analysis for timing such injuries as to antemortem or postmortem is discussed with a forensic viewpoint. **Conclusion:** It is a useful tool in faint ligature mark and in putrefied bodies to arrive at the cause and manner of death.

Keywords: Forensic autopsy, compression of neck, mechanical asphyxia, histopathology.

Introduction

Amongst all the mechanical asphyxial deaths "compression of neck" forms the biggest chunk of the pie. Compression injuries on neck are characterized by a 'ligature mark', as seen in cases of hanging and ligature strangulation. Although the neck is constricted by a ligature material in both the cases, the constricting force is endogenous in former and exogenous in later [1]. In hanging the force applied to the neck is derived from the gravitational drag of the weight of the body or part of the body of the victim [2]. But in strangulation the active force from outside is used to cause the constriction.

In deaths due to compression injuries of neck, the mark on the neck is the principal sign, though not the conclusive one. If the mark is dried and brown in appearance, it may have been applied before or soon after death. Exercising caution from the experiments of Casper, who concluded that a mark of hanging took place during life can also be produced if the body is suspended within a couple of hours or even longer after death, the evidence/ findings, etc must be scrutinized in entirety [3]. It is suggested that a portion of the skin and deeper tissue in relation to the ligature mark

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should be examined microscopically for the evidence of tissue reaction [3]. A thorough microscopic examination may reveal the presence of effusion of red cells but there would be no evidence of tissue reactions which takes some hours to develop [4]. The absence of tissue reaction does not exclude ante-mortem hanging. In deaths due to compression of neck, faint ligature mark or absence of ligature mark poses limitations in arriving at conclusion of mechanical asphyxia due to compression of neck. Further limitation is posed in cases of decomposed bodies where the ligature mark may not be obviously appreciable.

The objectives of this study were to analyze the gross pattern of compression on the neck, the microscopic features in the underlying subcutaneous tissues and its association with the configuration of ligature mark as well as the degree of decomposition.

This study emphasizes on the importance of microscopic analysis of skin and subcutaneous tissue from ligature site and shows that microscopic examination of 'ligature mark' is more conclusive in comparison to gross examination.

Material and methods

This is a 5 year retrospective autopsy study done on a cohort of 40 cases of asphyxial deaths due to compression of neck carried out at department of Forensic Medicine and Toxicology, JSS Medical College, JSS University, Mysore, Karnataka, India from January 2005 to December 2010. The said cohort consisted of 38 suicidal hanging, 2 ligature strangulation, including 2 decomposed bodies. Gross and microscopic findings of the compression marks were retrieved from the autopsy reports and the data was compiled and analyzed.

Results and Observations

Observations were made as in terms of gross and microscopic changes at the ligature site. The gross study revealed that the ligature mark was encircling the neck completely in 50% (n=20) of cases and incomplete in remaining 50% cases (n=20) [Figure 1].

In 95% of the study sample, the ligature mark was seen above the level of thyroid cartilage, which was due to hanging. In 5% of the cases, the mark was seen at the level of the thyroid cartilage, caused by strangulation [Figure 2]. The ligature mark was deep and obvious in 62.5% of the cases, and was faint or absent in the rest [Figure 3].

The subcutaneous area of ligature mark showed microscopically dilated and congested vessels in 85% of cases. Thinning of epidermis and crowding and compression of keratinocytes were seen in 67.5% of the cases, followed by crowding and pushing up of adnexal structures, in 40% of the cases. Rolling and focal fragmentation of epidermis was seen in 30% and 15% of the cases respectively. Separation of layers was appreciated in 10% of cases. [Figure 4].

In 2 cases of strangulation the microscopic features of epidermal thinning, crowding and pushing up of adnexa with separation of layers was noted along with dilated and congested vessels in the epidermis. Rolling and focal fragmentation were seen in one case.

In putrefied cases which formed 5% of the sample, epidermal crowding, fragmentation, rolling and thinning was appreciated in both the cases. [Figure 5] However the sub-epithelial region showed necrosis of tissue.

Discussion

Anatomically, the skin consists of epidermis & dermis as two main layers [5-6]. Epidermis is composed of a keratinised stratified squamous epithelium that grows continuously but maintains its normal thickness by the process of desquamation. The dermis is composed of a dense connective tissue that imparts mechanical support, strength and thickness to the skin. The hypodermis contains variable amounts of adipose tissue arranged into lobules separated by connective tissue septa. It lies deep to the dermis and is equivalent to the subcutaneous fascia [5].

Fig 1. Course of ligature mark around the neck

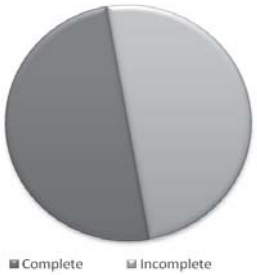


Fig 2. Position of ligature mark

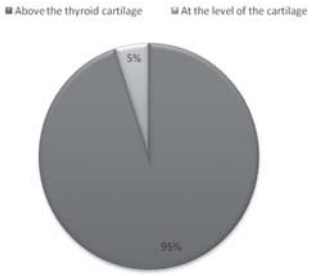


Fig 3. Configuration of ligature mark

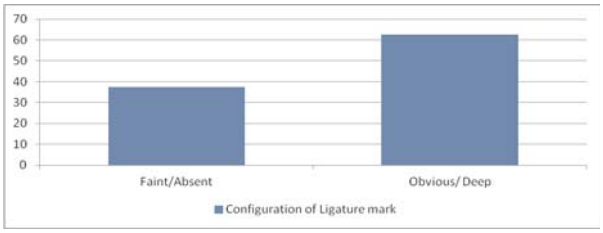


Fig 4. Graphical representation of incidence of histopathological changes in skin in compression injuries of neck

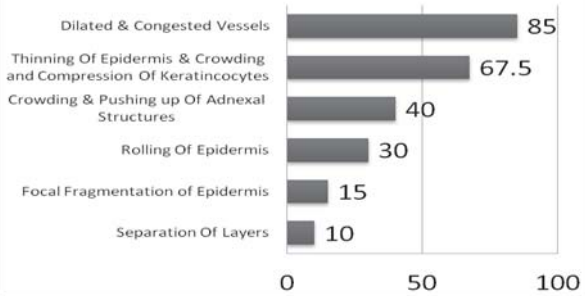
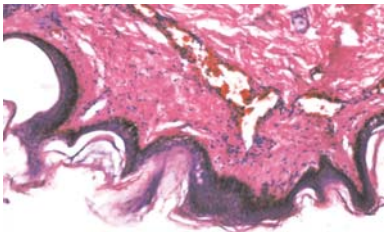


Fig 5. Section of skin from ligature showing thinning of epidermis



The thickness of the skin varies over the surface of the body, from less than 1mm to more than 5mm. The skin on the face and neck is considered as relatively thin in comparison to those of palms and soles [5]. The anatomical configuration of the skin derives much significance while interpreting the nature of forces on the surface, as in compressive neck injuries.

While analysing the study cohort, it was observed that in majority of the cases the ligature mark was deep (62.5%) and placed above the level of thyroid cartilage (95%). Microscopy showed dilated and congested vessels in the dermis (85%) along with epidermal thinning and crowding of keratinocytes (67.5%) [Figure 6]. A similar study conducted by Yadav A and Gupta BM Showed dilated and congested vessels in 31% of the cases [7].

Microscopic analysis of ligature mark was positive for compressive forces as evidenced by epidermal thinning (67.5%), focal fragmentation (15%) [Figure- 7], rolling (30%) and separation of layers [Figure 8]. In a reported study, it was shown that 46% of the cases had epidermal thinning followed by focal fragmentation in 35% and rolling in 44% of the cases [7]. Crowding and pushing up of adnexal structures also favours compression as the causative force. The term focal fragmentation means discontinuity of the epidermis and rolling indicates increased waviness of the epidermis. The underlying dermis is devoid of adnexal structures like hair follicles, sebaceous glands. The presence of these alterations in the skin, either alone or in various permutations and combinations, suggests that mechanical compression of neck has taken place.

It was further observed that the microscopic changes were positive irrespective of ligature mark being complete/ incomplete or faint/

obvious. Even in putrefied bodies which formed 5% of the study sample the microscopy was positive.

Ante-mortem nature of injury was confirmed by 'dilated and congested vessels' in the upper dermis. The absence of tissue reaction and lack of congestive changes however cannot be taken as evidence that the body was hung after death [8].

Fig 6. Section from skin showing crowding and compression of keratinocytes

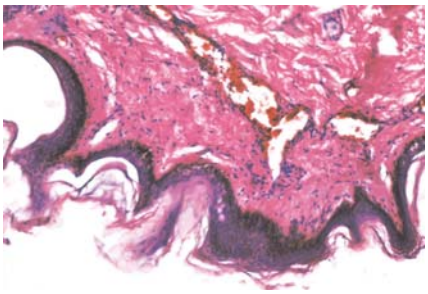
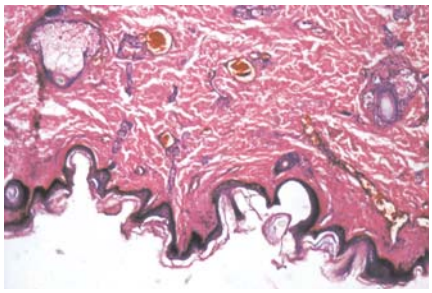


Fig 8. Section from skin showing rolling of epidermis and dilated and congested vessels in the dermis



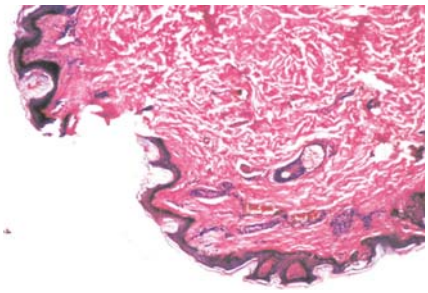
Conclusions

The present study re-affirms on the routine microscopic analysis of ligature mark in all cases of compression of neck by ligature. It is a useful tool in faint ligature mark and in putrefied bodies to arrive at the cause and manner of death. It would facilitate in administering the justice.

Limitations of the study

The current study is a retrospective analysis done on a smaller study cohort. A prospective study including a larger sample would be more beneficial.

Fig 7. Section from skin showing focal fragmentation



References

1. Nandy A. *Principles of Forensic Medicine Including Toxicology*. 3rd Edn. Kolkata; New Central Book Agency (P) Ltd, 2010; 517.
2. Saukko P, Knight B. *Knights Forensic Pathology*. 3rd Ed. London; Arnold, 2004; 383.
3. Vij K. *Textbook of Forensic Medicine and Toxicology,* 5th Ed. New Delhi; Elsevier, 2011; 127.
4. Mant AK. *Taylor's Principles and Practice of Medical Jurisprudence,* 13th Edn. London; Churchill Livingstone, 1984; 316.
5. Ross MH and Pawlina W. *Histology – A Text and Atlas*. Chapter 15: Integumentary system, 6th Edn. Philadelphia; Lippincott Williams & Wilkins, 2011; 488-489.
6. Singh IB. *Textbook of Human Histology,* 6th Edn. New Delhi; Jaypee Brothers; 2011; 203-204.
7. Yadav A, Gupta BM. Histopathological changes in skin and subcutaneous tissues at ligature site in cases of hanging and strangulation. *J Indian Acad Forensic Med* 2009; 31(3): 200-204.
8. Reddy KSN. *The essentials of Forensic Medicine & Toxicology,* 28th Edn. Hyderabad; Medical Book Company, 2009; 299.

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An Analysis of Gender Differences in Learning Style Preferences among Medical Students

Agnihotri Arun Kumar*
Agnihotri Smriti**
Singh Ashok Pratap***
Googoolye Krishnee****

Abstract

Background: Learning style is a way of learning that allows the individual to learn best. Four learning styles which are often identified in students are *visual, auditory, reading/writing and kinaesthetic (VARK).* The VARK focuses the learners to use their senses i.e. hearing, seeing, reading, writing and experiencing to learn. **Materials & Method:** A newest version of the VARK questionnaire (16 questions) was administered to 208 third and fourth year medical students (104 males and 104 females) during their course of forensic medicine course at SSR Medical College. The Students were allowed to choose multiple answers as per instruction given on the prescribed questions' sheet. The scoring algorithm of VARK was then applied to identify the modality preference of each student. **Result:** The results from a chi square analysis ($\div^2$=0.710, df = 3 and p = 0.871) indicated that there was no difference in learning preferences by gender. **Conclusion:** VARK encourages teachers to respect the diversity of the learners. The students have ability to learn in different ways, if the methods of teaching are appropriate to the students' preference.

Keywords: Learning styles; Gender difference; VARK; Medical Students.

Introduction

Learning style preference is the manner that allows the individual to learn most efficiently and effectively. According to Tanner el al [1], the knowledge of the students' learning style preferences is aid in the development of the most effective teaching approaches. The student population is very diverse with differing abilities and mode of learning. They prefer to take new information mainly by three major sensory modalities: visual (V), aural (A) and kinaesthetic (K), collectively known as VAK. This classification was further expanded by Fleming [2] to VARK by splitting the visual component into two categories: those who prefer graphical or pictorial representations of their incoming information (V) and those who prefer textual representations such reading/ writing (R). According to Miller [3], the students' motivation and performance can be improved by adapting teaching approaches to meet the different learning style preferences of these students.

There is a large amount of literature available on gender difference in learning. Honigsfeld analysed the learning styles of adolescents from diverse nations by age, gender, academic achievement, brain processing, culture and creative thinking, and found the gender as an important factor to influence the students' learning style [4]. Lie et al [5] reported that males have a preference for logical thinking and rational evaluation whereas females tend to look for personal connections and relevance with learning material. Chang [6] suggested that males are more achievement oriented and

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females are more performance oriented. Wehrwein et al [7] conducted a study on eighty six undergraduate physiology students and found a significant gender differences in their learning style preferences. Slater et al [8] observed that the female students tended to be more diverse than male students, encompassing a broader range of sensory modality combinations within their preference profiles. The present study was aimed to test the hypothesis that the males and females have different learning style preferences.

Methodology

Sample

A total of 208 third and fourth year medical students (104 males and 104 females) within the age ranging from 20 to 28 years have participated in this study. The study was conducted in the Department of Forensic Medicine, SSR Medical College, Mauritius in the year 2010.

Procedure

The newest version of VARK questionnaire [9] consists of 16 questions (Appendix-1) was applied to third and fourth year students for the assessment of their learning style preferences. The students were asked to complete the questionnaire in 15 minutes and allowed to choose multiple answers per question to adequately describe their preference(s). The students preferences were analysed for each of the four sensory modalities (V, A, R and K) and for all possible combinations of these modalities such as six possible bimodal combinations (VA, VR, VK, AR, AK and RK), four possible trimodal combinations (VAR, VAK, VRK and ARK) and one quadrimodal (VARK).

Scoring

The students' modality preferences were identified by using following steps:

1. The following VARK scoring chart (as mentioned in Table-1) [9] is used to find out VARK category for each question by encircling the letter(s) that correspond to the student's answers.

Table 1. VARK Scoring Chart

Questions	Categories			
	a	b	c	d
1	K	A	R	V
2	V	A	R	K
3	K	V	R	A
4	K	A	V	R
5	A	V	K	R
6	K	R	V	A
7	K	A	V	R
8	R	K	A	V
9	R	A	K	V
10	K	V	R	A
11	V	R	A	K
12	A	R	V	K
13	K	A	R	V
14	K	R	A	V
15	K	A	R	V
16	V	A	R	K

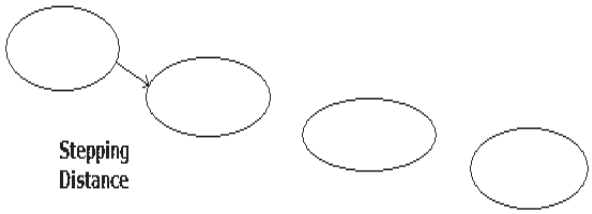
2. The score was calculated as table-II mentioned below:

Table II. Score Calculation Chart

Total number of circled Vs
Total number of circled As
Total number of circled Rs
Total number of circled Ks
Total

3. The students' modality preferences were identified by using a set of four stepping stones (Figure 1). The scores of each VARK category were entered on the stones from highest to lowest with their V, A, R and K labels[9].

Fig 1. A set of four stepping stones



4. The stepping distance was derived from total score as mentioned below Table III [9]:

Table III. Calculation of Stepping distance

Total score	Stepping distance
14-21	1
22-27	2
28-32	3
More than 32	4

5. Now, the highest score on first stone was checked (ticked) and then the next stone was checked if the step is equal to or less than the stepping distance (Table IV).

6. If two or more preferences are checked, the student is considered to have multimodal preferences.

7. If the student has single preference, the strength was determined as mild, strong or very strong as below:

Table IV

Total Score	Difference between two highest scores									
	0	1	2	3	4	5	6	7	8	9 or more
21 or less	Multi-modal	Multi-modal	Mild	Mild	Strong	Strong	Very Strong	Very Strong	Very Strong	Very Strong
22-27	Multi-modal	Multi-modal	Multi-modal	Mild	Mild	Strong	Strong	Very Strong	Very Strong	Very Strong
28-32	Multi-modal	Multi-modal	Multi-modal	Multi-modal	Mild	Mild	Strong	Strong	Very Strong	Very Strong
More than 32	Multi-modal	Multi-modal	Multi-modal	Multi-modal	Multi-modal	Mild	Mild	Mild	Mild	Very Strong

Statistical analysis

Data were reported as percentages of male and female students in each category of learning style preference. A x^2 analysis was performed to determine if significant gender differences exist in the categories such as quadrimodal, trimodal, bimodal and unimodal.

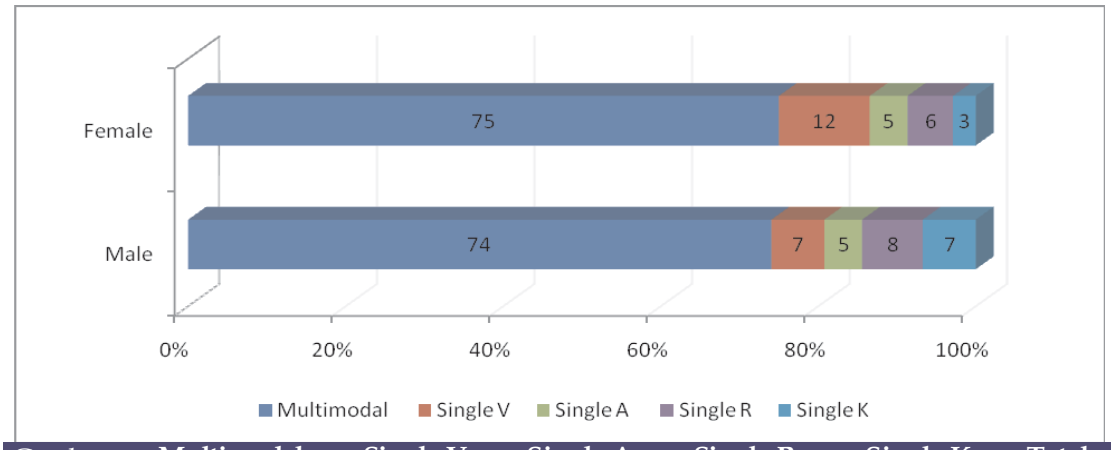
RESULTS

Figure 2 shows the percentages of male and female students who preferred multimodal and unimodal styles of information presentation.

Chi square analysis

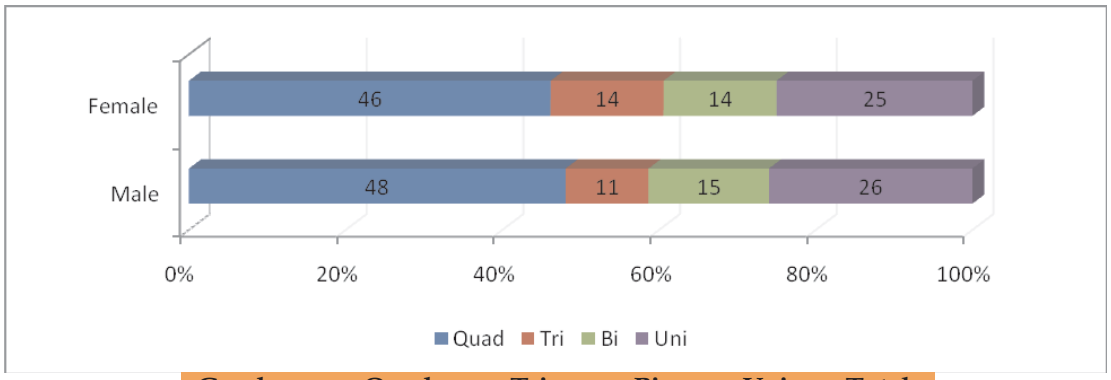
Chi square analysis was performed to determine whether there was any association between gender and learning preferences. The test revealed no significant association with x^2 =0.710, df = 3 and p = 0.871. In other words,

Fig 2. Shows the percentages of male and female students' learning preferences



Gender	Multimodal	Single V	Single A	Single R	Single K	Total
Male	**77**	**7**	**5**	**8**	**7**	**104**
Female	**78**	**12**	**5**	**6**	**3**	**104**
Total	**155**	**19**	**10**	**14**	**10**	**208**

Fig 3. Shows the percentages of male and female students who prefer one, two, three or four modes of information presentations



Gender	Quad	Tri	Bi	Uni	Total
Male	50	11	16	27	104
Female	48	15	15	26	104
Total	98	26	31	53	208

Fig 4. Shows the gender comparison for unimodal learning preferences

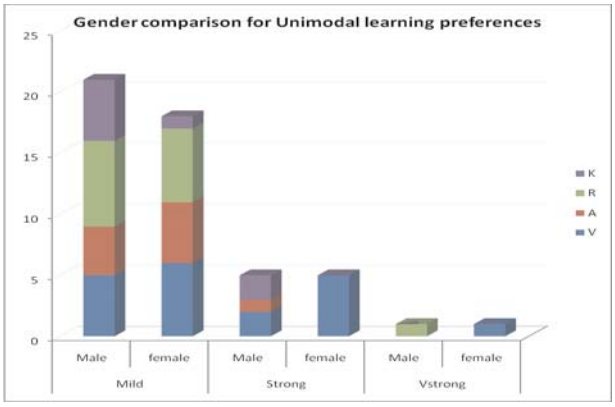
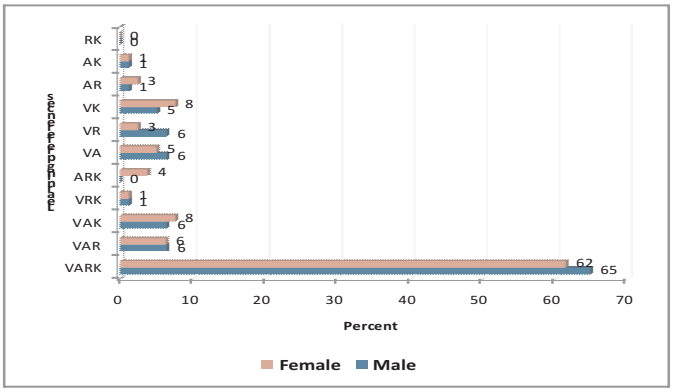


Fig 5. Shows the breakdown of bimodal, trimodal and quadrimodal preferences by gender



there was no difference in learning preferences by gender.

Discussion

Gender * learning _ pref Cross tabulation

			learning_pref				
			bi	quad	tri	uni	Total
Gender	Male	Count	16	50	11	27	104
		Expected Count	15.5	49.0	13.0	26.5	104.0
	Female	Count	15	48	15	26	104
		Expected Count	15.5	49.0	13.0	26.5	104.0
Total		Count	31	98	26	53	208
		Expected Count	31.0	98.0	26.0	53.0	208.0

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	.707 [a]	3	.871
Likelihood Ratio	.710	3	.871
N of Valid Cases	208		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 13.00.

The knowledge of student preferred learning styles is vital for the educators. Knowing students' preferred learning style helps to overcome the predisposition of many educators to treat all the students in a similar way (2). This study shows that both males and females preferred multimodal learning. This modality preference was almost similar in both male (75%) and female (74%) students who preferred learning by utilizing all four sensory modalities (VARK). This finding is supported by other previous studies conducted on medical (8, 10, 11) and dental students (12). These results are not surprising because in general sense, all physically unimpaired students use their all senses to take information at given time. In contrast, Wehrwein et al (7) observed that male undergraduate students of physiology preferred multimodal preferences, whereas female students preferred unimodal styles with a preference towards K. It is possible that multimodal learners may have stronger learning outcomes than unimodal learners.

Further studies are required to understand these findings.

The breakdown of multimodal preferences reveals no significant variations between the genders (female with 10 out of 11 and male with 9 out of 11 possible combinations). Slater et al (8) found greater diversity among the female population. They observed that male styles were concentrated in smaller subsets with only 6 (AK, AR and ARK are missing) of the 11 possible combinations. Dobson (13) indicated that females and males had significantly different learning style preferences.

Conclusion

VARK encourages teachers to respect the diversity of the learners. The students have ability to learn in different ways, if the methods of teaching are appropriate to the students' preference. This study revealed no significant difference in learning preferences by gender.l

References

1. Tanner K, Allen D. Approaches to biology teaching and learning: learning styles and the problems of instructional selection-engaging all students in science course. *Cell Biol Educ* 2004; 3:197-200.
2. Fleming ND. *I'm different; not dumb*. Modes of presentation (VARK) in tertiary classroom. In: Research and Development in Higher Education, edited by Zelmer A. Proceedings of the 1995 Annual Conference of Higher Education and Research Development Society of Australasia 1995; 35:308-13.
3. Miller P. Learning styles: the multimedia in mind. *Educ Resources Inform Center* 2001; 451:140.
4. A comparative analysis of the learning styles of adolescents from diverse nations by age, gender, academic achievement level and nationality. *Dissert Abstr Int* 2001; 62: 969.
5. Lie LY, Angelique L, Cheong E. how do male and female students approach learing at NUS? *CDTL Brief* 2004 Jan;7(1):1-3.
6. Chang WC. Learning goals and styles by gender- a study of NUS students. *CDTL Brief* 2004 Jan; 7(1):4-5.
7. Wehrwein EA, Lujan HL, DiCarlo SE. Gender differences in learning style preferences among undergraduate physiology students. A*dv Physiol Educ* 2007; 31:153-7.
8. Slater JA, Lujan HA, DiCario SE. Does gender influence learning style preferences of first-year medical students? *Adv Physiol Educ* 2007; 31:336-42.
9. Fleming ND. *VARK*: a Guide to Learn Styles (online) 2007. http://www.vark-learn.com/english/page.asp?p= questionnaire.
10. Baykan Z, Nacar M. Learning styles of first-year medical students attending Erciyes University in Kayseri, Turkey. *Adv Physiol Educ.* 2007; 31:158-60.
11. Lujan HL, DiCarlo SE. First-year medical students prefer multiple learning styles. *Adv Physiol Educ.* 2006; 30:13-16.
12. Murphy RJ, Gray SA, Straja SR, Bogert MC. Student learning preference and teaching implications. *J Dent Educ*. 2004; 859-66.
13. Dobson JL. Learning style preferences and course performance in an undergraduate physiology class. *Adv Physiol Educ*. 2009 Dec; 33(4):308-14.

Appendix 1. The VARK Questionnaire

1. I like website that have:

a. Things I can click on and do.
b. Audio channels for music, chat and discussion.
c. Interesting information and articles in print
d. Interesting design and visual effects

2. You are not sure whether a word should be spelled 'dependent' or dependand'. I would:

a. See the word in my mind and choose by the way it looks.
b. Sound it out in my mind
c. Find then in the dictionary
d. Write both words on paper and choose one.

3. You want to plan a surprise party for a friend. I would:

a. Invite the friend and just let it happen.

b. Imagine the party happening.

c. Make a list of what to do and what to buy for the party.

d. Talk about it on the phone and text others.

4. You are going to something special for your family. I would:

a. Make something I have made before.

b. Talk it over with my friends.

c. Look for ideas and plans from the pictures through books.

d. Find written instructions to make it.

5. You have been selected as a tutor or a leader for a holiday program which is interesting for your friends. I would:

a. Describe the activities I will be doing in the program.

b. Show them the map of where it will be held and photos about it.

c. Start practicing the activities I will be doing in the program.

d. Show them the list of activities in the program.

6. You are a buy a new digital camera or mobile phone. Other than price, what would most influence your decision?

a. Trying it.

b. Reading the details about its features.

c. It is the latest design and looks good.

d. The salesperson telling me about it.

7. Remember when you learned how to ply a new computer or board game. I learned best by:

a. Watching others to do it first.

b. Listening to somebody explaining it.

c. Clues from the diagrams in the instructions.

d. Reading instruction.

8. After reading a play you need to do a project. Would you prefer to?

a. Write about the play.

b. Act out a scene from the play.

c. Draw or sketch something that happened in the play.

d. Read a speech from the play.

9. You are about to hook up your parent's new computer. I would:

a. Read the instructions that came with it.

b. Phone, text or email a friend and ask how to do it.

c. Unpack the box and start putting the pieces together.

d. Follow the diagram that show how it is done.

10. You need to give directions to a person to go to a house nearby. I would:

a. Walk with them.

b. Draw a map on a piece of paper.

c. Write down the directions as a list.

d. Tell him the direction.

11. You have a problem with your knee. You would prefer the doctor to:

a. Show me a diagram of what is wrong.

b. Give me an article that explains knee injuries.

c. Tell me what is wrong.

d. Demonstrate what is wrong by using model.

12. A new movie has arrived in town. What would most influence your decision to go (or not to go)?

a. I heard friends talking about it.

b. I read a review about it.

c. I saw a preview about it.

d. It is similar to others you have liked.

13. Do you prefer a teacher who likes to use:

a. Demonstrations, models or practical sessions.

b. Class discussion and guest speakers.

c. A text book and handouts.

d. An overview diagram, charts and maps.

14. You are learning to take photos with your new digital camera or mobile phone. I would like to have:

a. Examples of good and poor photos and how to improve them.

b. Clear written instructions with lists and bullet points.

c. A chance to ask questions and talk about the camera's features.

d. Diagram showing the camera and how to use it.

15. You want some feedback about an event, competition or test. I would like have feedback:

a. That used examples of what I have done.

b. From somebody who discussed it with me.

c. That used a written description or table of my results.

d. That used graphs showing what I achieved.

16. You have to present you ideas to your class. I would:

a. Make diagrams or get graphs to explain.

b. Write few key words and practice what to say again and again.

c. Write out my speech and learn it by reading it again and again.

d. Gather examples and stories to make it real and practical.

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Evaluation of Different Errors in Writing Cause of Death Certificate

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Abstract

Background: Prompt and accurate certification of death is essential. This provides legal evidence of the fact and cause(s) of death, thus enabling the death to be formally registered. Death certification also provides data of mortality statistics. These are vital for public health surveillance and for a wide range of research – and thus ultimately for improving the health of the population. **METHODS:** This is a retrospective, descriptive, cross-sectional study. In this study, all issued death certificates in five private non-teaching hospitals in Davangere, during Jan., 2010 to Dec. 2010 were reviewed. The total 334 death certificates were considered for the study. The rate of documentation and errors were calculated. The questionnaire was designed according to aim of research and reliability was tested with Cronbach's alpha = 0.87 in a pilot study. **RESULTS:** The gross errors in writing Medical Certification of Cause of Death (MCCD) were the frequent findings in our study. Out of 334 MCCDs' evaluated, the name of deceased was not written correctly in 24.25% of cases. The sex and age are the two of the important demographic criteria which were not mentioned in more than 1/3 of cases. The Address of the deceased was not mentioned correctly in 21.84% cases. The date and time of death were not written properly in 17.07% of cases, but they are the very important factors to be mentioned in the cause of death certificate. The doctor's name was not written in more than 50% of cases. In 66 certificates, the place of death was not mentioned amounting to 19.76% of the total certificates. The Cause of Death was not correctly written in about 75% certificates. Mode of death was wrongly mentioned as cause of death in 35.33% of total cases. **CONCLUSION:** Evaluation of MCCD's shows significant number of errors in writing death certificate. The reasons being, low level training and callous attitude of the physicians towards writing death certificates. Training program in death certificate completion by physicians and improvement of diagnostic tests for better documentation are suggested. Physician's skills in death certificate completion can be improved with an educational intervention. An interactive workshop is a more effective intervention than a printed handout.

Keywords: Cause of Death, World health organization, medical certification, Autopsy, guidelines, Medical Certification of Cause of Death (MCCD).

Introduction

The death certificate is an important medical document that impacts mortality statistics and health care policy. Resident physician's accuracy in completing death certificates is poor [1]. The death certificate is the source for State and national mortality statistics and is used to determine which medical conditions receive research and development funding, to set public health goals, and to measure health status at local, State, national, and international levels. Death-related information is source for identifying the health prerequisites and formulating the related programs. Due to importance of data for decision making, evaluation of it to determine the rate of documentation and errors is necessary [2].

In order to examine the accuracy of death statistics, the present study analyzed the death certificates for various errors in writing the Medical Certification of Cause of Death

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(MCCD) Certificate. This study brings into realization that there is a high rate of error in wring the death certificates and also, there are a few useful and correctly written death certificates. Because statistical data derived from death certificates can be no more accurate than the information on the certificate, it is very important that all persons concerned with the registration of deaths strive not only for complete registration, but also for accuracy and promptness in reporting these events. Furthermore, the potential usefulness of detailed specific information is greater than more general information. Therefore, we want to propose several remedies to increase the accuracy of writing a death certificate [3].

Methods

In this retrospective, descriptive, cross-sectional study, all issued death certificates in five private non-teaching hospitals in Davangere, during Jan: 2010 to Dec: 2010 were reviewed. The characteristics of certifying death of deceased and the documentation error were checked with a checklist according to the WHO's model death certificate and for associated factors a self-administration questioners were used. The rate of different documentation errors in certifying the cause of death is calculated. The total of 367 death certificates were collected, out of which 33 were excluded. Thus remaining 334 death certificates were considered for the study.

Exclusion criteria

The certificates which were damp & black, crumbling due to moisture, & those which are only carbon copies nothing visible on the sheet.

Three groups comprising of 3 students each were formed to collect primary data written in English language from the hospitals selected for the study. They were given a tutorial as well as a printed form of MCCD along with a sheet having 10 columns to be filled (Parameters).

The parameters that were studied in details are as follow:

1. Errors in writing the Name of deceased (Illegible& Incomplete)
2. Absence Name of deceased in MCCD.
3. Age
4. Sex
5. Address
6. Place of death (POD)
7. Time of death (TOD)
8. Critical care Unit deaths not mentioning time of death.
9. Errors in writing Correct Cause of death (COD) in MCCD.
10. Cause of death not written in chronology: (Immediate cause à Antecedent cause à Other associated condition).

The questionnaires were designed according to aims of research and reliability was tested with Cronbach's alpha = 0.87 in a pilot study. Data were analyzed with simple mathematical calculations.

Results

Total 334 Medical Cause of Death Certificates evaluated, out of that the doctor's name who declared death or written MCCD was not written in more than 56% of certificates followed by the Age of the deceased not mentioned in 34.13% of certificates and signature of the doctor was missing in 107 cases amounting to 32.04% of cases. Furthermore some other important parameters like address of the deceased was not mentioned correctly in 28.14% certificates, name of deceased not written correctly in 24.25% of certificates, and the gender of the deceased was also not mentioned in about 2.% of cases. In addition to this the most important information of the cause of death certificate i.e. date and time of death is also not written properly in a significant number of certificates amounting to 17.07% of total cases (Table 1).

Table I. Showing different documentation errors in writing MCCDs

Parameter	Cases N= 334	Percentage (%)
Correct Name not mentioned	81	24.25
Sex not mentioned	07	02.10
Age not mentioned	114	34.13
Address not mentioned	94	28.14
Time of Death not mentioned	57	17.07
Doctors signature missing	107	32.04
Doctors Name not mentioned	188	56.29.

Amongst the total 334 cases of MCCDs evaluated, the place of death in case of deaths occurring at the hospitals, was correctly written in 268 death certificates (81.24%) and not at all mentioned in the remaining 66 death certificates which amounts to 19.76% of error. The commonest place of death was the hospital ward i.e 130 cases out of 334 certificates amounting to 38.92% cases followed by Causality where 110 cases died amounting to 32.93% and only in 26 cases the place of death was ICU/ OT amounting to 7.78% of total 334 certificates evaluated (Table-II).

Table II. Showing various PLACES OF DEATH in the hospitals and errors in mentioning the same in MCCDs

Place of Death	Cases N= 334	Percentage (%)
Place of Death not written	66	19.76
Causality	110	32.94
Ward	130	38.92
ICU/OT	26	07.78
Total	**334**	**100**

Amongst the total 334 cases of MCCDs evaluated, there is error in writing the Cause of Death in 251 certificates amounting to 75.15% of cases. Among these, in 118 certificates, Mode of death is wrongly mentioned as cause of death amounting to 35.33% of total 334 MCCD's evaluated, in 90 certificates cause of death is not mentioned / written at all amounting to 26.94% error and in 43 certificates, the Cause of Death is not written in chronological order amounting to 12.87% error out of total number of certificates evaluated. The cause of death is correctly and chronologically mentioned only in 83 certificates (24.85% cases) out of 334 MCCD's evaluated (Table III).

Table III. Showing errors in writing the correct cause of death in the MCCD

Cause of Death	Cases N= 334	Percentage (%)
Mode of death is mentioned as cause of death	118	35.33
Cause of Death Not written correctly	90	26.94
Cause of Death is not written in chronological order	43	12.87
Cause of Death is written correctly	83	24.85

Discussion

Data from death certificates constitute an essential component of national mortality and morbidity statistics. The Department of Health and family Services, the National Center for Health Statistics, and the National Death Index rely on the accuracy of these forms. In only 83 (24.85%) death certificates cause of death was documented correctly. The most common error being is failure to mention the doctor name (56.29 %) and least common error being failure to mention the sex of the deceased (02.10%) of total cases. Thus, MCCD documentation errors in our study are little better compared to study conducted at Mazandaran University of Medical Sciences, Iran during March 2004-5 [2]. Earlier studies suggest that the accuracy and reliability of certification of underlying cause of death is very poor, and error rates range from 16 to 40% [4-10]. In the present study, time and date of death was not mentioned in 57 (17.07%) of certificates. The date of death, a fact of

medico-legal significance, may sometimes be very important in subsequent handling of the affairs of the deceased. It should therefore always be indicated whether the date of death stated in the certificate was actually verified or whether it was estimated [8]. In the present study error in documenting the correct cause of death ranges from 12.87% to 35.33%. The inconsistency rate between the actual underlying causes of death and the underlying causes of death on death certificates was 18.9%, with the most frequent reason for inconsistency being the recording of an uncertain cause of death such as old age or unknown cause (53.3%), and next most frequent parameter being the recording of an interim result as the underlying cause of death (38.7%) [11]. In our study, occurrence of gross errors range from 12.87% to 56.29%. This is more compared to any of the previous such studies done in Australia and European countries [12]. The most common cause for error in writing cause of death certificate is the low level training or exposure of the doctor or physician in writing the certificate.

Conclusions

The Provision of data of vital and cause of death statistics is undoubtedly a primary purpose of death certificate, however , despite constantly increasing importance of this statistical aspect, it should not be forgotten that a death certificate is always also a medico-legal instrument. Equal consideration must be given to the statistical and medico-legal aspects of death certificates, and this will in turn enhance the reliability of cause of death statistics.

The accuracy of the certified information therefore rests more or less upon the authority of the certifier, who can seldom be known to all parties examining or using the death certificate. For this reason the reliability of death certificates or cause of death statistics cannot be considered unless laborious additional investigations are made. Physician's skills in death certificate completion can be improved with an educational intervention. An interactive workshop is a more effective intervention than a printed handout.[3]

Recommendations

The accuracy of the medical certificate of cause of death is ultimately based on its being a document of medico-legal character. Emphasis on this fact by the very manner in which the certificate form is drawn up and by other means provides a possibility- only partly utilized in most countries for improving the reliability of death certificates and cause of death statistics. To comply with medico-legal requirements the death certificate should be a medical certificate that contains all the information known to the certifier as to what caused or contributed the death and is capable of evaluated as to reliability. To attain this objective the death certificate form must have an adequate space for the medical entries and a detailed statement of the examinations that form the basis for the certification. Any doubt as to the time of death should be indicated.

Appropriate arrangements should be made so that the verified cause of death can be entered in the death certificate even in cases requiring lengthy examinations. The filling out of death certificate should be made as easy as possible, and consideration given to the increasing use of computers in many countries. The authorities verifying the certificates should each be provided an individual space on the form for annotations, since any information they may add enhances the reliability of certificate in many ways.

General instructions for writing cause of death certificate

Death certificates are permanent legal records from which official copies are made. It is essential that the certificate be prepared accurately. Completing a death certificate involves the following guidelines:

1. If you are a registered medical practitioner and were in attendance during the deceased's last illness, you are required to certify the cause of death as per the Births

and Deaths Registration Act 1953. You must state the cause or causes of death to the best of your knowledge and belief.

2. Death certification should preferably be carried out by a consultant or other senior clinician, if available at that time. Delegation of this duty to a junior doctor who was also in attendance should only occur if he/she is closely supervised.
3. Use the current form designated by the State.
4. Complete each item, following the specific instructions for that item.
5. Make the entry legible. Use a computer printer with high resolution, typewriter with good black ribbon and clean keys, or print legibly using permanent black ink.
6. Do not use abbreviations except those recommended in the specific item instructions.
7. Verify with the informant the spelling of names, especially those that have different spellings for the same sound ,
8. Refer problems not covered in these instructions to the State office of vital statistics or to the local registrar.
9. Obtain all signatures; rubber stamps or other facsimile signatures are not acceptable. If jurisdiction provides, authenticate electronically.
10. Do not make alterations or erasures.
11. File the original certificate or report with the registrar. Reproductions or duplicates are not acceptable.
12. Doctor should complete the counterfoil for your record in all cases.
13. In the following cases, doctor should not issue MCCD, and the death should be informed to the POLICE;

- The cause of death is unknown.
- The deceased was not seen by the certifying doctor *either* after death *or* within 14 days before death.
- The death was violent or unnatural or was suspicious.
- The death may be due to an accident (whenever it occurred).
- The death may be due to self-neglect or neglect by others.
- The death may be due to an industrial disease or related to the deceased's employment.
- The death may be due to an abortion.
- The death occurred during an operation or recovery from the effects of anesthetic.
- The death may be suicide.
- The death occurred during or shortly after detention in police or prison custody.

Most States require that the death certificate be completed and filed within a specified time period. Physicians are expected to use medical training, knowledge of medicine, available medical history, symptoms, diagnostic tests, and autopsy results, if available, to determine the cause of death.

References

1. Dhanunjaya R., Lakkireddy DR., Basarkodu KR., James LV., Kondur AK., Ramachandruni SK., Esterbrooks DJ., Markert RJ., et al: Improving Death Certificate Completion- A Trial of Two Training Interventions. *J General Internal Medicine* 2007; 22: 544–548.
2. Benyamin MS, Azar KZ, Ebrahim BF, Aliea ZA. Documentation of Data in Medical Certificate of Cause of Death According to WHO Roles. *Health Information Management Spring* 2010; 7(13)): 85-93.
3. Hoyert DL, Minino AM. *Physician's Handbook on Medical Certification of Death*: Department of Health and Human Services publication No-(PHS) 2003-1108: Hyattsville; Maryland, 2003.
4. Slater DN. Certifying the cause of death: an audit of wording inaccuracies. *J Clinic Pathol* 1993; 46: 232–234.
5. Peach HG, Brumley DJ. Death certification by doctors in non-metropolitan Victoria. *Aust Fam Physician* 1998; 27: 178–182.
6. Gjersoe P, Andersen SE, Molbak AG, et al. Reliability of death certificates. The

reproducibility of the recorded causes of death in patients admitted to departments of internal medicine. *Ugeskr Laeger* 1998; 160: 5030–5034.

7. Barber JB. Improving the accuracy of death certificates. *J National Med Assoc* 1992; 84(12):1007–1008.
8. Hanzlick R (editor): The Medical Cause of Death Manual. Instructions for Writing Cause of Death Statements for Deaths Due to Natural Causes. Northfield (IL); College of American Pathologists, 1994; 8-104.
9. Magrane BP, Gilliland MG, King DE. Certification of death by family physicians. *Am Fam Phys* 1997; 56: 1433–1438.
10. Jordan JM, Bass MJ. Errors in death certificate completion in a teaching hospital. *Clin Invest Med* 1993; 16: 249–255.
11. Won TY, Kang BS, Im TH, Choi HJ. The Study of Accuracy of Death Statistics. *J Korean Soc Emerg Med* 2007; 18(3): 256-262.
12. Weeramanthri T, Bensford B. Death certification in Western Australia— classification of major errors in certificate completion. Aust J Public Health. 1992; 16: 431–434.Antti Isotalo. Medico-legal aspects of Medical certification of cause of death. *WHO Bulletin* 1960; 23: 811-814.

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Study of Fingerprint Patterns in Myocardial Infarction

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Abstract

Background: Myocardial infarction is the most important cause of mortality and morbidity in the world. The knowledge of major risk factors can be useful in prevention of it. The objective of this study is to investigate the relation between the dermatoglyphic patterns as an indication of genetic susceptibility in the incidence of myocardial infarction. Dermatoglyphics has been well established as a diagnostic aid in a number of diseases having hereditary basis. **Materials & Method:** The method used to collect the dermatoglyphic patterns for the present study was standard ink method. Before taking the print persons asked to wash hands with soap and water to remove oil, sweat and dirt from the skin. Total 180 cases of both sex (90 patients of myocardial infarction & 90 controls normal healthy) were included. **Results:** It was found that patients of myocardial infarction have decrease in ulnar loops & increase in whorls and increase in total finger ridge count. These genetic factors are reflected as changes in dermatoglyphic pattern in patients of ischemic heart disease. Sophisticated investigations may not be possible in all cases. **Conclusion:** Dermatoglyphics may be used as a screening test & preventive measures in development of myocardial infarction.

Keywords: - Dermatoglyphics, Myocardial infarction, Palm print, Loops, Arches, Whorls.

Introduction

Dermatoglyphics is the scientific study of epidermal ridges and their configurations on volar aspect of fingers, palms, toes and soles. The term 'Dermatoglyphics' was first introduced by the Anatomist, Harold Cummins in 1926 [1]. The biologic, embryologic, anthropologic, forensic, clinical and genetic implications of friction ridges have been folded into one scientific discipline called 'Dermatoglyphics'.

The importance of dermatoglyphics is based upon the facts as mentioned below (Penrose and Ohara 1973) [2].

1. Each dermatoglyphic configuration is unique, not same even in monozygotic twins.
2. These remains unchanged throughout life and survive superficial injury.
3. Recording of ridge pattern can be done rapidly, it does not require expensive equipments and procedure is safe & atraumatic.
4. Can be studied immediately after birth.
5. Useful for screening large population.

Ridge differentiation takes place early in fetal life which is genetically determined and influenced by environmental factors. Once they formed, do not change throughout life. Genetically related medical disorders may be, studied with the help of dermatoglyphics. Heart diseases are now considered as number one killer in Western countries. Their diagnosis is often difficult due to scarcity of physical

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signs, specially in rural areas of developing countries where diagnostic facilities are lacking. It is, therefore, important to pay attention to the preventive aspects of the diseases. In the present study a preliminary observation was made of the usefulness of finger tip patterns in serving as predictor for myocardial infarction among individuals living in Sholapur district of Maharashtra [3].

Aims and objectives

1. To study dermatoglyphic pattern in patients suffering from myocardial infarction.

2. To compare the dermatoglyphic patterns in normal and patients with myocardial infarction.

Materials and methods

Materials used are wooden table of suitable height, porcelain tile, Kores duplicating ink, sponge rubber pad, a rubber roller, white bond paper, spirit, soap, water, towel, and magnifying lens.

The method used to collect the data for the present study was standard ink method. First of all selected subjects were asked to wash hands with soap and water to remove oil, sweat and dirt from the skin. The porcelain tile was kept on table. A small amount of ink was placed on the slab and spread with roller into a thin, even film. The area to be printed was pressed against the slab, taking care that, the whole area to be printed was covered with ink.

Palm Prints

A firm surface was used under the sheet of paper on which inked finger is pressed. Pressure is applied on interphalangeal joints, head of metacarpals and dorsum of hand. With the help of fingers or blunt end of the pencil little pressure is applied on the web space between the fingers. Complete palm impression including hallow of space was obtained over the paper. To ensure complete print and also to print the hollow of the palm, a sponge rubber pad was kept under the paper on which prints are made [4]. Thus prints of the both hands were obtained and recorded with care.

Fingertip Prints

The distal phalanges of person's right hand were inked over the tile by firm pressure starting from thumb (ulnar to radial side). White bond paper was kept on the edge of the table for recording the fingerprint pattern. Rolled finger prints were obtained starting from the thumb to little finger. The same procedure was followed for recording the finger prints of the left hand. Thus rolled finger prints of the both hands were obtained and recorded with care.

Collection of data

With the help of standard ink method, prints of 90 diagnosed myocardial infarction patients (45 males and 45 females) were obtained from Dept. of Medicine of Sholapur civil hospital, Maharashtra. Patient's age was between 28-75 years and diagnosis of myocardial infarction was confirmed by electrocardiogram and clinically. The controls (45 males and 45 females) were having age group of 28-75 years. All the data was analyzed qualitatively and quantitatively. Findings of each case were recorded and tabulated.

The following parameters were studied,

A) Finger tip patterns

The ridge patterns on the distal phalanges of the finger tip are divided into following types

1) Arch

It is formed by succession of more or less parallel ridges which traverse the pattern area and form a curve which is concave proximally. (As shown in Photograph No 1)

2) Loop

It is a series of ridges enter the pattern area on one side of the digit, re-curves and leave the pattern area on the same side. If the ridge opens on the ulnar margin, the resulting loop is termed as ulnar loop. If the ridge opens towards the radial margin the resulting loop is termed as radial loop. (As shown in Photograph No 1)

3) Whorl

In this ridges are commonly arranged as a succession of concentric rings. (As shown in Photograph No 1)

B) 'a-b' Ridge Count

Ridges on palms are often counted between two inter digital triradii. The ridge count most frequently obtained is in between triradii 'a' and 'b' which is denoted as 'a-b' ridge count. (As shown in Photograph No 2)

Finger-ridge count

The counting is done along a straight line connecting the triradial point to the point of core (centre of fingertip pattern). As arches do not have any triradius, so no finger ridge can counted. In case of whorl, it has two triradii, so it has two ridge counts, out of which larger one is taken because ridge count expresses pattern size.

The triradius is formed by the confluence of three ridge systems. The digital triradii located in the distal palm in the region of heads of metacarpal bones. These are almost always located proximal to base of digits II, III, IV, V and are labeled as 'a' , 'b' , 'c' , 'd' triradii respectively [5].

The triradius close to palmer axis is termed as axial triradius. It is present normally near to the proximal margin of the palm and separates thenar & hypothenar eminence. It is denoted as't' [5].

C) 'atd' angle is formed by lines drawn from the digital triradius 'a' and 'd' to the axial triradius 't' in the palm. (As shown in Photograph No 2)

D) Total Finger Ridge Count (TFRC)

It presents the sum of the ridge counts of all ten fingers, where only the larger count is used on those digits with more than one ridge count. (As shown in Photograph 1).

The obtained data is tabulated separately for case and controls and for males and females. The data is analyzed and compared statistically by applying 'z' test and then 'p' value is calculated. If 'p' value is less than 0.05, then results are considered significant.

Results and discussion

1) Finger Tip Pattern

As per table-1 in male cases, frequency of ulnar loops is 58.89% in MI cases and 66% in controls, whereas radial loops is 3.55% in MI cases and 2.45% in controls , whorls is 34.88% in MI cases and 27.76% in controls, arches is 2.65% in MI cases and 3.77% in controls. In male cases percentage of ulnar loops & arches are decreased, while radial loops & whorls are seen increased. In this result decreased incidence of ulnar loops & increased incidence of whorls are statistically significant.

In females, frequency of ulnar loops is 57.55% in MI cases and 64.44% in controls , whereas radial loops is 2.65% in MI cases and 2% in controls, whorls is 36.22% in MI cases and 29.55% in controls, arches is 3.56% in MI cases and 4% in controls. In female cases the percentage of ulnar loops & arches are decreased while radial loops & whorls are seen increased. In this decreased incidence of ulnar loops & increased incidence of whorls are statistically significant.

Similar findings are reported by Dhall et al [6].

2) Mean 'ab' ridge count

As depicted in table -2 that the right hand findings in males shows that mean 'ab' ridge count is 32.37± 2.87 in MI cases and 31.26±3.25 in controls. This increase in 'ab' ridge count is

statistically non significant. Left hand finding in males shows that the value of mean 'ab' ridge count is 34.62±2.78 in MI cases and 33.82± 2.69 in controls. This increase in 'ab' ridge count is also statistically non significant. Right hand finding in females shows that the value of mean 'ab' ridge count is 30.53± 2.44 in MI cases and 31.17± 2.20 in controls. This decrease in 'ab' ridge count is statistically non significant. Left hand finding in females shows that the value of mean 'ab' ridge count is 35± 3.21 in MI cases and 34.26± 3.26 in controls. Thus increase in 'ab' ridge count is statistically non significant. However there were no previous studies found to compare this parameter.

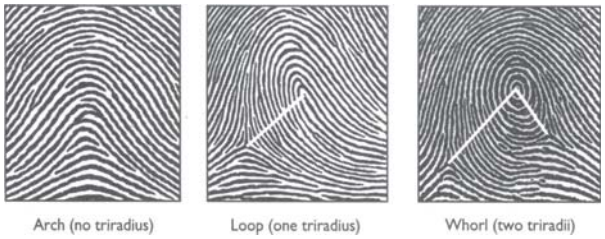
3) Mean 'atd' angle

The right hand finding in males shows that the value of mean 'atd' angle is 41.2±4.15 in MI cases and 40.73±3.24 in controls. This increase in 'atd' angle is statistically non significant. Left hand finding in males shows that the value of mean 'atd' angle is 40.88±3.76 in MI cases and 40.66±3.01 in controls. This increase in mean 'atd' angle is also statistically non significant. Right hand finding in females shows that the value of mean 'atd' angle is 40.04±3.06 in MI cases and 40.24±3.39 in controls. This decrease in mean 'atd' angle is statistically non significant. Left hand finding in females shows that the value of mean 'atd' angle is 41±3.84 in MI cases and 41.06±2.65 in controls. This increase in mean 'atd' angle is statistically non significant. However there were no previous studies found to compare this parameter (Table 2).

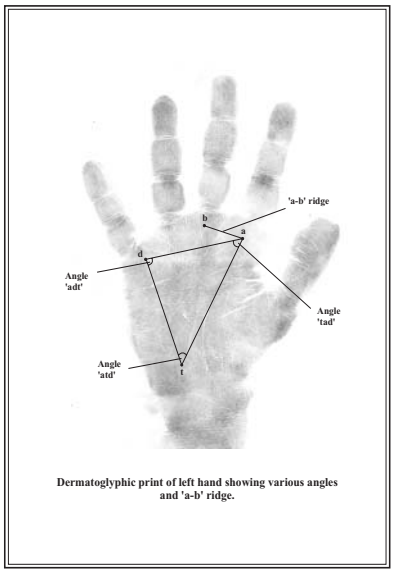
4) Total finger ridge count (TFRC)

Table 2 showed that in male MI cases, mean TFRC is 122.04±10.70 while that of controls is 117.26±9.76. This increase in difference in male cases of MI is statistically significant. In female MI cases the mean TFRC is 109.24±10.25 while that of controls 103.68±10.87. This increase in difference in female cases of MI is also statistically significant. Our study correlates with the study of Rashad M. N. et al [7] & there is no correlation with the study of Anderson M.W. et al [8] due to differences in sample size and racial homogeneity.

Photograph 1. Showing different finger tip patterns & TFRC



Photograph 2. Showing 'ab' ridge count & 'atd' angle



Dermatoglyphic print of left hand showing various angles and 'a-b' ridge.

Z test formula

$$Z = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{\sigma_1^2}{n_1} + \frac{\sigma_2^2}{n_2}}}$$

$\bar{X}_1$ = Mean (Cases)
$\bar{X}_2$ = Mean (Control)
σ_1 = S.D.Cases
σ_2 = S.D. Control
n_1 = Number of cases
n_2 = Number of Controls

Conclusion

The following conclusions can be drawn on the findings of the study that the following parameters can be used as dermatoglyphic markers in case of myocardial infarction:-

1. Decrease in frequency of ulnar loops in males and females

2. Increase in frequency of whorls in males and females

Increase in Total finger ridge count

Mean 'ab' ridge count and mean 'atd' angle can not be taken as dermatoglyphic markers in case of myocardial infarction as they are not significant in our study. The result of this study establishes the fact that there is a random relation between fingertip pattern and incidence of MI. We recommend for further quantitative study to confirm the findings of present study.

Presence of above dermatoglyphic features can help to predict the chances of development of myocardial infarction, so that the individual can take preventive measures at the earliest.

References

1. Cummins H. Epidermal ridge configuration in developmental defects, with peculiar reference to autogenetic factors with condition ridge detection, *Am J Anat* 1926; 38: 89-115.
2. Penrose L.S. and Ohara P.T. The development of the epidermal ridges. *J Medi Genet* 1973; 10: 201-208.
3. Polzik E. V., Sidorovich S. B. The dermatoglyphic characteristics of patients with ischemic heart diseases. *Citol Genet* 1991; 23(4): 31-5.
4. Schaumann B. & Alter M. *Dermatoglyphics in medical disorders*. Springer verlag, New York. Berlin; Heidelberg, 1976.
5. Miller J.R. Dermal ridge patterns : technique for their study in human fetuses. *J Peditr* 1968; 73 : 614.
6. Dhall U., Rathee S. K. Utility of fingerprints in Myocardial Infarction Patients. *J Anat Soc India* 2000; 49(2): 153-154.
7. Rashad, M.M. and MI, M.P. Dermatoglyphic traits in patients with cardiovascular disorders. *American Journal of Physical Anthropology* 1975; 42: 281-284.
8. Anderson MW, Haug PJ, Critchfield G. Dermatoglyphic feature of myocardial infarction patients. *Am J Physi Anthro* 1981; 55(4).
9. Alter M. (1967). Dematoglyphic analysis as a diagnostic tool. *Medicine* 1967; 46: 35-56.
10. Sommer A. & Gregg L. A simple technique for recording dermatoglyphics. *J Ped* 1973; 182: 1092-1093.

Table 1. Finger tip patterns in cases and controls

Finger tip pattern	Male				Female			
	Cases	Controls	Z value	P value	Cases	Controls	Z value	P value
Ulnar loop	265 (58.89 %)	297 (66%)	2.2	**<0.05**	259 (57.55%)	290 (64%)	2.12	**<0.05**
Radial loop	16 (3.55%)	11 (2.45%)	0.98	>0.05	12 (2.65%)	9 (2%)	0.66	>0.05
Whorls	157 (34.88 %)	125 (27.76%)	2.3	**<0.05**	163 (36.22%)	133 (29.55%)	2.13	**<0.05**
Arches	12 (2.65%)	17 (3.77%)	0.94	>0.05	16 (3.56%)	18 (4%)	0.35	>0.05
Total	450 (100%)	450 (100%)			450 (100%)	450 (100%)		

*P value- <0.05 Significant, >0.05 non significant

Table 2. Mean 'ab' ridge count, Mean 'atd' angle, TFRC in cases and controls

Parameters		Male				Female				
		Case	Control	Z value	P value*	Case	Control	Z value	P value*
Mean 'ab' ridge count	Rt hand	32.37 ±2.87	31.26 ±3.25	1.71	>0.05,	30.53 ±2.44	31.17 ±2.20	1.31	>0.05
	Lt hand	34.62 ±2.78	33.82 ±2.69	1.38	>0.05	35 ±3.21	34.26 ±3.26	1.07	>0.05
Mean 'atd' angle	Rt hand	41.2 ±4.15	40.73 ±3.24	0.59	>0.05	40.04 ±3.06	40.24 ±3.39	0.29	>0.05
	Lt hand	40.88 ±3.76	40.66 ±3.01	0.30	>0.05	41 ±3.84	41.06 ±2.64	0.09	>0.05
TFRC		122.04 ±10.70	117.26 ±9.76	2.21	**<0.05**	109.24 ±10.25	103.68 ±10.81	2.5	**<0.05**

*P value- <0.05 Significant, >0.05 non significant

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Sex Determination of Human Hip Bone by Metric Analysis of Ileum

Vijayeendra Kanabur

Abstract

Background: Identification of sex of an individual from human skeleton is important for forensic experts. The hip bone is ideal bone for sex determination. **Material & Method:** Present study was done on 65 hip bones (35 male and 30 female) of known sex. Three parameters were used. **Results:** In the present study significant statistical difference was seen between the mean values of width and the distance from posterior superior iliac spine to posterior inferior iliac spine of male and female hip bones on both the sides. **Conclusion:** Since a significant difference was observed in values of width and distance from posterior superior iliac spine to posterior inferior iliac spine of male and female hip bones on the both the sides. Hence these parameters are useful in identifying the sex of ileum to determining the sex using the hip bone.

Keywords: Hip bone; ileum; sex determination.

Introduction

Determination of sex of an unknown individual is one of the critical questions addressed when human skeletal remains are found both in forensic investigation and archeological studies. Therefore the study of sexual dimorphism of bones in human population is a matter of interest not only for the anatomist but also for the anthropologists and forensic experts[1]. Traditional non metrical methods such as visual impressions about the pattern of bone morphology for determination of sex from such skeletal remains depend entirely on the ability and experience of the expert and unless whole skeleton is available it is almost impossible to assign sex with hundred percent certainty in all cases. The introduction of precise metric methods not only provides simplicity and accuracy but allows no individual variation and is therefore entirely an objective assessment[2]. Superiority of objective assessment by metrical methods over simple morphological observations has been well stressed[3]. The hip bone is the most reliable indicator for the sex determination because of the pattern of sexual dimorphism is common to whole human race[4]. Hence the hip bone is considered as the most reliable sex indicator in the human skeleton[5]. Many workers have studied various metric parameters for sexing the hip bone. The present study was done to identify the important measurements of ileum which significantly differentiates the sex of hip bone which will be useful in anatomical, anthropological, archaeological and forensic studies.

Materials and Methods

For the study 65 hip bones (35 male and 30 female) of known sex collected from the Department of Anatomy of B.L.D.E.A's Shri B. M. Patil Medical College Hospital and Research Centre, Bijapur were selected to conduct present study. The measurements of ileum were measured by using a vernier caliper and osteometric board.

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The following parameters measured

1. Width: - Maximum distance between anterior and posterior ends of iliac crest measured using osteometric board (Fig 1).

2. Distance between the anterior superior iliac spines to anterior inferior iliac spine measured using vernier caliper (Fig 2).

3. Distance from posterior superior iliac spine to posterior inferior iliac spine measured using vernier caliper (Fig 3).

Inclusion Criteria

The adult human hip bones which were included in the study were fully ossified, not broken and not having any deformities.

Exclusion Criteria

The human hip bones with deformity, malunion and congenital anomalies were excluded from the study.

Results

All the 65 adult hip bones were measured using 3 parameters. After all the measurements were done, the observations were statistically analysed by using unpaired t- test. These male and female hip bones for both right and left sides were compared. The results are shown in tables 1-3 for all the variables used.

1) Width: The width of the hip bone of male of right side varies from 13-16 cm with an average of 14.50±0.37 cm and that of female of right side varies from 13.1 - 14.8 cm with an average of 13.55±0.49 cm. The width of the hip bone of male of left side varies from 14 -16 cm with an average of 14.68±0.34 cm and that of female of left side varies from 13.4 - 14.7 cm with an average of 13.92±0.35 cm. The sex differences in mean values of width of hip bone of males and females is statistically significant ($p<0.01$) for both right and left hip bones.

2) Distance between the anterior superior iliac spine to anterior inferior iliac spine: - The distance between the anterior superior iliac spine to anterior inferior iliac spine in hip bone of male of right side varies from 2.6 - 4.1 cm with an average of 3.31±0.18 cm and that of female of right side varies from 2.6 - 3.7 cm with an average of 3.31±0.08 cm. In hip bone of male of left side it varies from 2.3 - 3.8 cm with an average of 3.08±0.17 cm and that of female of left side it varies from 2.1-3.6 cm with an average of 3.28±0.15 cm. The sex differences in the mean values of distance between the anterior superior iliac spine to anterior inferior iliac spine of hip bone of males and females is statistically not significant ($p>0.05$) for both right and left hip bones.

3) Distance from posterior superior iliac spine to posterior inferior iliac spine : - The distance from posterior superior iliac spine to posterior inferior iliac spine in hip bone of male of right side varies from 2.3 - 4.1 cm with an average of 3.2±0.28 cm and that of females of right side varies from 2.1 - 3.1 cm with an average of 2.44±0.09 cm. In hip bone of male of left side it varies from 2.4 - 3.9 cm with an average of 3.10±0.23 cm and that of females of left side varies from 2.1 - 3.8 cm with an average of 2.62±0.31 cm. The sex differences in mean value of distance from posterior superior iliac spine to posterior inferior iliac spine of hip bone of males and females is statistically significant ($p<0.01$) for both right and left hip bones.

Table I. Width (V1) in centimeters

Details of measurements	Right		Left	
	Male	Female	Male	Female
No. of Bones	16	15	19	15
Range	13-16	13.1-14.8	14-16	13.4-14.7
Mean	14.5	13.55	14.68	13.92
Standard Deviation	0.37	0.49	0.34	0.35
p Value	<0.01		<0.01	

Table II. Distance between the anterior superior iliac spine to anterior inferior iliac spine (V2) in centimeters

Details of easurements	Right		Left	
	Male	Female	Male	Female
No. of Bones	16	15	19	15
Range	2.6-4.1	2.6-3.7	2.3-3.8	2.1-3.6
Mean	3.31	3.31	3.08	3.28
Standard Deviation	0.18	0.08	0.17	0.15
p Value	>0.05		>0.05	

Table III. Distance from posterior superior iliac spine to posterior inferior iliac spine (V3) in centimeters

Details of Measurements	Right		Left	
	Male	Female	Male	Female
No. of Bones	16	15	19	15
Range	2.3-4.1	2.1-3.1	2.4-3.9	2.1-3.8
Mean	3.2	2.44	3.10	2.62
Standard Deviation	0.28	0.09	0.23	0.31
p Value	<0.01		<0.01	

Fig 1. Width measured using osteometric board (Photo 1)

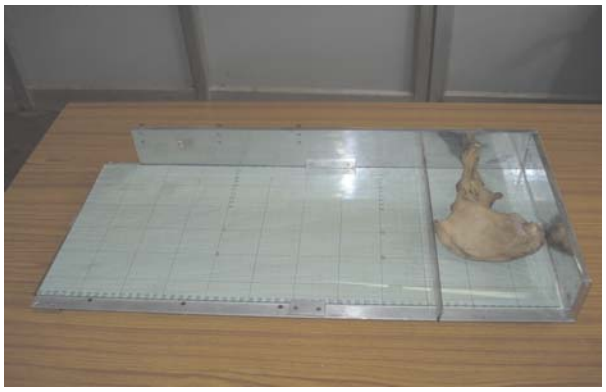

Fig 2. Distance between the anterior superior iliac spines to anterior inferior iliac spine measured using vernier caliper (Photo 2)

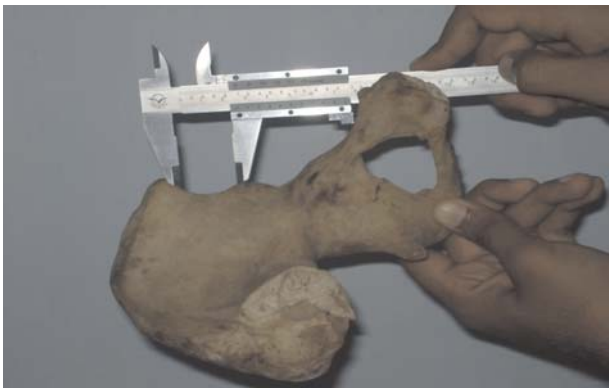

Fig 3. Distance from posterior superior iliac spine to posterior inferior iliac spine measured using vernier caliper

Discussion

Width

In the present study the mean value of the width in the hip bones of right side of male hip bone is 14.50 cm and in female is 13.55 cm and on the left side it is 14.68 cm in males and 13.92 cm in female hip bones. Steyn and Iscan[6] found in their study that the mean value was 15.92 cm in males and 15.45 cm in females. Patriqnin and Steyn[7] based on the study of 400 bones found the mean value to be 16.31 cm with range of 14.5 - 18.5 cm in males and 16.09 cm the mean value, with the range of 14.2 - 18.3 cm in females. Davivongs[8] studied 50 male and 50 female bones and found that the mean value to be 14.79 cm with the range of 13.3 - 16.7 cm in males and mean value in females to be 14.21 cm with the range of 12.6 - 16.1 cm. Rajangam and Janakiram[9] studied 140 hip bones of Karnataka origin and found that the mean value is 14.43 cm in males and 13.50 cm in females. Singh and Raju[10] based on the measurements of 120 male and 80 female hip bones found the mean value to be 14.31 cm in males and 13.77 cm in females of right side and 14.35 cm in males and 13.77 cm in females of left side. Camacho and Pellico[11] found the mean value to be 15.07 cm in males and 14.78 cm in females based on study of 42 hip bones.

Distance between anterior superior iliac spines to anterior inferior iliac spine

In the present study the mean value of the distance between the anterior superior iliac spine to anterior inferior iliac spine in the hip bones of right side of male's hip bone is 3.31 cm and of female is 3.31 cm and on the left side it is 3.08 cm in males and 3.28 cm in female hip bones while results of study conducted by Camacho and Pellico[11] showed the mean value to be 4.26 cm in males and 4.37 cm in females.

Distance from posterior superior iliac spine to posterior inferior iliac spine

In the present study the mean value of the distance from the posterior superior iliac spine to posterior inferior iliac spine in the hip bones of right side the male hip bone is 3.20 cm and of female is 2.44 cm and on the left side it is 3.10 cm in males and 2.62 cm in female hip bones as compared to Isaac[12] in his study found the mean value to be 2.76 cm in males and 2.52 cm in females.

Conclusion

In the present study significant statistical difference was seen in between the mean values of width and the distance from posterior superior iliac spine to posterior inferior iliac spine of male and female hip bones on the both the sides. Hence these parameters are useful in identifying the sex of ileum thus determining the sex of the human hip bone.

References

1. Trancho GI, Robledo B, Bueis LI, Sanchez IA. Sexual determination of femur using discriminant functions : Analysis of a Spanish population of known sex and age. *J Forensic Sci* 1997; 42 (2):181-5.
2. Singh G, Singh S, Singh SP. Identification of sex from tibia. *J Anat Soc India* 1975; 24: 20-4.
3. Raju PB, Singh S. Sexual dimorphism in scapula. *J Indian Acad Forensic sci* 1978;17(2):23-33.
4. Bruzek J, Murail J. *Methodology and reliability of sex determination from the skeleton*. France; Humana Press, 2007; 225-42.
5. Nagesh KR, Kanchan T, Bastia BK. Sexual dimorphism of acetabulum – pubis index in South – Indian population. *Leg Med* 2007; 9: 305-8.
6. Steyn M, Iscan MY. Metric sex determination from the pelvis in modern Greeks. *Forensic Sci Int* 2008; 179: 861-66
7. Patriqnin ML, Steyn M, Loth SR. Metric analysis of sex differences in South African black and white pelves. *Forensic Sci Int* 2005; 147: 119-27.
8. Davivongs V. The pelvic girdle of the Australian Aborigine; sex difference and sex determination. *Am J Phys Anthrop* 1963; 21(4): 443-56.

9. Rajangam S, Janakiram S, Thomas IM. Sexing of hip bones of Karnataka origin. *JAnat soc India* 1991; 40(2):105-08.
10. Singh S, Raju PB. Identification of sex from the hip bone demarking points. *J Anat Soc India* 1977; 26(2): 111-17.
11. Camacho FJ, Pellico LG, Rodrignez RF. Osteometry of the human iliac crest: patterns of normality and its utility, in sexing human remains. *J Forensic sci* 1993; 38(4): 779-87.
12. Isaac B. Biometry of the posterior border of the human hip bone: normal values and their use in sex determination. *J Anat Soc India* 2002;51(1):43-6.

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Estimation of Stature from Hand Length in the Tribal Population of Gujarat Region

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Abstract

Background: Estimation of an individual's stature is an important parameter in forensic examination and anthropological studies. Only few studies of other racial groups, exists which emphasis the need to establish standard in different ethnic populations. There fore this study was carried out in the 249 male and female above 23 years of tribal community from Aslona area of Gujarat region. **Materials & Method:** The height of the individuals was measured standing erect in anatomical position, using a standing height measuring instrument. The hand length (direct linear distance between the distal wrist crease and the distal end of the most anterior projecting point of the middle finger) was measured using the sliding caliper capable of measuring to the nearest 0.01mm and to investigate the relationship between personal stature and hand length among a group of male or female. **Results:** The differences of hand length between the sexes were found to be highly significant. A positive correlation between height and hand length was observed in both the sexes and it was statically significant. Regression equation for stature has been estimated using the hand length for both sexes. **Conclusion:** The result indicates that hand length provides precise means of estimating the stature of an unknown individual. The regression formula derived in this study will be useful for anatomists, archeologist, anthropologist and forensic scientist.

Keywords: Standard Deviation (SD), Ethnic populations, Regression equation, Stature.

Introduction

Dimensional relationship between body segments and the whole body has been the focus of forensic scientists, anatomists and anthropologists for many years. Furthermore, the relationship between body segments has been used to compare and highlight variations between different ethnic groups and to relate them to locomotors pattern, energy expenditure and lifestyle [1-2]. Prediction of the dimensions of body segments is useful in many areas of modern science. For example, in growth and development the use is made of the relationships between body segments in the assessment of normal growth as well as in specific syndromes [3]. Body Proportions and the dimensions of various body segments, including the long bones of the limbs and the bones of the hand and foot have been used to estimate stature. The long bones of the limbs, however, have been the most widely studied [4-5].

Estimation of stature from incomplete skeletal and decomposing human remains is particularly important in personal identification. The relationship between specific body dimension / proportion can be used to solve crimes in the absence of complete evidence. For example, it has been proved that stature can be estimated from imprints of the hand, foot or footprints or from a shoe left at the scene of a crime [6]. Similarly stature of a

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victim can be estimated when a part of body, such as long bone, or hand, is all that remains [7].

Despite the relationships between body parameters that have been determined, it has been emphasized that these vary from population to population and ethnic origin to ethnic origin due to differences in nutrition and levels of physical activity [8].

Material and Method

This study was conducted on 249 adult individuals (125 male and 124 female) above 23 years, of tribal community. The subjects were mainly from Aslona which is in Gujarat state and they are mainly of Warlli and Mahadev coli community who perform all the activities needed for their existence. The subjects having Pathological defect in hand were excluded from study.

Hand length was defined as the linear distance between the distal wrist crease and the distal end of the most anterior projecting point i.e. tip of middle finger. The subjects were asked to place their hands supine on a flat, hard horizontal surface with fingers extended and adducted following which the hand length was measured. Care was taken to see that there was no abduction or adduction at the wrist joint i.e. the fore arm was directly in line with the middle finger.

Hand lengths were taken independently on left and right sides of each individual using a sliding caliper capable of measuring to the nearest 0.01mm (Mitutoyo – Japan).

The height of the individual was measured between the vertex and floor, when the person is standing erect in anatomical position and the head in the Frankfurt plane, using a standing height measuring instrument. The measurements were recorded by the same person to minimize the errors in methodology and during 2 to 5 pm, to avoid any diurnal variation. Results were analyzed using statistical calculations.

Ethnographic Profile

All the subject of this study belongs to Aslona. Aslona is a village in Kaparda Taluka of Gujarat. It is a beautiful village place in between the forest and Hills. Total 4554 persons living in 741 household and they are mainly from Warlli and Mahadev koli community.

These tribes have a rich heritage of culture that is distinctly different from other social groups and can be easily identified by their dress, dialect, folklore, customs and practices. They still practice old traditions like worship of nature in different forms, animal sacrifices during religious ceremonies, adorning head with horn etc.

Their life style and the profession display these characteristic in every social encounter. From generation to generation, these tribes have had wandering tradition and they have hardly been integrated in the society

These tribes have wandering tradition, which resulted in lack of education, which makes their survival difficult, and this didn't allow them to fit into the settled society and they are forced to continue with tradition of moving from place to place in search of work. Thousands of families belonging to these tribes wander from place to place and stay in temporary structures.

Result

Statistical analysis indicated that bilateral variation was insignificant for the measurements of hand length in both sexes. Various important parameters of the study are summarized in Table - I. Gender differences with respect to hand length and height were found to be highly significant ($P > 0.01$). The mean hand lengths of the male were significantly larger than that of the females ($P > 0.01$).

The table-I showed that the total individuals studied were 125 males and 124 females, the Mean height among the males was 151.77(± 4.59) and in females, 147.87 (± 5.51) while the Mean Hand length was 17.53 (± 0.96) for male and 16.26 (± 0.85) for Female. The correlation

Table I. Various Statistical parameters in Male and Female

Gender	Male	Female
Total No. (249)	125	124
Mean height ± SD (cm)	151.77 ± 4.59	147.87 ± 5.51
Mean hand length ± SD (cm)	17.53 ± 0.96	16.26 ± 0.85
Correlation coefficient	0.68	0.53
Regression coefficient	3.25	3.43
Value of constant	94.80	92.10

coefficient was found to be 0.68 for males and 0.53 for females. Regarding the regression coefficient the value is 3.25 for males and 3.43 for females. The value of constant is 94.80 for males and 92.10 for females.

Regression equation for stature estimation was derived as Follows:-

For Male: Height=94.80+3.25 (hand length)

For Female: Height=92.10+3.43(hand length)

For Both (combined): Height=80.54+4.32 (hand length)

Discussion

Estimation of an individual's stature is an important parameter in forensic examinations and anthropological studies. Morphometry of the hand provides important evidence in a crime scene, investigation which helps in the estimation of stature of a criminal. The available data usually apply to Caucasians and Tribal areas of Gujarat region mainly at the border of Maharashtra and Gujarat state. Only few studies of other racial group exist which emphasize the need to establish standards in different ethnic populations [4, 6].

The assessment of the physical dimensions of the human hand provides a metric description to a certain human – machine compatibility in the design of manual systems for the bare and gloved hand (e.g. Design of hand tools, knobs and controls, personal equipment, consumer appliances in the home and industry). Primarily adapted for reaching, grasping and manipulating the hand functions include activities such as pushing adjusting objects, striking blows and supporting the body in space. The hand may be used as a fist or forces may be transmitted through the fingers extended in close pack positions. Prehensile movements of the hand have been variously described as cylinder, ball, ring, pliers and pincer grips and all such grips are the variants of precision and power grips.

The dimensional and anatomical features of the human hand and the factors such as the size, shape, texture of object being held etc, influence the functional aspect of hand use. The occupational disorder associated with the improper use and cumulative exertion of the wrist and hand, include oncoarthritis, dislocation or sublimations, sinusitis, ligament strains and ganglia [9].

The correlation coefficient and stature hand length was found to be statically significant and positive indicating a strong relationship between the two parameters. Regression equation for stature estimation was formulated using hand lengths and checked for their accuracy by comparing the estimated stature and the actual stature. The results indicate that hand length provides an accurate and reliable means in reconstructing the stature of an unknown individual.

The present study shows a correlation coefficient of + 0.68 for male and + 0.53 for females which is very significant. These formulae are valid for the age group above 23 years i.e. fully grown adult of the tribal community of Gujarat region which is around the Aslona because this study is geographically limited only for this area. It is shown in earlier studies that various hand measurements tend to differ in various ethnic groups [10]. Consequently the formulae designed to estimate stature from various anatomical dimensions in one population do not apply to another [11-12]. Furthermore, the need for the alternative formula for gender is also proved as the rate of skeletal maturity in males and females vary during the course of development [12].

Significant and positive correlation coefficient has been shown to exist between stature and measurements of hand length. The result of the current study further highlight the ethnic differences in the anatomical dimensions and its relation to stature which were described earlier [13,10,4]. Taken together, the evidence suggests that the relationship between hand length and stature is of practical use in medico-legal, anthropology and archaeological studies when such evidence provides the investigator the only opportunity to gauge that aspect of an individual's physical description.

References

1. Muncie HL, Sobal J, Hoopes JM, Tenney JH and Warren JW: - A practical method of estimating stature of bedridden female nursing home patient. *J American Geriatrics Society* 1987; 35: 285-289.
2. Chiba M and Terazawa K. Estimation of stature from somatometry of skull. *Forensic Science International* 1998; 97: 87-92.
3. Hintz RL. Final height prediction in constitutional growth delay. *J Pediatric Endocrinology and Metabolism* 2001; 14: 1535-1540.
4. Bhatanager DP, Thapar SP and Batish MK. Identification of personal height from somatometry of hand in Punjab males. *Forensic Science International* 1984; 24: 137-41.
5. Mall G, Hubig M, Buttner A, Kuznik J, Penning R and Graw M. Sex determination and estimation of stature from the long bones of the arm. *Forensic Science International* 2001; 117: 23-30.
6. Saxena SK. A Study of correlation and estimation of stature from hand length, hand breath and sole length. *Anthropology Anz* 1984 ; 42: 271-276.
7. Ozaslan A, Iscan MY, Ozaslan I, Tugcu H and Koc S. Estimation of stature from body parts. *Forensic Science International* 2003; 132: 40-45.
8. Malina RM. Physical activity and training: effect on stature and adolescent growth spurt. *Med Science and Sport Exercise* 1994; 26: 759-766.
9. Anjli Nag , PK Nag and Iiina Desai. Hand Anthropometry of Indian woman. *Indian J Medical Res* 2003; 117: 260-269.
10. Davies BT, Benson AK, Courtney A and Minto I. A comparison of hand anthropometry of females in the three ethnic groups. *Ergonomics* 1980; 23: 183-184.
11. Athawale MC. Anthropological study of height from length of forearm bones. A study of one hundred Maharasrian male adults of ages between twenty five and thirty years. *American Journal of Physical Anthropology* 1963; 21: 105-12.
12. Williams PL, Bannister LH, Berry MM, Collins P, Dyson M and Dussek JE. *Grays Anatomy;* The anatomical basis of medicine and surgery, 38th Ed. New York; Churchill Livingstone. New York, 2000; 425-436.
13. Kanchan T and Rastogi P. Sex determination from hand dimensions of North and South Indias. *J Forensic Science* 2009; 54: 546-550.

Case Report

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Maggots in Detached Hair: A Valuable Conclusion

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Abstract

An unknown dead body of a middle aged man was found hanging from a tree, by a coir rope, in the Indian forests. The body was in an advanced state of decomposition and partial skeletonization was evident in the upper parts of the body. Crime scene investigation revealed a bunch of hair located at a distance away from the dead body with a few maggots crawling on the recovered bunch of hair. The source of the isolated hair bunch was perplexing and there was a possibility of violence ensuing ante-mortem separation of hairs. The length and texture of isolated hairs matched with the scalp hairs on the dead body, which was later confirmed by microscopy. The presence of maggots in the isolated hair bunch recovered from the deep forest suggests that the flies had laid eggs on these hairs in situ. The hairs were later detached from the scalp as a normal postmortem sequel. The maggots that were present in the scalp accompanied the hairs during its postmortem detachment. These findings confirm that the isolated hairs had their origin in the corpse, and rules out the ante-mortem separation of hairs, a possibility of any scuffle or homicidal attempt. The above case justifies the diverse implementations of Forensic Entomology in crime investigation.

Keywords: Forensic entomology; Maggots; Detached hair.

Introduction

Forensic Entomology has remarkable contribution in determination of the location and time of death. The presence of maggots in a dead body, study of its species and developmental stages provide valuable information in crime investigation [1-3]. More recently the value of entomological evidence in detecting poisoning has been established [4]. Every component of a dead body undergoes insect infestation: in the initial stages of decomposition, when the body is moist and fleshy, two-winged flies predominate, but in the later stages, other kinds of insects appear such as beetles and moths which can even infest hair and bones. The Skin/Hide Beetle belonging to Family Dermestidae characteristically makes its appearance only in the final stages of decomposition of a carcass. The adults and larvae of this beetle species feed on the dried skin, tendons and bone left by fly larvae. Hide beetles possess enzymes necessary for breaking down keratin, a protein component of hair. Subsequently, Clothes moths belonging to Family Tineidae arrive to feed on the hair during their larval stages, and often forage on any hair that remains. They are amongst the last of the insects contributing to the decomposition of a corpse.

Sometimes a careful observation could reveal obscure, unforeseen, fascinating details regarding the case under investigation. We report one such case where a bunch of hair was located at a distance away from the dead body with a few maggots crawling on it. The source

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of the isolated hair bunch was perplexing and there was a possibility of violence ensuing ante-mortem separation of hairs.

Case details

An unknown dead body of a middle aged man was found completely hanging from a tree, by a coir rope, in the Indian forests. One end of the rope was fastened around his neck and the other end was tied to a branch of a tree. The human remains were in an advanced state of decomposition and partial skeletonization was evident in the upper parts of the body. Soft tissues in the neck were absent and, hence the nature of the ligature mark in the neck could not be ascertained. No external injuries were obvious on the body. Numerous maggots were present predominantly on the upper part of the completely hanging body. Post mortem interval was estimated to be around 2 weeks to 2 months.

Crime scene investigation revealed a bunch of hair located nearly 15 meters away from the dead body. A few maggots were crawling on the recovered hair bunch that appeared similar to those observed on the dead body on gross examination. Due to lack of facilities the maggots were not examined further for the identification of its type and species. The length and texture of isolated hairs matched with the scalp hairs on the dead body, which was later confirmed by microscopy.

Discussion

Normally the flies start laying eggs within a day after the death. Flies do not lay eggs in cut or plucked hair bunches, even with their intact roots, as the hair can not provide nourishment for the developing maggots. This consentaneous observation is substantiated by the fact that the snipped hairs hoarded at barber shops or at certain places of pilgrimage, in India, are never invaded by the flies to lay eggs. For hair and bones to be invaded, a faunal succession is required that occurs only in a decaying body. A decaying body emanates odours that attract insects to get the process of putrefaction going. The question of entomological infestation in the detached hairs originating from a living being hence, does not arise.

The presence of maggots in the isolated hair bunch recovered from the deep forest suggests that the flies had laid eggs on these hairs in situ. The hairs were later detached from the scalp as a normal postmortem sequel. The maggots that were present in the scalp accompanied the hairs during its postmortem detachment. Maggots are not likely to derive any nutrition from the hair. Considering the fact that live maggots were still present on the detached hairs, it can even be argued that the postmortem detachment was a recent event. The observations confirm that the isolated hairs had their origin in the corpse, and rules out the ante-mortem separation of hairs, a possibility of any scuffle or homicidal attempt.

The reported case justifies the diverse implementations of Forensic entomology in crime investigation, and explores the possibility of finding maggots in detached hairs. The same principle can also be applied in evaluating the presence of living or dead maggots in clothes and other inanimate evidentiary material. No literature is available on whether or not flies lay eggs on the isolated hairs. Our opinion is based on observations at places where loose/ detached hairs are usually found in bunches. Our observations and description hence, needs to be confirmed by further experiments. Oil or other human or animal body fluid may be attached on the hairs that are cut or plucked ante-mortem to study the various possibilities of insect invasion.

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References

1. Archer MS, Bassed RB, Briggs CA, Lynch MJ. Social isolation and delayed discovery of bodies in houses: the value of forensic pathology, anthropology, odontology and entomology in the medico-legal investigation. *Forensic Sci Int* 2005; 151(2-3): 259-265.
2. Arnaldos MI, García MD, Romera E, Presa JJ, Luna A. Estimation of postmortem interval in real cases based on experimentally obtained entomological evidence. *Forensic Sci Int* 2005; 149(1): 57-65.
3. Campobasso CP, Introna F. The forensic entomologist in the context of the forensic pathologist's role. *Forensic Sci Int* 2001; 120(1-2): 132-139.
4. Introna F, Campobasso CP, Goff ML. Entomotoxicology. *Forensic Sci Int* 2001; 120(1-2): 42-47.

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Case Report

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Fatal Myocardial Infarction in Bus Driver: A Case Report

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Balaraj B.M.[5]

Abstract

An increased incidence of myocardial infarction is seen among the professional drivers. Sedentary life style, high psychological demands and job strain can be attributed to higher risk of coronary artery disease in these professionals. Herein, we report a case where a male bus driver died due to myocardial ischemia. This case is of importance because if myocardial infarction occurs in a driver while on duty it can pose a great danger to the lives of the passengers travelling in the vehicle.

Keywords: Professional driver, Job strain, Sudden death, Autopsy, Myocardial ischemia.

Introduction

Coronary artery diseases (CAD) are the leading cause of morbidity and mortality worldwide [1]. Increase of approximately 82 % mortality and 89 % morbidity due to coronary artery disease is anticipated in developing countries between 1990 and 2020 [2]. An increased risk of myocardial infarction among professional drivers was first reported about 50 years ago [3] and has been reported repeatedly since then, especially among bus drivers [4]. Traditional risk factors for myocardial infarction include tobacco smoking, increased blood lipids and hypertension. Hereditary factors and overweight also play a part in assessing the risk of developing myocardial infarction. Further, low physical activities at work or during leisure time, cold, and heat have been proposed as risk factors for myocardial infarction. A few chemical occupational exposures have been associated with an increased risk of myocardial infarction, among them are combustion products [5]. Herein, we report a case of sudden death of a professional bus driver due to myocardial infarction secondary to coronary atherosclerosis.

Case report

An apparently healthy 44 year old male bus driver developed sudden severe chest pain while driving. He anticipated some problem and immediately stopped the bus. Arrangements were made without delay to shift him to the hospital where he was declared *brought dead*. The relatives revealed that the deceased was healthy before this incident. Medicolegal requisition was made for autopsy.

On postmortem examination length of the body measured 167 cms and weighed 61 kgs. There were no external injuries on the body. Heart weighed 230 gms. Left and right ventricular wall measured 1.5 cms and 0.5 cms respectively. Coronaries were thick and gritty on cut section. Right coronary artery showed fatty streaks. Proximal 1 cm of left coronary artery was normal. Rest of the lumen of left coronary artery showed block throughout its length due to the atheromatous plaque

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deposition within the intima of the arterial wall with a thrombus in situ (Fig 1). Aorta showed intimal deposition of atheromatous plaques at places. Both the lungs were oedematous exuding frothy fluid. Stomach contained 200 ml of white coloured fluid without any abnormal odour. Small and large intestines were intact and healthy. The brain, spleen, liv er and kidneys did not reveal any significant morphological changes. Toxicological analysis was unremarkable.

Multiple sections from the areas of the heart corresponding to the drainage areas of the blocked coronary arteries were subjected for histopathological examination using Eosin & Haemotoxylin stain. No significant morphological changes were evident except for an area of early signs of ischemia (Fig 2). Microscopy of the left coronary artery showed obliteration of the lumen with thrombus formation associated by atherosclerosis of the vessel wall. The cause of death was opined as myocardial ischemia secondary to thrombotic occlusion of left coronary artery.

Fig 1. Lumen of left descending coronary artery showing thrombotic occlusion

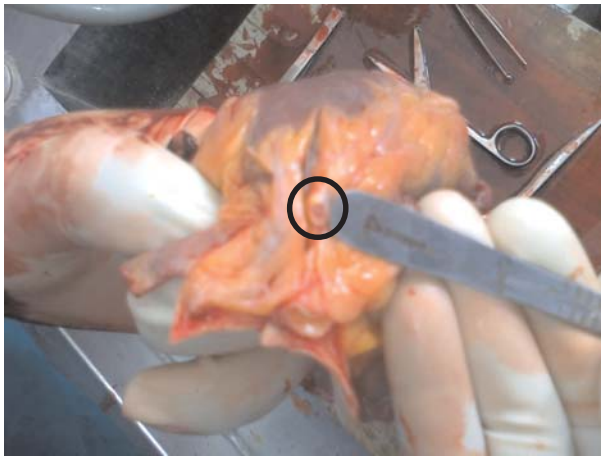
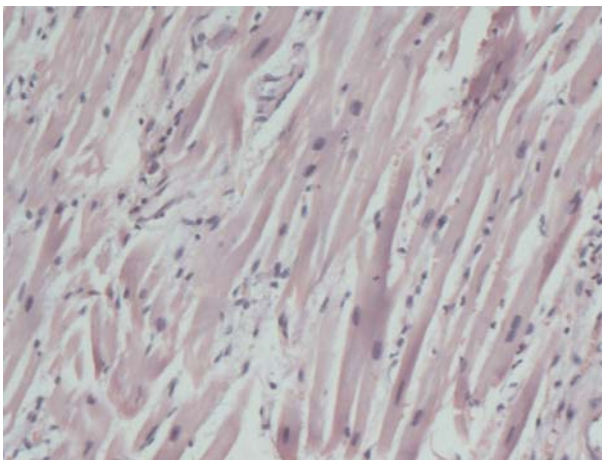


Fig 2. Microscopy showing the early signs of myocardial ischemia (H & E stain, 20X)



Discussion

There are several main risk factors associated with the development of coronary heart disease and some studies have indeed corroborated that bus drivers have a high risk of developing CHD as a result of such factors. A study published on the causes of death of 376 New York City bus drivers showed that proportionate mortality ratio was significantly excess due to ischemic heart disease. It was concluded that these findings were consistent with the scientific literature linking job strain with cardiovascular disease among bus drivers [6].

In a study of heart disease prevention in Sweden, coronary heart disease in 103 bus and tram drivers, using 6,596 men in other occupational groups as a reference group was studied. Over the 11.8 years study period, one in five (18.4%) bus and tram drivers had a coronary artery disease event, compared to only 6.4% rate in the comparison group [7].

In 1993, a study was reported on incidence of myocardial infarction among bus drivers in Sweden. It was suggested that among the factors that might contribute to observed excess risk of myocardial infarction are job strain, irregular working hours, a sedentary job, automobile exhaust fumes, and noise [8].

A study was done to determine the risk factors for coronary heart disease in 2297 bus drivers and skilled workers from the Taipei Municipal Bus Administrative Bureau, Taiwan. The prevalence of obesity was 9.6%, hypercholesterolemia; 34.0%,

hypertriglyceridemia; 69.4% and ischemic heart disease; 1.7% was observed among bus drivers. By contrast, among skilled workers, the prevalence of obesity was only 4.6%, hypercholesterolemia; 29.9%, hypertriglyceridemia; 30.6% and ischemic heart disease was 0.9%. It was inferred that exposure to the occupation of driving a bus may carry an increased risk of coronary heart disease [9]. Similar findings were reported by Hartvig and Midttun, from a controlled cohort study which compared CHD risk factors among bus drivers and industrial workers in Norway [10].

To conclude, a predisposition to myocardial ischemia as a result of the job is clear from the literature reviewed above. Growing threats to drivers' well-being such as increase in road traffic, violent passengers and increasingly tight running schedules from commercial pressure will no doubt add to their burden. Any impairment in the physical and psychological health of the bus drivers can lead to undesirable consequences for passengers as well as bus operating companies. Hence there is a necessity for bus operators to improve workplace practices in order to reduce job strain and ameliorate the working environment of bus drivers. As buses are one of the most popular modes of public transport worldwide, there is a need for actively addressing the problems in the working environment of bus drivers. Regular screening for cardiovascular diseases has to be carried out and pre-hospital resuscitation by Basic Life support has to be taught to transit workers. It is suggested that drivers with known risk factors have to be given an alternative job in the same firm which does not require him to drive so as to minimize the risk for the passengers.

References

1. Murray CJL and Lopez AD. Alternative projections of mortality and disability by cause 1990-2020.Global burden of disease study. *Lancet* 1997; 349: 1498-504
2. Ounpuu S, Negassa A and Yusuf S. Inter-heart: A global study of risk factors for acute myocardial infarction .*Am Heart J* 2001; 141: 711-21.
3. Morris JN, Heady JA, Raffle PA, Roberts CG and Parks JW. Coronary heart-disease and physical activity at work. *Lancet* 1953; 265: 1053–57.
4. Belkic K, Emdad R and Theorell T. Occupational profile and cardiac risk: possible mechanisms and implications for professional drivers. *Int J Occup Med Environ Health* 1998; 11: 37–57.
5. Kristensen TS. Cardiovascular diseases and the work environment. A critical review of the epidemiologic literature on non-chemical factors. *Scand Y Work Environ Health* 1989; 15: 165-79.
6. Michaels D and Zoloth SR. Mortality among urban bus drivers. *Int J Epidemiol* 1991; 20: 399-404.
7. Rosengren, Anderson K and Wilhelmsen L. Risk of coronary heart disease in middle-aged male bus and tram drivers compared to men in other occupations: A prospective study. *Int J Epidemiol* 1991; 20: 82-87.
8. Alfredsson N, Hammar and Hogstedt C. Incidence of myocardial infarction and mortality from specific causes among bus drivers in Sweden. *Int J Epidemiol* 1993; 22: 57-61.
9. Wang PD and Lin RS. Coronary heart disease risk factors in urban bus drivers. *Public Health* 2001; 115: 261–264.
10. Hartvig P and Midttun O. Coronary heart disease risk factors in bus and truck drivers. *Int Arch Occup Environ Health* 1983; 52: 353–360.

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[2] Twetman S, Axelsson S, Dahlgren H, Holm AK, Källestål C, Lagerlöf F, et al. Caries-preventive effect of fluoride toothpaste: A systematic review. Acta Odontol Scand 2003;61:347-55.

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[3] Fleischer W, Reimer K. Povidone iodine antisepsis. State of the art. Dermatology 1997;195 Suppl 2:3-9.

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[4] American Academy of Periodontology. Sonic and ultrasonic scalers in periodontics. J Periodontol 2000;71:1792-801.

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[6] Hosmer D, Lemeshow S. Applied logistic regression, 2nd edn. New York: Wiley-Interscience; 2000.

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[7] Nauntofte B, Tenovuo J, Lagerlöf F. Secretion and composition of saliva. In: Fejerskov O, Kidd EAM, editors. Dental caries: The disease and its clinical management. Oxford: Blackwell Munksgaard; 2003. p. 7-27.

No author given

[8] World Health Organization. Oral health surveys - basic methods, 4th edn. Geneva: World Health Organization; 1997.

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