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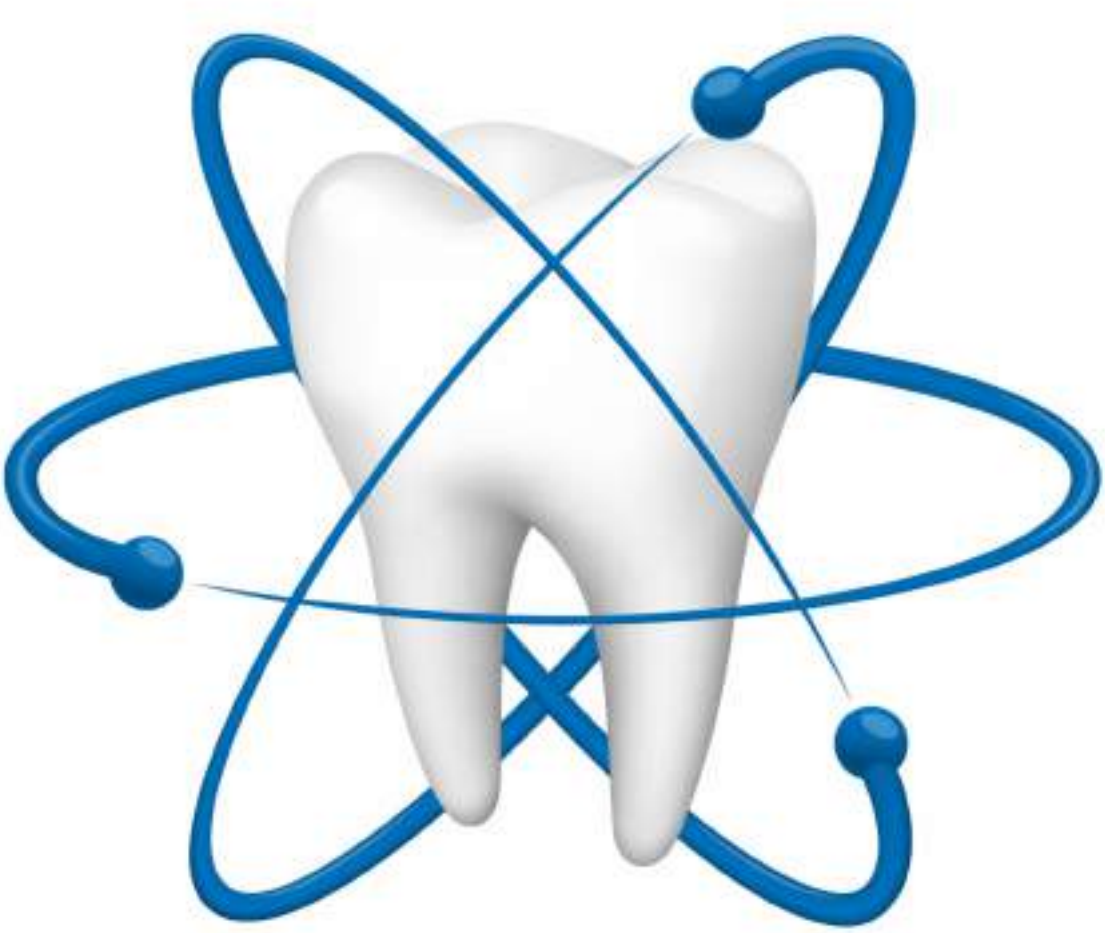

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Editor's Desk

I am very happy to being a part of Desh Bhagat University Dental Journal "International Journal of Dental Sciences & Research" as editor-in-chief. . I am pleased to introduce the 2nd issue for second volume of our journal under the guidance of honorable Chancellor 'Dr Zora Singh', Pro Chancellor 'Dr Tajinder Kaur', Vice Chancellor 'Dr. Virinder Singh'.

I am fortunate to have team of well renowned, efficient, sincere national and international peer- reviewers, research scholars, editorial board members, and the office bearers to be the part of this journal. Our journal is a constructive platform to improve the quality and competitiveness of the manuscript, providing readers with most comprehensive and reliable information in advanced areas of dental sciences. We publish original research investigations, review articles (systematic and narrative), short communications, editorials, case reports and letters to the editor on basic and clinical issues in dentistry.

Our Anatomy Department under the guidance of Dr. Ajit Pal Singh, Prof. & Head Department of Anatomy, Desh Bhagat Dental College and Hospital, A constituent campus of Desh Bhagat University has organized two days 1st International Conference of Anatomy & 3rd North Zone Symposium of Anatomy, 2nd CME cum Workshop on Living Anatomy in 21stCentury: An Emerging Trend in Health Sciences. Conference was inaugurated by Dr. Zora Singh hon'ble Chancellor of Desh Bhagat University and Pro-Chancellor Dr. Tajinder Kaur in the warm presence of Hon'ble Vice Chancellor Dr. Virinder Singh, Hon'ble President Dr. Sandeep Singh, Hon'ble Vice President Dr. Harsh Sadawarti, Hon'ble Dean Academics Dr. Sunil Malhan. The prestigious event was encouraged by the Chief Guest Dr Jagwinder Singh Maan, the President, Punjab Dental Council. Dr. Tulika Gupta, Associate Prof. in the Department of Anatomy, PGIMER Chandigarh presents the Key Note Address of the conference. There were three plenary sessions out of which one was Workshop Session and other one was CME Session. All the sessions were presented by highly dignified speakers Prof. (Dr.) Klaus Peter Herm (Germany), Prof. (Dr.) Hitant Vohra (DMC Ludhiana), Dr. Rimpi Gupta (Kalpana Chawala Govt.Medical College, Karnal), Prof. (Dr.) Priti Chaudhary and Dr. Anjali Singal (All India Institution of Medical Sciences, Bathinda), Prof. (Dr.) SP Singh (Punjabi University, Patiala), Dr. Gaurav Agnihotri (Govt. Medical College, Amritsar) , Prof.(Dr.) Ajit Jaiswal (BJS Dental College and Research Center, Ludhiana), Dr. Sanjay Bedi (MEU India) and Mr. Amritvir Singh Deol (Chandigarh). There were four Scientific Sessions that includes Award Paper Presentation, Oral Presentations and Poster Presentations. Sardar Lal Singh Memorial Faculty Young Scientist Award was begged by Dr. Rafiqa from PGIMER Chandigarh and Mata Jarnail Kaur Memorial Young Research Scholar Award was begged by Ramandeep Kaur Dhillon from MMIMSR, Mullana. Both Awards included Trophies with cash prizes. The conference has been graced by 300 offline delegates and 100 delegates from UAE, Kingdom of Saudi Arabia, Germany, and more than 15 states of India including Jammu & Kashmir, Rajasthan, Gujrat, Uttarakhand, Chhattisgarh, Haryana, Utter Pradesh, Madhya Pradesh, Andhra Pradesh Tamil Nadu, Kerala, Jharkhand and Karnataka. Musical gala evening with Sufi vibrations by local artist "Prince Inderpreet Singh" has added more colors to the event. Two days mega academic fiesta ends in creating new everlasting memories with some known and some strangers.

I sincerely thank all the authors, reviewers, editorial board members, office bearers of the journal and readers for extending their continuous support and cooperation in bringing out this issue of the year 2022 successfully. Needless to say, any papers that you wish to submit, either individually or collaboratively, are much appreciated and will make a substantial contribution to the early development and success of the journal. I seek support of all interested faculty members, students, institutions and practitioners to give their inputs, comments and valuable suggestions that will improve our Journal's standards and reputation as a reliable source of high-quality information in the field of dentistry.

Dr. Vikram Bali
Edior-In-Chief

International Journal of Dental Sciences & Research

Contents

IMPACT OF FAMILY CHARACTERISTICS, PARENTAL EDUCATION, AND AREA OF RESIDENCE ON DENTAL CARIES KNOWLEDGE SCORE OF SCHOOL CHILDREN

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Abstract

Aims and objectives: The aim of study was to evaluate the impact of family background, income of parents and parental education on child's knowledge score regarding dental caries and oral health practices.

Materials & methods: The study was conducted in two schools of Mandi Gobindgarh. The target population of the study was the school children within the age group of 10 to 12 years Based on the selection criteria 80 subjects (40 from urban school, 40 from rural school) were considered as the samples for the study. Data was collected to analyze knowledge score of school children and impact of different family characteristics on knowledge score of children.

Results and conclusions: The knowledge of school children regarding prevention of dental caries was in adequate. Majority of the respondents were belonging to Sikh religion (88.8%) and from nuclear family (77.5%). Majority of the mother and were housewives (72.5%). Among Parents (38.8%) were illiterate. Urban school children had more knowledge on dental caries than rural school children. Children from Urban school showed 2.5% (poor), 27.5% (average), 65% (good) knowledge and children from Rural school showed 7.5% (poor), 27.5%(average), 0.0% (good). The Mean knowledge score was 57.04%.

It was found that area of residence, education of father and mother of child and income of parents have association with knowledge score of children for prevention of caries. There was no impact of type of family and number of children in a family on dental caries knowledge score of children.

Keywords: Dental caries, enamel, family background, knowledge score.

INTRODUCTION

It is a well-known fact that while a majority of dental diseases can be prevented by proper dental care, the lack of it can lead to major dental problems especially in children and ultimately it affect their proper growth and development. Dental caries is one of the most common chronic diseases that affect human beings at all ages. It is a principal problem in children and adolescents. Dental caries, if untreated results in total destruction of teeth.[1] Normal healthy teeth are smooth, white and shiny. A chalky white discoloration of the enamel is an early indication of caries formation. Brown or Black discolorations indicate the formation of caries. Dental caries involves loss of tooth structure or the formation of cavity as a result of bacterial attack first on the enamel and then on the pulp. There are many complications as a result of dental caries or missing teeth. Child may experience many problems like poor nutrition, faulty speech habit psychological problems and oral foci of infection.

It is essential that the common man is made aware of the methods of proper health care and also should be educated regarding the consequences of the lack of oral health. The dental diseases usually start in childhood and leading to complications and tooth mortality. It is thus essential that to detect and treat this dental problems at the earliest and also very important to prevent, by educating the children and parents. Dental caries is the single most common chronic childhood disease affects children ages five through seventeen years. Prevalence of dental caries five times more common than asthma and seven times more common than hay fever[2] Of the WHO goals for the global oral health, the first goal is the 50 percentage of the five to six years old children should be caries free and the second goal is that the global average should not be more than three decayed, missing or filled teeth at twelve years of age. Prevention and early diagnosis are just as important in managing dental diseases, specifically dental caries as in managing any other infectious diseases[3]

For positive results in oral health, children have to form core target group, so the only constructive and practical solution to this grave problem of dental health is the initial detection and prevention of dental diseases. Hence it is necessary to introduce "intensive dental health care programme" covering the children and involving the schoolteachers and parents. Continuous educational programme should be conducted in the schools[4]

A higher percentage of children do not receive dental supervision and significant number reach adulthood without having been examined or treated. Many dental problems can be prevented if children and parents are well informed of the causes of dental diseases, prevention and aware of the importance of regular dental care[5] Parental attitudes toward the importance of oral hygiene have influence on the formation of their children's oral habits and the prevalence of oral diseases. Therefore the aim of present study was to evaluate the impact of family background, parental education on child's knowledge score regarding dental caries and oral health practices.

Materials and Methods

The study was conducted in two schools of Mandi Gobindgarh. The

first school was Primary School, which was situated in Mandi Gobindgarh, and it is in the outskirts of the city i.e., 22 kms away. It has 1-7 standards each with three sections. There were 756 students and 16 teachers. 95% of students were belonging to backward caste. Students were provided mid-day meals free of cost.

The second school i.e., school of Mandi Gobindgarh was situated at the heart of the city. It was an English medium school, which has standards from 1st to 12th standards .There were 780 students and 36 teachers. Two institutions were selected in order to assess the knowledge of school children regarding dental caries in both schools and also to compare their knowledge. As the permission was granted from these schools study was conducted after the random selection.

A population is an aggregate (or) totality of all subjects that process a set of specification. The target population is the group of population that the researcher aim to study and to whom the study findings will be generalized. The target population of the study was the school children within the age group of 10 to 12 years

Sample and Sampling Technique

A sample is a portion of the population that has been selected to represent the population of the interest. Based on the selection criteria 80 subjects (40 from urban school, 40 from rural school) were considered as the samples for the study.

Sampling is a process of selecting a portion of the population to obtain data regarding a problem. In this study purposive sampling technique was used to select area. Simple random sampling technique was used to select the subjects (40 from urban school, 40 from rural school) by lottery method.

Method of Data Collection

The technique used for collecting the information was structured interview method. Interview technique provides greater opportunity to prove and clarify questions and this results in nearly complete the data from all subjects, when subjects cannot read or respond to a questioner. The structured interview technique was preferred since the subjects were from both rural and urban school and also we felt that face to face contact would encourage the children to give free and frank information about their knowledge regarding prevention of dental carries. It allowed for uniformity in asking question and objectivity in recording the response.

A structured interview schedule was prepared by. The review of literature, opinion from experts in the field of child health nursing, dental health department, Pediatric department and materials from various sources helped in the selection of content for structured interview schedule.

Description of tool

The final format of structured interview schedule comprised of two parts.

Part 1 –It consisted of items describing sample characteristic parent's education and occupation ,family income ,type of family, number of children in family, religion, and residence.

Part 2 –It consisted of items to assess the knowledge of school children regarding dentition, structure of tooth, causes, signs and symptoms, treatment and prevention of dental caries. There are 30 questions, each carry one mark. The scores allotted for each statement as one mark for each correct and zero for each wrong answer. The minimum and maximum score found to be 0 and 30. For the purpose of the study, the knowledge scores are categorized in to

Poor - >50%

Average - 50%- 70%

Good - 70%-100%

Inclusion criteria

- The study includes the school children who were :
- Studying in 5th to 7th standard.
- Age group of 10 -12 yrs.
- Both boys and girls were selected
- Students were selected from urban and rural schools who were
- willing to participate in the study
- Available at the time of data collection

Exclusion criteria

- Less than 10 yrs and more than 12 yrs.
- Not studying in selected urban and rural schools of Mandi Gobindgarh
- Not willing to participate in the study

Results

Characteristics	Category	Respondents	
		Number	Percent
Living Children	One	26	32.5
	Two	39	48.8
	Three	15	18.7
Residence	Rural	40	50.0
	Urban	40	50.0
Type of Family	Nuclear	62	77.5
	Joint	18	22.5
Religion	Sikh	71	88.8
	Hindu	2	2.5
	Muslims	7	8.7
Family Income /m	<Rs.2,500	19	23.8
	Rs.2,501-5,000	28	35.0
	Rs.5,001-10,000	15	18.7
	>Rs.10,000	18	22.5
Total		80	100

Table 1: Family related characteristics of Respondents

Table 1 It represented majority of the respondents belong to nuclear family (77.5%) and 22.5% belongs to joint family. Sikh religion found with 88.8%, 2.5% of Hindu and 8.7% of Muslims. 50% of the children belonged to rural and 50% of them belong to urban family. Majority of respondents belonged to family with income of Rs 2501 – 5000 per month (35%), 23.8% of respondents were found in the income group of below Rs 2500 rupees and above Rs.10, 000 were 22.5% only. Families with one child constituted 32.5%, families with two children and families with three children were 18.7 percent.

Characteristics	**Father (N=80)**		**Mother (N=80)**	
	Number	**Percent**	**Number**	**Percent**
Education				
Illiterate	8	10.0	23	28.8
Primary	11	13.8	11	13.7
Secondary	16	20.0	8	10.0
PUC	14	17.5	13	16.2
Graduation	21	26.2	20	25.0
Post graduation	10	12.5	5	6.3
Occupation				
Daily wages	21	26.2	4	5.0
Housewife	0	0.0	58	72.5
Farmer	6	7.5	0	0.0
Government	31	38.8	12	15.0
Private	14	17.5	4	5.0
Business	8	10.0	2	2.5
Total	80	100	80	100

Table 2: Educational level and Occupational Status of Parents

Table 2 depicted the educational level and occupational status of both parents. Among mothers 25% were completed their graduation, 6.3 % post graduation, and 28.8% were illiterate. Among fathers 26.2% were educated upto graduation, 12.5% post graduation. 10 % fathers were found to be illiterate. Nature of occupation showed the number of daily wages were 21 (26.2%) among fathers, 4 (5%) among mothers. Housewives were 58 (72.5%). Only 12.2% parents were engaged in business where as 38.8& fathers and 15% mothers were found as government employees

NS: Non-Significant

Type of Family	Sample (n)	Knowledge Score (%)			F Value
		Mean	Mean (%)	SD (%)	
Nuclear	62	17.02	56.72	15.6	0.11NS
Joint	18	17.44	58.14	17.8	
Combined	80	17.11	57.04	16.0	

Table 3: Impact of Type of family on Knowledge of children in prevention of dental caries

Table 3 showed the association between the type of family and knowledge of children for prevention of dental caries. It can be concluded that there was no association between the type of family and knowledge of children in prevention of dental caries (F value – 0.11).

*Significant at 5% Level (P<0.05)

Residence	Sample (n)	Knowledge Score (%)			F Value
		Mean	Mean (%)	SD (%)	
Rural	40	13.15	43.83	7.1	173.14*
Urban	40	21.07	70.24	10.5	
Combined	80	17.11	57.04	16.0	

Table 4: Impact of Residence on Knowledge of children in prevention of dental caries

Table 4 depicted the impact of area of residence on knowledge of children in prevention of dental caries.. It was evident from the findings that respondents of urban family showed higher mean knowledge score (70.24 %) as compared to rural respondents (43.83%) .The data subjected to statistical test which indicated that the impact on residence is significant at 5% level. (F=173.14*).
*Significant at5%Level

Education of Father	Sample (n)	Knowledge Score (%)			F Value
		Mean	Mean (%)	SD (%)	
Illiterate	8	12.75	42.51	5.5	43.19*
Primary/Secondary	27	13.07	43.58	7.6	
PUC	14	18.14	60.46	12.3	
Graduation	31	21.29	70.96	11.3	
Combined	80	17.11	57.04	16.0	

Table 5: Impact of Education of Father on Knowledge of children in prevention of dental caries

Table 5 showed that the mean knowledge of children whose fathers were illiterate found to be 42.5% followed by primary, secondary educational level 43,58%, P.U.C (60.46%) respondents of graduate fathers had knowledge score of 70.96%. The results indicated that the higher educational level of father better was the knowledge of child (F=43.19*) (figure 1).

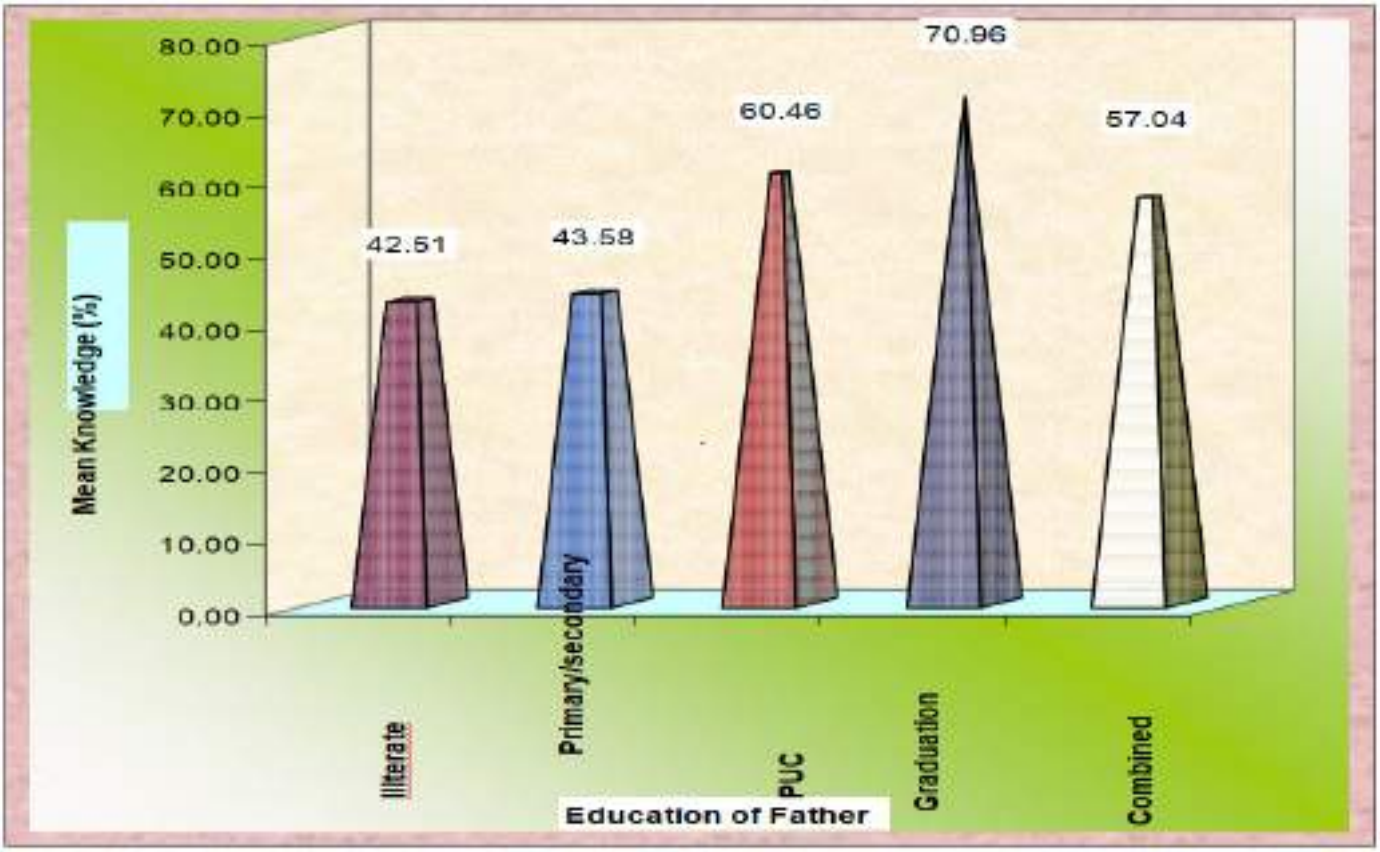

Figure 1: Impact of Education of Father on Knowledge of children in prevention of dental caries

Education of Mother	Sample(n)	Knowledge Score (%)			F Value
		Mean	Mean (%)	SD (%)	
Illiterate	23	12.87	42.90	6.0	26.43*
Primary/Secondary	19	16.10	53.67	14.4	
PUC	13	17.54	58.46	14.2	
Graduation	25	23.95	71.86	11.1	
Combined	80	17.11	57.04	16.0	

*Significantat 5% Level
Table 6: Impact of Education of Mother on Knowledge of children in prevention of dental caries

Table –6 showed that the mean knowledge score of children having illiterate mothers found to be 42.9% followed by primary, secondary educational level mothers (53,67%), P.U.C (58.46%). Knowledge of children whose mothers were graduate found to be 71.86%. The result clearly established that the higher educational level of mother, better the knowledge score of children. Further statistical F test result (F=26.43*) showed the impact of education of mother on knowledge of children in prevention of dental caries (figure 2).

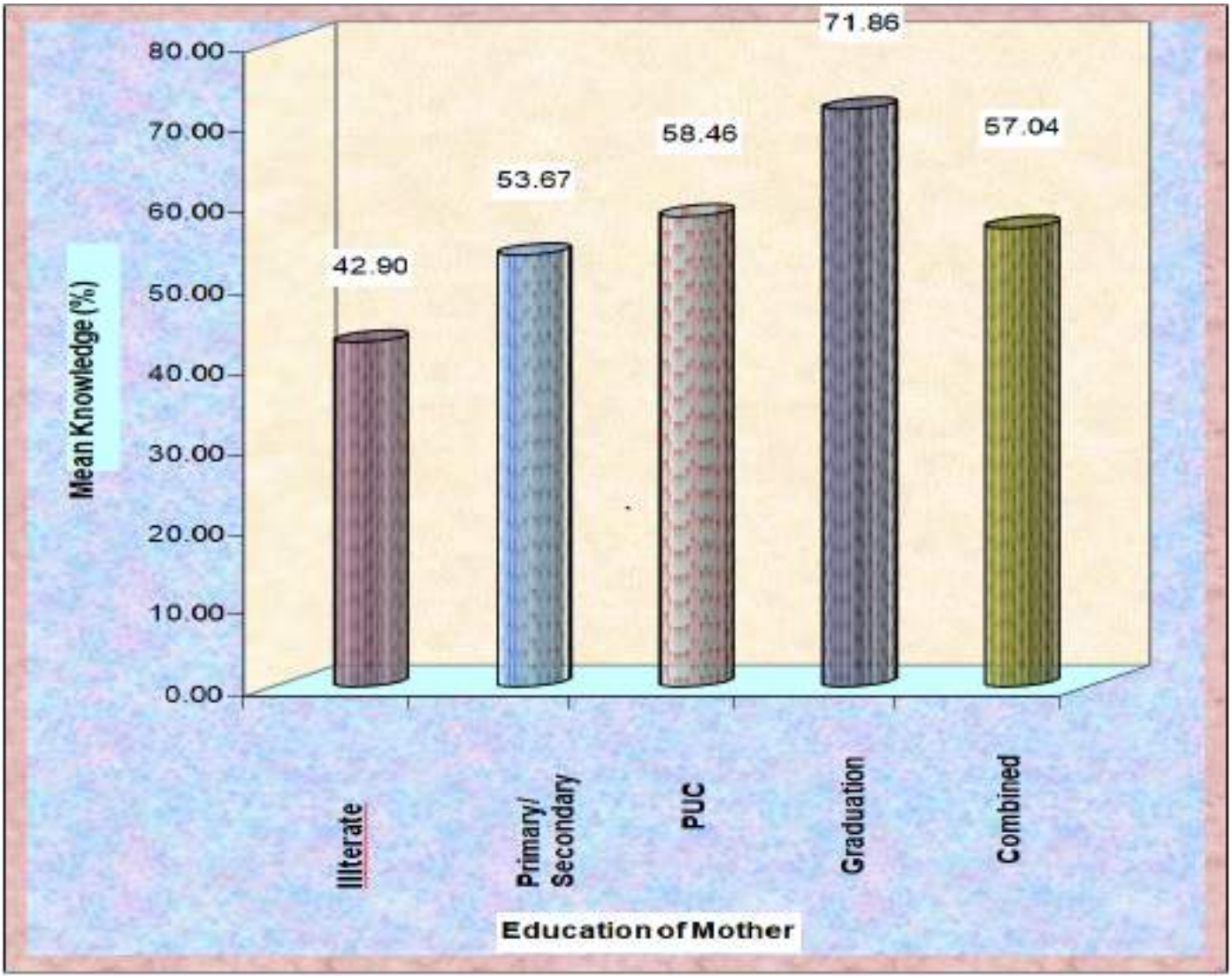

Figure 2: Impact of Education of Mother on Knowledge of children in prevention of dental caries

No. of children	Sample (n)	Knowledge Score (%)			F Value
		Mean	Mean (%)	SD (%)	
One	26	16.12	53.72	16.2	1.12NS
Two	39	17.90	59.65	15.8	
Three	15	16.80	56.00	15.9	
Combined	80	17.11	57.04	16.0	

*NS: Non-Significant

Table 7: Impact of number of children on Knowledge of children in prevention of dental caries

Table –7 depicted the impact of number of children on their knowledge for prevention of dental caries .The mean knowledge score of respondents who were single child of their family was 53.72% compared to 59.65% 56.00% with existing two and three children in the family respectively. However non significant statistical test (F=1.12 NS*) established no impact of number of children on dental caries prevention knowledge of children.

Family Income /m	Sample (n)	Knowledge Score (%)			F Value
		Mean	Mean (%)	SD (%)	
<Rs.2,500	19	12.89	42.98	6.8	32.76*
Rs.2,501-5,000	28	15.18	50.59	14.0	
Rs.5,001-10,000	15	20.00	66.65	9.8	
>Rs.10,000	18	22.16	73.88	9.0	
Combined	80	17.11	57.04	16.0	

*Significantat5%Level

Table 8: Impact of Family Income on Knowledge of children in prevention of dental caries

Impact on family income on knowledge of children for prevention of dental caries was shown in table 8. The higher mean knowledge score was found to be 73.88% among respondents who belong to family with income > Rs.10000 per month followed by 66.65% score with income Rs 5001-10000,50.59% with Rs 2501 –5000 and the less knowledge found with respondents of family having income < 2500 per month. The results clearly indicated that higher the income level of family, better the mean knowledge of respondents on prevention of dental caries.

Discussion

The present study was undertaken to assess the knowledge of school children regarding prevention of dental caries in selected schools i.e., schools of Mandi Gobindgarh with a view to develop health education module. A simple random sampling technique was used to select samples by lottery method.

The findings of the study revealed that the mean knowledge of school children {57.4%} regarding dental caries found to be inadequate to prevent dental caries. In Urban school 2.5% children showed poor knowledge score, 27.5% average, 65% have good knowledge and in Rural school 7.5% children have poor knowledge, 27.5% average. Many studies revealed the inadequacy of knowledge among school children. These findings of this study were supported by studies conducted by Safola II[6] and Oliveira ER et al (2000)[7].

The finding of the study revealed that there was significant impact of education of the parents, significant at 5% level (Table 5 and 6). The knowledge of children was found more whose parents are educated so research hypothesis was accepted. This is in concordance with the findings of Vigilid and Peterson (1999)[8].

The findings of the study revealed that the knowledge of children increases where the family income increases. Children who belonged to the family with income below Rs.2500 have the knowledge mean score of 42.98%. Whereas the mean knowledge score of children belonged to the family with income above Rs.10,000 was found to be 73.88% (Table 8). The prevalence of dental caries was also more in low socio-economic group due to poor oral hygiene. It is supported by Kulkarni S (2002)[9]. Ellakany P et al observed a high educational level of parents and high income were correlated with a lower prevalence of decayed teeth.[10]

Finding of the study revealed that there was no significant impact of type of family and number of children in a family on the knowledge score of children regarding caries prevention (Table 3 & 7). So Research hypothesis rejected and null hypothesis accepted.

Findings of the study stated that the school children should be imparted knowledge through continuous education and printed materials; it is incidence with the study of Ilieva[11]. Findings indicated the need for an effective health education module for school children with colorful pictures.

Conclusion

The knowledge of school children regarding prevention of dental caries was in adequate. In Urban school 2.5% children showed poor knowledge score, 27.5% average, 65% have good knowledge and in rural school 7.5% children have poor knowledge, 27.5% average. Many studies revealed the inadequacy of knowledge among school children. Urban school children had more knowledge on dental caries than rural school children and the Mean knowledge score was 57.04%.

There was a significant association between the knowledge of children in urban and rural schools. There was a significant association between the educational status of parents and children's knowledge score. Also the family income and knowledge score of children were associated with each other. More the family income, higher the knowledge score of child. There was no significant association between the type

of family, number of child in family and the knowledge of children.

Overall findings revealed that the knowledge of school children was not adequate for the prevention of dental caries and it was concluded that continuous educational programme should be carried out in all schools. Thus the present study strongly emphasizes the need for enhancement in knowledge and change in oral health practice in order to prevent dental caries.

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MANAGEMENT OF TRAUMATISED TOOTH WITH MINERAL TRIOXIDE AGGERATE (MTA) : A CASE REPORT

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Abstract

Aims and objectives: The aim of study was to evaluate the impact of family background, income of parents and parental education on child's knowledge score regarding dental caries and oral health practices.

Materials & methods: The study was conducted in two schools of Mandi Gobindgarh. The target population of the study was the school children within the age group of 10 to 12 years

Based on the selection criteria 80 subjects (40 from urban school, 40 from rural school) were considered as the samples for the study. Data was collected to analyze knowledge score of school children and impact of different family characteristics on knowledge score of children.

Results and conclusions: The knowledge of school children regarding prevention of dental caries was in adequate. Majority of the respondents were belonging to Sikh religion (88.8%) and from nuclear family (77.5%). Majority of the mother were housewives (72.5%). Among Parents (38.8%) were illiterate. Urban school children had more knowledge on dental caries than rural school children. Children from Urban school showed 2.5% (poor), 27.5% (average), 65% (good) knowledge and children from Rural school showed 7.5% (poor), 27.5%(average), 0.0% (good). The Mean knowledge score was 57.04%.

It was found that area of residence, education of father and mother of child and income of parents have association with knowledge score of children for prevention of caries. There was no impact of type of family and number of children in a family on dental caries knowledge score of children.

Keywords: dental caries, enamel, family background, knowledge score.

Introduction

The primary objective in endodontic therapy is complete obturation of root canal space to prevent re infection. In teeth with incomplete root development caused by trauma, caries and other pulpal pathosis, the absence of natural constriction at the end of the root canal presents a challenge and makes control of filling materials difficult. The aim is to seal a sizeable communication between the root canal system and the periradicular tissue and provide a barrier against which obturation material can be compacted.[1]

MTA stands for Mineral Trioxide Aggregate. Over the past two decades, MTA has become one of the most widely studied endodontic materials.[2,3] The trioxide aggregate in MTA consists of calcium, aluminum and selenium. MTA has several desirable properties in terms of its biocompatiblity, bioactivity, hydrophilicity, radiopacity, sealing ability and low solubility. The most important of these properties in dentistry are its biocompatibility and sealing ability. High biocompatibility encourages optimal healing responses. This has been observed histologically with the formation of new cementum in periradicular tissues area and a low inflammatory response with bridge formation in the pulp space.[4,5] The seal achieved is due to its expansion and contraction properties being very similar to dentin which results in high resistance to marginal leakage and to bacterial migration into the root canal system. A stable barrier to bacterial and fluid leakage is one of the key factors which facilitates clinical success.

A very practical advantage of MTA is that it sets in the moist environment omnipresent in dentistry. Unlike many other dental materials, MTA sets in a moist environment. When in contact with moisture, it's main component, which is calcium oxide, converts into calcium hydroxide which many clinicians will be familiar with.[6] This conversion results in a high pH microenvironment which has beneficial antibacterial effects. Unlike calcium hydroxide, however, this material has very low solubility and maintains its physical integrity after placement.

MTA materials are derived from a Portland cement parent compound. Although these compounds are similar in some respects, Portland cement and MTA are not identical.[7] MTA products undergo additional processing and purification. MTA products when compared to Portland cements have a smaller mean particle size and contain fewer toxic heavy metals.[8]

Case report

A 35-year-old male reported with fractured upper right incisors to the department of Conservative Dentistry and Endodontics (Figure 1). The medical history was not contributory. No significant family history was revealed. Clinically, we found that there was blackish discoloration in relation to upper right central incisor #[11]. The incisors were slightly ten-

der to percussion. Grade 3 mobility was seen. On electric pulp testing, the upper right central incisor #11 was non-responsive. On the basis of clinical and radiographical findings, a diagnosis of traumatised permanent teeth with open apex was made with respect to upper right central incisor #11.

Figure 1:Intraoral image showing fractured upper right central incisor #11.

An intraoral periapical radiograph was taken which showed incomplete root formation with wide open apices in right upper central incisor. No other periapical pathology was seen. Electric pulp testing was carried out which showed that the upper right central incisor #11 was non-responsive. (Figure 2)

Figure 2: Preoperative X ray

In the first appointment, root canal therapy with apexification using Mineral Trioxide was planned in relation to upper right central incisor #11 The tooth was isolated under a rubber dam and an access cavity was prepared. (Figure 3)

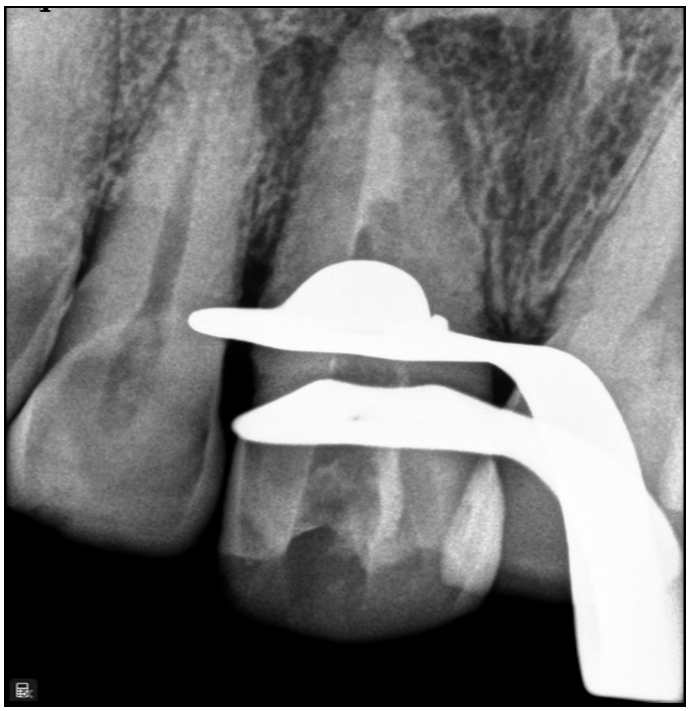

Figure 3: Mineral trioxide aggregate apical plug placed in relation to upper right central incisor #11.

MTA was mixed to the manufacturer's instructions and carried to the canal with an MTA Carrier. Apical plug of about 4 mm of MTA was placed and confirmed radiographically (Figure 3). A sterile cotton pellet moistened with sterile water was placed over the canal orifice and the access cavity was sealed with Cavit (3 M ESPE, Seefeld, Germany). After 72 h, the hard set of MTA was confirmed and the remainder of the root canal was obturated gutta-percha (Figure 4). In the same visit, the access cavity was restored with GIC.

Figure 4: Obturated #11

After 2 weeks, the patient was recalled for his aesthetic rehabilitation. As there was discoloration of the central incisor 11(Figure 5). crown preparation was done wrt 11 and zirconia crown was fabricated and cemented.

Figure 5: Crown preparation wrt upper right central incisor #11.

Patient was recalled after 3 months for follow up and results were satisfactory with reduced mobility.

Discussion

Dental injuries are very common in children. A serious complication of these traumas is pulp necrosis whose prevalence varies with the type of traumatism from 1% to 6% for crown fractures to nearly 100% for intrusions. Pulp necrosis of permanent immature teeth implies the interruption of root formation and apical closure. It is then necessary to implement a therapy, called apexification to induce a hard calcific barrier at the apical end of the root, to achieve definitive root canal filling.[3]

The completion of root development and closure of the apex occurs up to 3 years after eruption of the tooth. The treatment of pulpal injury during this period provides a significant challenge for the clinician.

A variety of materials have been proposed for induction of apical barrier formation. Calcium hydroxide (Ca(OH)2) has become the material of choice for apexification; it is bactericidal with an alkaline pH that may be responsible for stimulating apical calcification.[9]

Despite its popularity for the apexification procedure, Ca(OH)2 therapy has some inherent disadvantages, including variability of treatment time, unpredictability of apical closure, difficulty in patient follow-up and delayed treatment.[10] Also, it has some tissue altering and dissolving effects. Therefore, the search continues for procedures and materials that may allow for more natural continued apical closure in teeth with immature apices.

The US Food and Drug Administration approved mineral trioxide aggregate (MTA) in 1998 as a therapeutic endodontic material for humans.11MTA has been shown to have superior sealing ability to amalgam, zinc oxide eugenol, intermediate restorative material (IRM) and super-ethoxybenzoic acid[12] MTA has also been shown to have superior characteristics as a direct pulp-capping agent when compared with Ca(OH)2 in animals and humans in the root canal, which would result in intracanal bone formation and arrest of root development.[13]

More recently, white ProRoot (white MTA) root canal repair material was introduced as an aesthetic improvement over the original material (grey MTA) for placement in anterior teeth. The major components of white MTA are tricalcium silicate, dicalcium silicate, tricalcium aluminate, calcium sulphate dehydrate and bismuth oxide. The cement's setting time is 3–4 h, and its compressive strength after setting is 70 MPa—comparable with that of IRM.[14]

MTA is a material which has less leakage, better antibacterial properties, high marginal adaptation, short setting time (4 h) and a pH of 12.5 and is more biocompatible. Scaffolding is provided for hard tissue formation by MTA. It stimulates the production of interleukins and cytokines release. Hence, it is capable of promoting hard tissue formation. Clinicians may restore the tooth after setting of MTA. Thus, the fracture resistance of teeth with thin dentinal walls increases. MTA can be used in teeth with pulp necrosis and inflamed periapical lesions because it may set in moist environments.[15]

In the MTA plug technique, root canals must be disinfected with temporary calcium hydroxide before placing MTA for 2 weeks. This is because performing chemo-mechanical preparation alone is not effective for complete elimination of microorganisms. Hence, we used calcium hydroxide, in this case, in between the appointments in the root canal for disinfection.

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EVALUATION OF KNOWLEDGE SCORE OF DENTAL CARIES, ORAL HEALTH AND FREQUENCY OF CONSUMPTION OF CHOCOLATES, SWEETS AND SOFT DRINKS AMONG SCHOOL CHILDREN.

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Abstract

Aims & objectives: The aims of present study were to evaluate the knowledge score of dental caries, oral health among school children and also to know the consumption of chocolates, sweets and soft drinks by children in their routine life.

Materials & methods: The study was conducted in two schools of Mandi Gobindgarh. First school has 1-7 standards each with three sections. The second school of Mandi Gobindgarh has standards from 1st to 12th standards. Two institutions were selected in order to assess the knowledge of school children regarding dental caries in both schools and also to compare their knowledge. As the permission was granted from these schools study was conducted after the random selection.

Results: Results showed that 55% of respondents visited dental clinic and overall mean knowledge score among the respondents on dental caries found to be 57.04 percent with S.D as 16.0 percent. 38.7% never drink soft drinks and 53.7% drink occasionally. 61.2% of respondents take sweets and cake occasionally where as 3.8% take thrice a week. Only 2.5% of respondents never take chocolate but 40% of them take occasionally and 27.5% once in a week and 15% of them take twice and thrice a week respectively.

Conclusion: Majority of the respondents who visited dental clinic (55%), out of that 38.8 respondents (70.5%) visited due to toothache. The mean knowledge on prevention of dental caries was different among different age group under study and no difference was seen among males and females. Significant impact of medium of instruction on knowledge of children in prevention of dental caries was also reported in present study. English medium students' have higher knowledge score (70.24%) whereas students of Punjabi medium showed 43.83 % with the F value worked out to be 173.14 which indicated 5% level of significance.

Introduction

Oral health is a main division of overall health. As the oral cavity is the doorway for the human being body, any damage to oral health can be evident not only in the oral cavity but also in other parts of the body. As prevention is better than cure, preventive procedures are being executed within various divisions of society to maintain the good status of oral health.[1] It is a well-known fact that while a majority of dental diseases can be prevented by proper dental care, the lack of it can lead to major dental problems especially in children and ultimately it affect their proper growth and development. Dental caries is one of the most common chronic diseases that affect human beings at all ages. It is a principal problem in children and adolescents. Dental caries, if untreated results in total destruction of teeth.[2] Oral diseases present a major public health problem. About 90% of school children worldwide and most adults have experienced caries, with the disease being most prevalent in Asian and Latin American countries.[3]

Oral health education is believed to be a cost-effective method for promoting oral health if done through schools, where all school children irrespective of their socioeconomic status or ethnicity can be reached.[4] To create such oral health education, the assessment of knowledge and attitude is essential.[5] Knowledge means that the individual has all data necessary to understand what oral disease is and how it arises, as well as to understand the protective measures that need to be adopted.

Evidence has showed that an increase in knowledge about risk factors for oral disease and strong knowledge of oral health demonstrates better oral care practices that aim to promote healthy habits.[6,7] Moreover, school children with inadequate oral health knowledge are twice as likely to have caries as school children with adequate knowledge.[4] Therefore, an effective preventive program is desirable for these school children. However, it is important to evaluate the current status of oral health knowledge before designing an effective prevention program.

Food is necessary for the proper growth and development of children. It is important for the support of oral and physical health, the enhancement of the powers of resistance and continued renewal of the substances in the cells and tissues in children.

According to the World Health Organization, the diet has an important role in the prevention of oral diseases, including dental caries, dental erosion, defects in development, diseases of the oral mucosa and periodontal diseases.8 Dental caries eventually leads

to tooth loss, which in turn impairs the chewing ability, causing avoidance of hard and fibrous foods, including fruits, vegetables and whole grains.[8] An effective means of caries prevention is consumption of fluoridated water coupled with reduction in the intake of non-milk extrinsic sugar.[9] The excessive intake of low-molecular carbohydrates constitutes a serious health issue, which has an unfavorable impact on the dental health status.[10]

So, the aim of present study was to evaluate the knowledge score of dental caries, oral health among school children and also to know the consumption of chocolates, sweets and soft drinks by children in their routine life.

Materials & methods

The study was conducted in two schools of Mandi Gobindgarh. First school has 1-7 standards each with three sections. The second school of Mandi Gobindgarh has standards from 1st to 12th standards. Two institutions were selected in order to assess the knowledge of school children regarding dental caries in both schools and also to compare their knowledge. As the permission was granted from these schools study was conducted after the random selection.

Population

A population is an aggregate (or) totality of all subjects that process a set of specification. The target population is the group of population that the researcher aim to study and to whom the study findings will be generalized. The target population of present study was the school children within the age group of 10 to 12 years

Sample and sampling technique

A sample is a portion of the population that has been selected to represent the population of the interest. Based on the selection criteria 80 subjects (40 from urban school, 40 from rural school) were considered as the samples for the study and selected by lottery method.

Method of data collection

The technique used for collecting the information was structured interview method. Interview technique provides greater opportunity to prove and clarify questions and this results in nearly complete the data from all subjects, when subjects cannot read or respond to a questioner. The structured interview technique was preferred since the subjects were from both rural and urban school and also we felt that face to face contact would encourage the children to give free and frank information about their knowledge regarding prevention of dental carries. It allowed for uniformity in asking question and objectivity in recording the response.

A structured interview schedule was prepared.

The final format of structured interview schedule comprised of items describing sample characteristics such as age and sex of participants and frequency of consumption of chocolates, sweets and soft drinks Also It consisted of items to assess the knowledge of school children regarding dentition, structure of tooth, causes, signs and symptoms, treatment and prevention of dental caries. There are 30 questions, each carry one mark. The scores allotted for each statement as one mark for each correct and zero for each wrong answer. The minimum and maximum score found to be 0 and 30. For the purpose of the study, the knowledge scores are categorized in to

Poor - >50%

Average - 50%- 70%

Good - 70%-100%

Inclusion criteria

- The study includes the school children who were :
- Studying in 5th to 7th standard.
- Age group of 10 -12 yrs.
- Both boys and girls were selected
- Students were selected from urban and rural schools who were
- willing to participate in the study
- Available at the time of data collection

Exclusion criteria

- Less than 10 yrs and more than 12 yrs.
- Not studying in selected urban and rural schools of Mandi Gobindgarh
- Not willing to participate in the study

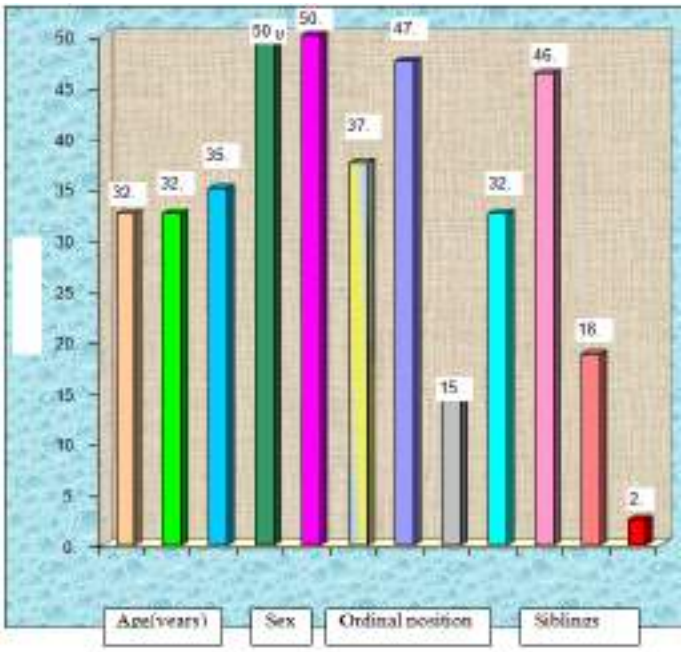
Results

The sample characteristics were described as follows.

Percentage and frequency distribution of sample characteristics

Characteristics	Category	Respondents	
		Number	Percent
Age	10years	26	32.5
	11years	26	32.5
	12years	28	35.0
Sex	Male	40	50.0
	Female	40	50.0
Ordinal position	First	30	37.5
	Second	38	47.5
	Third	12	15.0
Siblings	No	26	32.5
	One	37	46.3
	Two	15	18.7
	Three	2	2.5
Medium of Instruction	English	40	50.0
	Punjabi	40	50.0
Total		80	100

Table 1: Personal characteristics of Respondents



Graph – 1: Personal characteristics of Respondents

It is evident from the findings that higher percentage of (35%)of respondents belongs to 12 years of age followed by equal percentage (32.2%) of respondents noticed in the age group of 10 years and 11 years. Regarding sex, it is observed that equal number of respondents (50%) was taken for the study purpose. With respect to ordinal positions respondents majority (47.5%) found second ordinal position followed by first ordinal position (37.5%)and15% as third ordinal position. Majority of the respondents (46.3%) with one siblings followed by 18.7% and 2.5% of respondents possess with two and three sibling respectively. Further 32.5% of respondents noticed with no siblings (Table 1, Graph1)

Aspects	Response	Respondents	
		Number	Percent
Ever visited dental clinic	Yes No	44 36	55.0 45.0
Purpose of visiting clinic	Toothache	31	38.8
	School checkup	26	32.5
	Extraction of teeth	5	6.3
Brother or sister having dental	Yes	16	20.0
problems	No	64	80.0
Done filling teeth	Yes No	21 56	26.3 73.7
Absent to school due to dental	Yes	4	5.0
problems	No	76	95.0

Table 2: Response on Dental problems and visit to dental clinic

Table – 2 shows 55% of respondents visited dental clinic, out of which 38.8% visited for toothache, and32.5% underwent school checkup. 20% of the respondent's brother or sister had dental problems. Further, 26.3% undergone filling of their teeth. There are only 5% of the respondents absent to school due to dental problems.

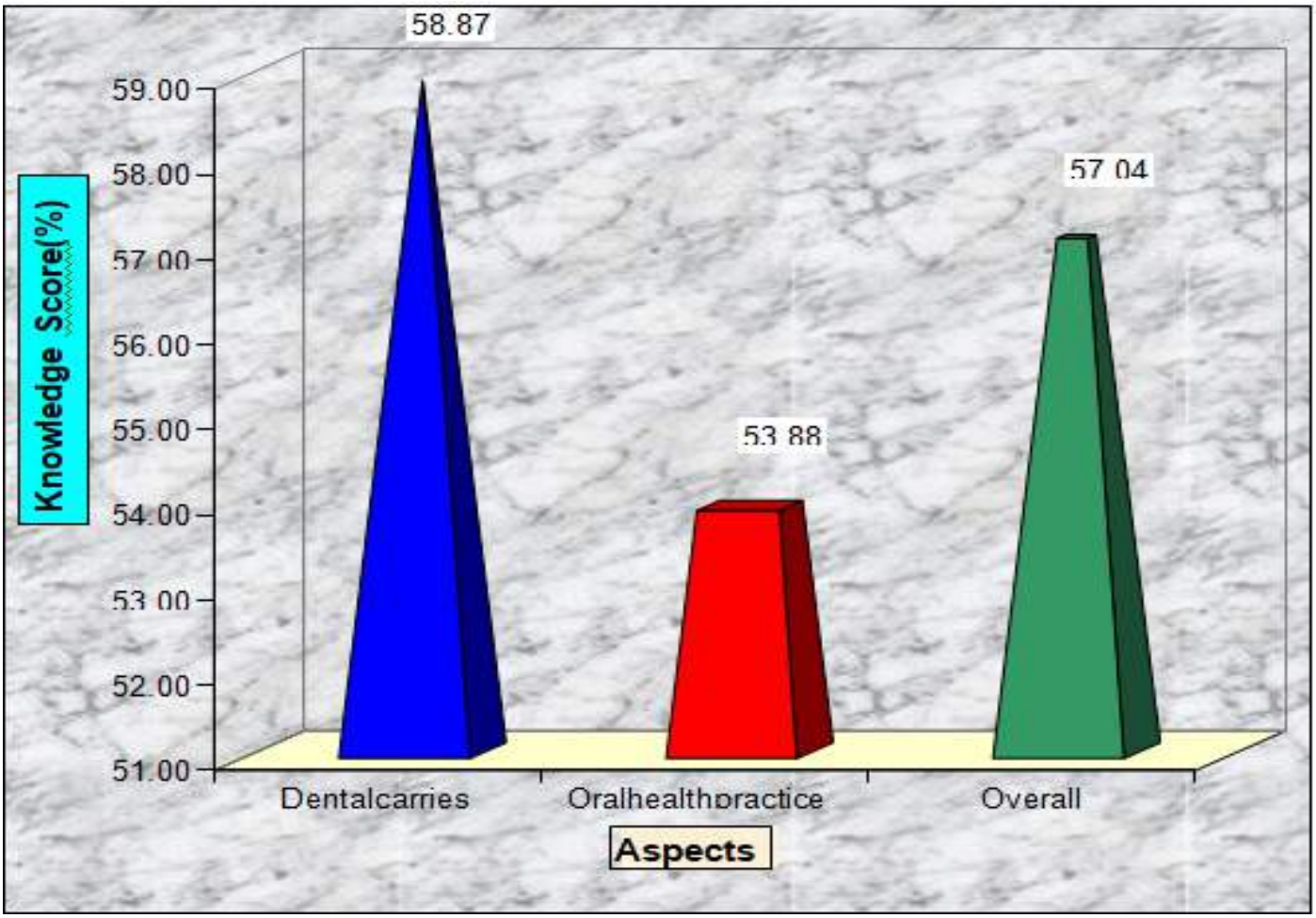
Frequency of Consumption	Soft Drinks		Eat Sweets & Cakes		Eat Chocolates	
	Number	Percent	Number	Percent	Number	Percent
Never	31	38.7	6	7.5	2	2.5
Occasionally	43	53.7	49	61.2	32	40.0
Once in a week	3	3.8	18	22.5	22	27.5
Twice in a week	3	3.8	4	5.0	12	15.0
Thrice in a week	0	0.0	3	3.8	12	15.0
Total	80	100	80	100	80	100

Table 3: Frequency of Consumption of Soft Drinks, Sweets & cakes and Chocolates

Table – 3 depicts the frequency of consumption of soft drinks, sweets and chocolates. 38.7% never drink soft drinks 53.7% drink occasionally. None of them drink soft drinks thrice in a week. 61.2% of respondents take sweets and cake occasionally where as 3.8% take thrice a week. Further analysis of consumption of chocolates only 2.5% of respondents never take but 40% of them take occasionally and 27.5% once in a week and 15% of them take twice and thrice a week respectively.

Aspects	Statements	Score Range	Knowledge Score		
			Mean	Mean (%)	SD (%)
Dental carries	19	6-17	11.18	58.87	15.5
Oral health Practice	11	3-10	5.93	53.88	20.8
Overall	30	10-26	17.151	57.04	16.0

Table 4: Response on Knowledge of Dental caries and Oral health Practice



Graph 2:Response on Knowledge of Dental caries and Oral health Practice

The data presented in table – 4 and graph 2 shows that the mean, mean percentage, standard deviation percentage , and range on knowledge of 80 school children regarding the knowledge of dental caries. It is evident from the findings that the overall mean knowledge score among the respondents on dental caries found to be 57.04 percent with S.D as 16.0 percent.

Sex	Sample (n)	Knowledge Score			F Value
		Mean	Mean (%)	SD (%)	0.24NS
Male	40	16.85	56.16	14.9	
Female	40	17.38	57.92	17.2	
Combined	80	17.11	57.04	16.0	

Table 5: Impact of Sex on Knowledge of children in prevention of dental caries

NS : Non-Significant

Table-5 shows the impact of sex on knowledge of children in prevention of dental caries.(figure 3) The analysis reveals that the mean knowledge of female respondents on prevention of dental caries found to be slightly higher (57.92 and S.D.17.2%) as compared to male respondents (56.16% and S.D 14.9%). The data subjected for statistical test indicate the difference in mean knowledge score in prevention of dental caries between sex found to be non significant.(F= 0.24 NS).

Age	Sample(n)	Knowledge Score (%)			F Value
		Mean	Mean (%)	SD (%)	
10years	26	17.35	51.82	17.1	3.35*
11years	26	15.31	57.02	14.2	
12years	28	18.57	61.90	15.3	
Combined	80	17.11	57.04	16.0	

*Significant at 5% level

Table 6: Impact of Age on Knowledge of children in prevention of dental caries

The impact of age on knowledge of children in prevention of dental caries is indicated in table.6. The mean knowledge on the aspect found with 51.82 percent among 10 years of age, 57.02% among 11 years of age and (61.90%) found in 12 years of age. The statistical test (F= 3.35) establishes that the difference to the mean knowledge on prevention of dental caries among different age group under study found to be significant at 5% level. (P<0.05)

Medium of Instruction	Sample(n)	Knowledge Score (%)			F Value
		Mean	Mean (%)	SD (%)	173.14*
English	40	21.07	70.24	10.5	
Punjabi	40	13.15	43.83	7.1	
Combined	80	17.11	57.04	16.0	

*Significantat5%Level

Table No.7 Impact of Medium of Instruction on Knowledge of children in prevention of dental caries

Table 7 depicts the impact of medium of instruction on knowledge of children in prevention of dental caries, the result depicts that English medium students' knowledge found higher (70.24%) whereas students of Punjabi medium shows 43.83 % with the F value worked out to be 173.14 which indicates 5% level of significance. Further there exists a significant association between the mediums of instruction on knowledge of children in prevention of dental caries

Discussion

Dental caries is infectious and preventable disease. School based preventive programme is very essential to prevent this problem. Health educational module can improve the knowledge and practice of school children to prevent dental caries. Hence the present study was undertaken to assess the knowledge of school children regarding prevention of dental caries in selected schools i.e., school of Mandi Gobindgarh with a view to develop health education module.

Present study reported that 55% of respondents visited dental clinic, out of which 38.8% visited for toothache, and 32.5% underwent school checkup. 20% of the respondent's brother or sister had dental problems. Further, 26.3% undergone filling of their teeth. There are only 5% of the respondents absent to school due to dental problems (table 2)

Mohammed S Al Darwish et[11] observed in their study that the majority of the children, 687 (32.5%), visited their dentist only when they had dental pain. This attitude could be explained in terms of fear due to previous negative dental visit experience or negligence of parents. These results are in agreement with the reports by the WHO[12] and Cheah et al.[13] Approximately a quarter of the children, 537 (25.4%), had a regular visit every six months. This could be due to the low awareness of importance of routine dental visits for dental check-ups. Studies conducted for children in India and China where 71.6% and 73.6% respectively had a regular dental visit every six months.[11,14] Muhanad Alhareky and Muhammad Ashraf Nazir reported that Most children (64.1%) visited the dentist during the past one year, 22.1% performed no dental visit during the past one year, and 8.3% never visited the dentist. Among children who visited the dentist, the pain was the most common reason for dental visits (39.10%, N=170), followed by routine dental check-ups (18.60%, N=81).[15] About 99.43% of children knew that maintenance of healthy mouth is each individual responsibility. Around 46.86% of children had visited the dentist, and 53.14% of children hadn't visited the dentist before. It was noted that 22.29% of children visited dentist for decay reason, 9.71% for reason of pain, 3.29% constituted for filling, and 2.71% for extraction.[16]

In the everyday diet of most children there were many risk foods of the 'junk food' type: chocolate, sweets, snickers, potato crisps, corn sticks. Such foods are appealing and have a pleasant taste (mostly sweet); they are packed in colourful shiny packages in the form of sticks, chocolate bars or sweet drinks in boxes. Their high sugar content causes a major concern as it tremendously raises the risk of caries. Other foods such as corn sticks, corn snacks, popcorn, crisps, French fries are very tasty and have an appealing aroma and colour. A worrying trend of frequent consumption of non-alcoholic fizzy drinks was found in 2/3 of the children. Due to the high sugar content, this creates a high risk of caries development. Energy drinks are a favourite amongst some children, who consume them regularly.

Table – 3 depicted the frequency of consumption of soft drinks, sweets and chocolates. 38.7% never drink soft drinks 53.7% drink occasionally. None of them drink soft drinks thrice in a week. 61.2% of respondents take sweets and cake occasionally where as 3.8% take thrice a week. Analysis of consumption of chocolates showed that only 2.5% of respondents never take but 40% of them take occasionally and 27.5% once in a week and 15% of them take twice and thrice a week respectively. Another study showed that 34% children have chocolates two to four times a week, 6 % once a week, 36% once a day and 24% take more than once a day.[17] So present study reported less chocolate consumption as compared to this study. Doichinova L et al17 also reported higher intake of sweets and soft drinks by children as compared to our study.

The findings of the study revealed that the mean knowledge of school children {57.4%} regarding dental caries and oral health practices found to be inadequate to prevent dental caries.

It is evident from the findings that the overall mean knowledge score among the respondents on dental caries found to be 58.87% and knowledge score for oral health practices was 53.87% (Table 4). Rajab[18] conducted a study to assess the level of knowledge and attitudes of children and parents. 49 % of the children had tooth extraction and 8 %had preventive services. Tooth brushing at least twice a day was reported for 31% of the children. Mohammed S Al Darwish et11 found that Only 25.8% of children reported a high level of oral health knowledge. A large number of children (32.5%) thought incorrectly that one must visit the dentist only in case of pain. Less than half 38.9% of children actually had heard about fluoride. Only 16.8% correctly answered the question about sign of tooth decay. Slightly less than half 48.4% could not define the meaning of plaque. Thus oral health knowledge in Qatar is below the satisfactory level. [11] Geethapriya PR et al[19] Found that age did not seem to influence the dental caries status, oral hygiene status, and knowledge related to oral health. Both the younger and older children had similar caries status. The older children had better knowledge on oral health,

but the oral hygiene practices were not followed effectively. In their study both third and fifth grade children had similar caries status. The caries treatment needs was significantly higher ($p = 0.02$) in fifth grade children of school III. The oral hygiene status was significantly better ($p = 0.004$) in fifth grade children of school I and third grade children ($p < 0.001$) of school III. Fifth grade children were found to have more knowledge on oral health and it was statistically significant in school II ($p = 0.001$). In school III, as caries status increased, the oral hygiene index score significantly increased ($p = 0.001$). But in present study showed impact of age on knowledge score of children (Table 6).

Finding of the study revealed that there is no significant impact between both sexes and knowledge of children regarding prevention and prevalence of dental caries. Abd El -Kareem et al[20] in their study revealed that the majority of the studied subjects possess unsatisfactory level of knowledge score, in the same line with study conducted by Abd-Alsemia, et al[21] ,who reported that the majority of studied children had poor level of knowledge regarding to dental caries and care. They also revealed the majority of the studied subjects who possessed unsatisfactory level of knowledge were males under age of 10 years and lived in urban, this finding come in accordance with Al-Darwish[11] ,who examined oral health knowledge, behavior and practices among school children in Qatar; found that the highest percentage of the studied sample that have poor knowledge related to oral health were boys, under age of 12 years and lived in urban. In contrast to this present study no influence of gender on knowledge score on dental caries and oral practices (Table 5). Similarly Imran et al[22] examined knowledge and practice of oral health among higher secondary school students to determine the knowledge and practice of oral health among higher secondary school students and revealed no significant difference for knowledge and practice among male and female students El-Nasr[23] (2017) also revealed no statistically significant correlation between sex and place of residence with total knowledge and total practice before and after the oral health intervention program. Same results found by Jose A Joseph.(2003)[24.]

Conclusion

Majority of the respondents who visited dental clinic (55%), out of that 38.8 respondents (70.5%) visited due to toothache. There were 5% of respondents were absent to school due to dental problem.The mean knowledge on prevention of dental caries was different among different age group under study and no difference was seen among males and females. Significant impact of medium of instruction on knowledge of children in prevention of dental caries was also reported in present study. English medium students' have higher knowledge score (70.24%) whereas students of Punjabi medium showed 43.83 % . Evaluation of frequency of consumption of sweets and soft drinks indicated that 38.7% never drink soft drinks and 53.7% drink occasionally. 61.2% of respondents take sweets and cake occasionally where as 3.8% take thrice a week. Only 2.5% of respondents never take chocolate but 40% of them take occasionally and 27.5% once in a week and 15% of them take twice and thrice a week respectively.

Dentist have very important role to play in the early detection, treatment and prevention of the disease and also enable individual and families to attain and maintain the highest possible level of health. The ultimate goal of dental intervention is to help people to help themselves. Hence the most important role played by dentist in relation to health promotion is that of a health educator. Health education is a process that helps people to make sound decisions about personnel health practices and about the individual, family and community's well-being. Health education in schools helps children to learn health practices and life style.

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A STUDY OF GENETIC INHERITANCE PATTERN OF THE EAR LOBULE ATTACHMENT IN SELECTIVE SAMPLE OF RAJASTHAN STATE

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Abstract

Introduction: The earlobe is formed by tough areola and adipose tissue, lacking the firmness and elasticity of the rest of the ear auricle. The study of earlobe attachment, as a morphogenetic trait can be used to investigate the diversity that arises within and among different populations due to genetic variations

Materials and Methods: The present longitudinal randomized study was carried on randomly selected 100 families, residing in Sriganganagar Rajasthan. Digital camera, USB Cable and laptop were used for the study.

Results: Out of total 158 offspring 86.08% are free and 13.92% are attached. Males and females displayed the highest frequency of free earlobes. There is no significant gender difference in the pattern of earlobe attachment.

Conclusion: The free earlobe is more predominant than attached earlobe and this study investigated an inheritance pattern of simple dominance recessive pattern where free earlobes are dominant over attached earlobes.

Key Words: Free earlobes, attached earlobes, human ear, trait, frequency.

Introduction

There are several morphological and metric features of human body have been used in the past for personal identification in forensic examination. Fingerprinting, DNA fingerprinting, footprints, facial features, Iris, gait, teeth, bite marks, lip prints from a variety of tissues of humans are utilized in forensic medicine. Like fingerprints, human ear is also unique to an individual, due to variations in the anatomical structure of the external ear (Iannarelli 1989).

The earlobe is formed by tough areola and adipose tissue, lacking the firmness and elasticity of the rest of the ear auricle (Keith and Arthur 2006). The earlobe is either directly attached to the lateral side of the face or hanging freely and therefore attached type of earlobe is slightly smaller than the free earlobe. This variation in the earlobe attachment may be a trait that is genetically inherited from parents and this inheritance follows a pattern (Ordu et al. 2014). The ear lobe attachment is referred to the way the base of the ear is attached to the upper part. Free and attached earlobe with a horizontal attachment to the lateral side of the face (Lai and Walsh 1966). In one article it is acknowledged that earlobe attachment is genetically determined and is usually presented as an example of a readily observable Mendelian phenotype in the educational materials and continues to be studied as Mendelian phenotype contemporary primary literature (Shaffer et al., 2017). The study of earlobe attachment, as a morphogenetic trait can be used to investigate the diversity that arises within and among different populations due to genetic variations (Chadha and Sandhu, 2013). It can be useful in settling parental dispute when they arise by understanding inheritance pattern of trait helps genetics to predict the probability of an offspring inheriting certain traits from parents (Hugo et al.,2003). In Indian population , inter population relationship and variations between populations have been studied (Kalia and Gupta 1978; Jadav et al.,2000). In this study, therefore the variability of earlobe attachment and its inheritance pattern will be investigated.

Materials and Methods

The present longitudinal randomized study was carried on randomly selected 100 families, residing in Sriganganagar Rajasthan. Digital camera, USB Cable and laptop were used for the study. Subjects were required to sit down with the head positioned in Frankfurt horizontal plane, namely a horizontal line connecting both inferior orbitale and tragion. Lateral surface of the ear was photographed in such a way that mid-vertical grid line of the camera aligned to pass through the mid-saggital plane of the face while the mid-horizontal pass through the Frankfurt horizontal plane. Subjects having history of craniofacial trauma, ear diseases, congenital abnormalities, females with large ear piercing hole and surgery of ear were excluded from the study. Pictures were arranged according to families and analysed. Chi-test was used to test pattern of inheritance based on Mendellian pattern of inheritance at 0.05 significant.

Results

358 individuals consisting of 158 children and 200 parents from 100 families were included in the study. These were grouped into 6 categories as represented by pictures below. These 6 families represent the 100 families participated in the study. All the families fall into any of the prototype 6 families. In picture 1, all the children (1 male and 1 female) and parents have free earlobe. Picture 2 has all children (2 male 1 female) and mother with free earlobe and father with attached earlobe while mother has attached earlobe with son and father having detached earlobe in picture 3. Both parents and children in picture 4 are all attached as compared to picture 5 where father and child are attached while mother is having free earlobe. Picture 6 shows that mother and child 1have attached while father and child 2 have free earlobe

All the offspring were grouped into attached and free earlobes as represented in table I and table II. Table I showed that if parental combination is free earlobe out off 80 offspring, 76 are having free while 4 are having attached earlobe. If parental combination is father free and mother attached out off 33 offspring, 28 are having free while 5 are having attached earlobe. If parental combination is mother free and father attached out off 31 offspring, 28 are having free while 3 are having attached earlobe. If both parents are having attached earlobe, out off 14 offspring 4 are having free, while 10 are having attached earlobe. The significance of observed frequencies are tested by chi-test at $p<0.05$ (critical value=3.84; and degree of freedom=9) as shown in table I that all the values are significant.

Picture 1: Pictures of family where both parents and children have free earlobe

Picture 2: Pictures of family where mother and all the children have free while father has attached earlobe

Picture 3: Picture of the family where child and father have free earlobe while mother have attached earlobe

Picture: 4 picture of the family where all family members have attached earlobe

FATHER MOTHER CHILD 1 F CHILD 2 M

Picture: 5 Picture of the family where father and child have attached while mother have free earlobe

FATHER MOTHER CHILD1 M

Picture: 6 Picture of the family mother and child 1have attached while father and child 2 have free earlobe.

FATHER MOTHER CHILD 1 F CHILD 2 M

All these can be represented using a Mendellian monohybrid cross on assumption that free earlobe is dominant (E) and attached earlobe recessive (e) allele

Father→ Mother ↓	E	E
E	EE	EE
E	Ee	Ee

\Figure 1: Both parents are with free earlobe; one homozygous and another heterozygous. Expected offspring ratio is 1:0 (free:attached), all offspring will have free earlobe

Father→ Mother ↓	E	e
E	EE	Ee
e	Ee	Ee

Figure 2: Both parents are with free earlobe; heterozygous. Expected offspring ratio is 3:1 (free:attached), 75% of offspring will have free earlobe while 25% will have attached earlobe.

Father→ Mother ↓	E	E
e	Ee	Ee
E	Ee	Ee

Figure 3: one of parent is with free earlobe (homozygous) and another attached homozygous. Expected offspring ratio is 1:0 (free:attached), all offspring will have free earlobe.

Father→ Mother ↓	E	e
e	Ee	Ee
e	Ee	Ee

Figure 4: one of parent is with free earlobe (heterozygous) and another attached homozygous. Expected offspring ratio is 1:1 (free:attached), 50% offspring will have free earlobe while 50% will have attached earlobe.

Father→ Mother ↓	e	e
e	Ee	Ee
e	Ee	Ee

Figure 5: Both parents is attached (homozygous). Expected offspring ratio is 0:1 (free:attached), All offspring will have attached earlobe.

Parental combination Earlobe Attachment	Total no of offspring			No of male offspring		No of female offspring		Cal Chi-value	Critical value	Inference
	total	free	Attached	free	attached	free	attached			
Father free Mother attached	33	28	5	17	3	11	2	46.19	3.84	Significant
Mother free Father attached	31	28	3	15	2	13	1			
Both parents free	80	76	4	41	1	35	3			
Both parents attached	14	4	10	2	6	2	4			
Total	158	136	22	75	12	61	10			

Table I: Frequency table showing offspring with free and attached earlobe

Earlobe attachment	Total no offspring	No of male offspring	No of female offspring	Total %	Chi- value	P- value
Free	136	75	61	86.08	0.002	0.958
Attached	22	12	10	13.92		
Total	158	87	71	100.00		

Table II: Frequency table showing the total number of offspring

Table II showed that out of total 158 offspring 86.08% are free and 13.92% are attached. Males and females displayed the highest frequency of free earlobes. There is no significant gender difference in the pattern of earlobe attachment (df=1, chi-value=0.002, p-value=0.958)

Discussion

Our study suggested familial and gender pattern of earlobe traits and determine the pattern of earlobe attachment among the people of Sriganganagar District of Rajasthan state. This study revealed that the frequency of free earlobe (136, 86.08%) was above that of the attached earlobe (22, 13.92%) and this finding is in agreement with the report from Yadav et al., (2000) which stated that regularity of free earlobe as a range 56% to 74%in ethnic factions of Haryana. One investigation of ear lobe attachment done by Singh and Sengupta on the Indians remarked that the rate of recurrence of free earlobe (83.65%) is greater than that of attached (16.35%). The present study is not in accord with Pradhuman et al., (2016) who demonstrated that attached earlobe is more prevalent than free earlobe

(35% free and 65% attached) among North East and North West subpopulation of India.

This study showed that male and female both have more of free earlobe, though the gender variation was insignificant which is in concordance with Anibor (2016) who stated that there is no significant gender difference in earlobe attachment.

Seventy six (55.88%) offspring had free earlobe and 4 (18.18%) had attached ear lobe when both parents had detached (fig-1, table I, picture 1). It is highly significant at $p<.05$ with high ratio because the parents who had free earlobe might be homozygous (EE) or heterozygous (Ee) in their genetic constitution (Nussbaum et al 2007). Fifty six offspring (35.17%) had either parent with free earlobe as shown in table-1, fig 3,4 and picture 2,3,5,6. These agree with the crosses above. Only 4 offspring (2.5%) had free earlobe when both parents had attached earlobe. This variation might suggest polygenic inheritance. Variations the earlobe attachments are due to the differences in the ages of offspring as there is increase in the earlobe length with increase with the age (Anshu et al., 2007). It was observed that the earlobe inheritance by offspring was independent of sexual difference. The genetic endowment is not sex linked or mitochondrial inheritance rather controlled by autosomal genes which are recessive for attached and dominant for free earlobe. This is in correspond with when he Rhodes Islands Red and Leghorns (Hays, 1943)

Conclusion

The free earlobe is more predominant than attached earlobe and there is no significant gender variation in the pattern of earlobe attachment. This study investigated the genetic endowment of earlobe attachment amongst the general population of Sriganganagar District of Rajasthan state revealed an inheritance pattern of simple dominance recessive pattern where free earlobes are dominant over attached earlobes.

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THE MORPHOLOGY AND HISTOLOGY OF THORACIC SYMPATHETIC GANGLIA:A FETAL STUDY.

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Abstract

Introduction: The thoracic sympathetic trunk possesses 12 ganglia, one corresponding to each thoracic nerve ,it lies anterior to head of ribs or side of the body of thoracic vertebrae. Splanchnic nerves arise from the thoracic ganglia and supply thoracic and abdominal viscera.

Material and Method: The present study included 50 preserved fetus specimens sent for routine autopsy in Department of Anatomy, Government medical college and hospital, Chandigarh. The thoracic and abdominal wall of the fetus was incised, then all organs were removed to expose the sympathetic chain .Morphological observations were noted. Next the thoracic ganglion was removed and fixed in paraffin for the histological processing in different gestational ages.

Observation: The fetus were divided into 4 age group (Group A=11-15weeks,Group B=15+_20weeks,Group C=20+_25weeks and Group D=25 weeks onwards)

Morphological observation: The length of thoracic chain was noted which was directly proportional to gestational age.The number of ganglia showed variability 12 in 22 cases,11 in 18 cases and 10 in 7 cases. The origin of splanchnic nerves from thoracic ganglia was quite variable.

Histological observation: In group A the neuroblast cells were observed with eccentric nucleus. Presence of satellite cells was noticed in group B surrounding neuroblasts. In group C, some neuroblasts were seen undergoing mitosis whereas others slowed more differentiation.In group D mature adult like neuroblasts were seen with processes, satellite cell sheath and perinuclear halo.

Keywords: Thoracic, splanchni ,Fetus, Ganglion, Neuroblast.

Introduction

The sympathetic trunks consist of two ganglionated nerve trunks that extend along the length of the vertebral column. In the neck,there were 3 ganglia; in thorax:11 or 12; in the lumbar region 4 or 5 and in pelvis, 4 or 5.In the neck,trunks lie anterior to the transverse processes of the cervical vertebrae; in the thorax they are anterior to the heads of the ribs or lie on the sides of the vertebral bodies,in the abdomen,it lies anterolateral to the sides of the bodies of the lumbar vertebrae; and in the pelvis, they are anterior to the sacrum.[1]

The thoracic sympathetic trunk possesses 12 ganglia,corresponding to each thoracic nerve ,but often 1st is fused with inferior cervical ganglion to form a large stellate ganglion above the neck of the 1st rib.The ganglion is attached to spinal nerve by white and grey rami and it gives communicantes to spinal nerves.[2] There were three splanchnic nerves of the thoracic sympathetic trunk; arising from the lower eight ganglia. The greater splanchnic nerve (GSN) is formed by branches of the 5th to 9th thoracic sympathetic ganglia, the lesser splanchnic nerve (LSN) from 10th to 11th thoracic sympathetic ganglia and the least splanchnic nerve from the 12th thoracic ganglion. Splanchnic nerves contain predominantly visceral efferent fibers and pain conducting visceral afferent fibers.[3] Splanchnic ganglia of the greater splanchnic nerve was first described by Lobstein in 1823.[4] These ganglia give off numerous medial branches to the aortic coat, and sometimes to the coeliac plexus, superior mesenteric plexus, renal plexus or oesophageal plexuses.[5],Preganglioic axons are coming from the lateral grey column (horn) of the spinal cord. The myelinated axons of these cells leave the cord and join the paravertebral ganglia of the sympathetic trunk through the white rami communicantes while postganglionic axons leave the trunk through the grey rami communicantes. The axons of postganglionic neurons are nonmyelinated and distributed to target organs in various ways.[6]

The group of visceral nerves that arise from the thoracic sympathetic trunks which carry pre and post ganglionic sympathetic and afferent nerve fibres supplying upper abdominal organs.[7,8] The pattern of connections of pANS don't change significantly between the fetal period and the adult according to Kuntz[7] and Pick.[9]Anatomical variations of the thoracic sympathetic trunk in relation to intercostal nerves may be one of the reasons that cause surgical failures.

Aims and objectives

The present study was undertaken to

- To find out variations in the number of ganglia in the thoracic part of the sympathetic chain.
- To observe the variations in the formation of splanchnic nerves in the thoracic part of the sympathetic chain.
- To study histogenesis of thoracic ganglia.

Materials and method

50 formalin preserved fetus specimens from 11- 28th week of gestation from spontaneous abortions received at Department of Anat-

omy, Government medical college and hospital 32 Chandigarh were the part of study. The research work was conducted after obtaining necessary permission from the parents and ethical clearance from the institute. The age estimation was obtained from the fetuses' medical records as well as through standard crown rump length measurements. General anatomical features were recorded. The congenitally malformed fetuses were excluded from study. Then fetuses were fixed in formalin.Then the fetuses were dissected by anterior midline and lateral incisions, organs were eviscerated and the sympathetic chains were dissected from cervical to sacral region. The thoracic part of sympathetic chain was exposed bilaterally. (as shown in fig 1&2)

The fetuses were divided into four gestational age groups: Group A (11-15 weeks) Group B (15+-20 weeks) Group C (20+-25 weeks) and Group D (25+ onwards).

The length of thoracic sympathetic chain and number of thoracic ganglia were measured. It was not possible to measure the size of thoracic sympathetic ganglia as these were very small. The dissections were done under a dissecting microscope or with the help of a convex lens. Next, Light microscopic study of fetal thoracic ganglia was done with H &E staining in different gestational age groups to note the histological changes.

Figure 1 : Anterior midline incision

Figure 2: Evisceration of thoracic and abdominal viscera

Observation

The thoracic part of sympathetic chain was present bilaterally in all fetus specimens with variation in number of ganglia.

Morphological

The number of thoracic ganglia and length of thoracic part of sympathetic chain was noted and discussed as under.

Table 1: Showing age distribution in groups

Group	Gestational age	Number of fetus	Total number of chains
A	11-15	11	22
B	15+_20	13	26
C	20+_25	14	28
D	25 onwards	12	24

In group A 22 chains were dissected ,followed by 26 in Group B,28 in group C and 24 in group D.

Group	Mean length(in cm)
A	2.88
B	3.16
C	4.24
D	6.75

Table 2: Showing mean length of thoracic part of sympathetic chain

The mean length of thoracic chain ranged from 2.88cm to 6.75cm.There was slight increase in length from A-B group but there was significant increase from group C to D .The length of chain was increasing with the gestational age.

Number	Number of cases	%age
10	7	14%
11	18	36%
12	22	42%

Table 3: Showing total number of ganglia

In most of the chains (48%) 12 ganglion were present.While in 36% cases there were 11 ganglion in thoracic sympathetic chain. In 3% cases the 2-3 ganglia were seen fused .

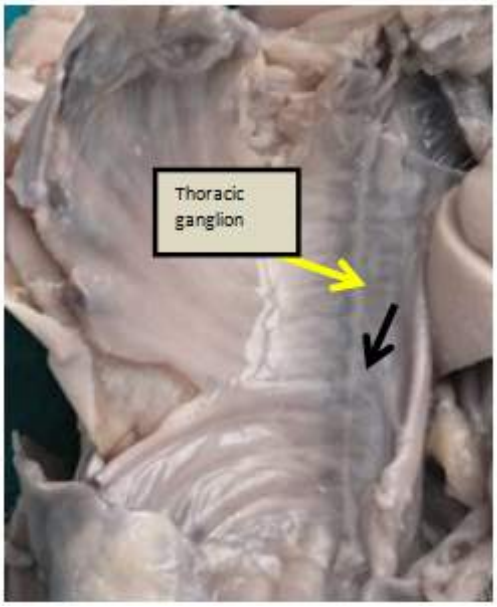
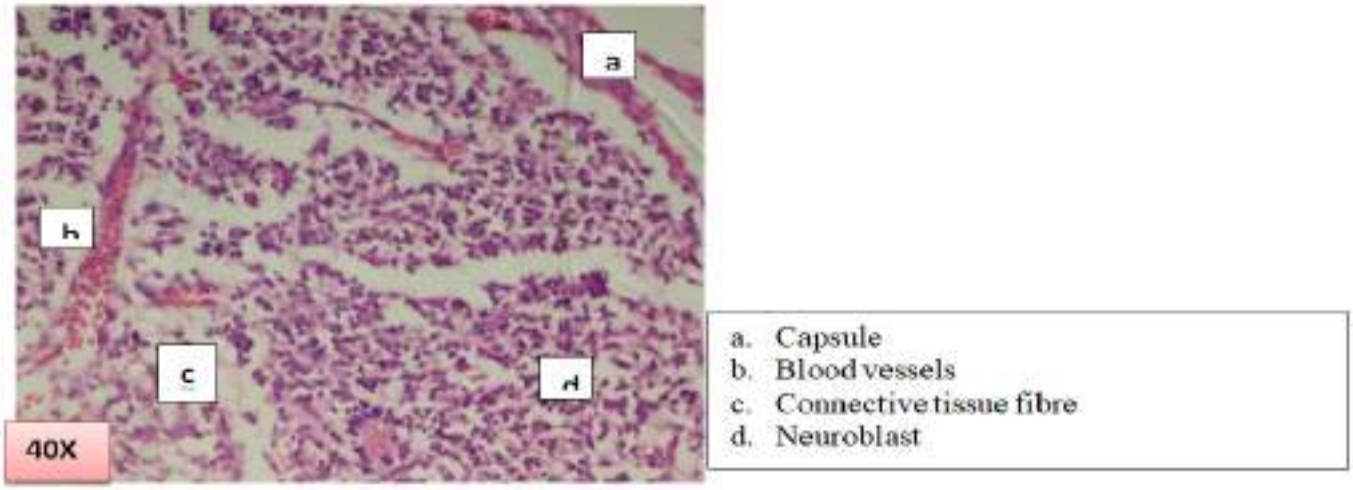


Figure 3: Showing origin of splanchnic nerves (arrow marked)

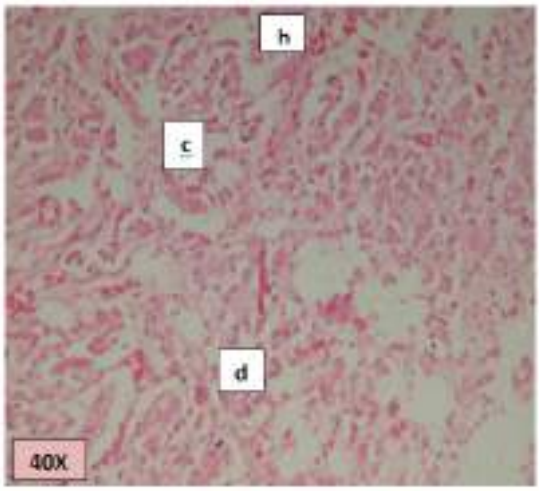
The origin of splanchnic nerve was quite variable in present study .In fetus from 20 weeks onward we were able to locate the splanchnic nerves.However in small age groups the splanchnic nerves were not distinguished.The origin of GSN was seen arising from 6,7,8and 9th in 37% cases,LSN arising from 10 and 11th in 63 %cases ,Least SN from 12th in 8% cases.

Histological observations

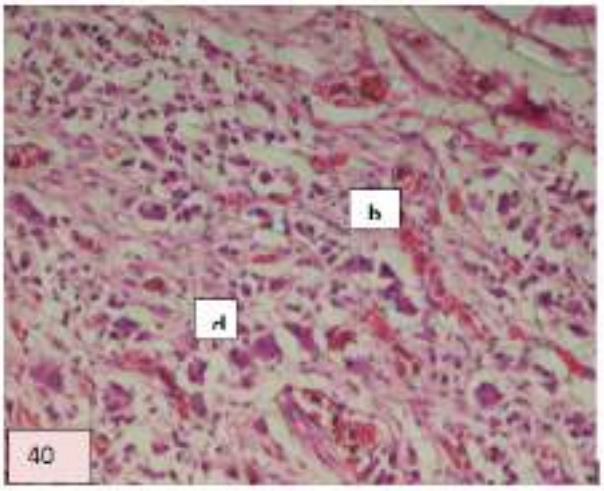
The thoracic ganglia were removed and fixed in Paraffin wax.The paraffin blocks were section and stained with H& E staining to examine the changes in appearance of cells,their differentiation in different age groups according to their gestation.



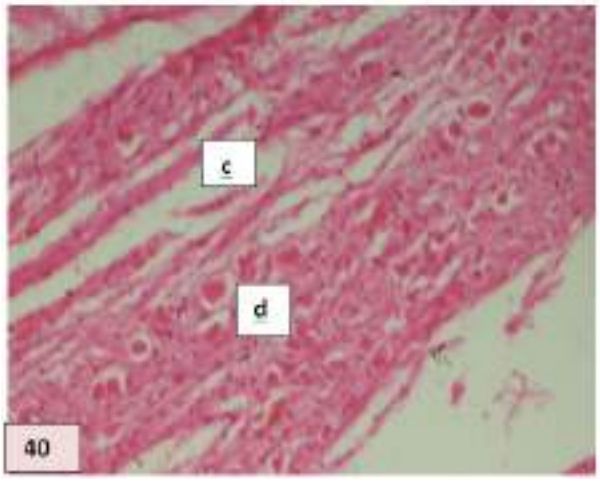
Group A: The Capsule was very well defined at 11 week onwards .The neuroblast cells were small and numerous with connective tissue fibres and blood vessels.



Group B:The neuroblasts were increased in size and few neuroblast were seen surrounded by satellite cell sheath.Blood vessels were numerous with connective tissue fibres.



Group C: In group C the neuroblast were quite big in size with perinuclear halo space and satellite cell sheath.Blood vessels were numerous seen with connective tissue fibre intervening.Few neuroblast were seen undergoing mitosis.



Group D: Fully mature adult like neurons seen with perinuclear space surrounded by satellite cell sheath.Few cells were also seen undergoing mitosis.The connective tissue fibre and nuclei of the cells seen among the mature neurons.

Discussion

The formation of sympathetic chain was noted in 9cm stage of human embryo.10Neurons to the human sympathetic chain are contributed by ventromedial aspect of the dorsal root Ganglia and are also derived from the ventral aspect of neural tube which pass along the ventral nerve roots.11The aggregation of cells, representing the primordia of the future ganglia of the sympathetic trunk, are first evident in the lower thoracic and upper lumbar regions, and they are located on the posterolateral aspects of the aorta. Such aggregations of primordial cells are arranged initially in an ill-defined column,

and in embryos at the 15 mm stage, they are present in all except the cervical region.[8]

In present study the presence of sympathetic chain was noted in all fetuses from 11 weeks onwards and it could be a quide for the forensics in determination of age.

The thoracic sympathetic branches in man show a complex, segmentally organized pattern and may have a considerable component of somatosensory nerve fibers. The segmental organization of the thoracic sympathetic trunk and all its ramifications was studied in 6 human fetuses (16-22 weeks) by means of the acetylcholinesterase in to staining method. Each trunk was divided into 12 sympathetic segments. A segment is defined as that part of the sympathetic trunk which is connected via its rami communicantes with one spinal nerve, Three categories of nerves are discerned: (1) large splanchnic rootlets confined to the greater, lesser and least thoracic splanchnic nerves, (2) medium-sized splanchnic nerves directed towards thoracic viscera, some of which give off branches towards costovertebral joint plexuses and, described for the first time in man, (3) small nerves which ramify extensively and form nerve plexuses in the capsule of the costovertebral joints.[12] Hemanth Kommuru et al conducted study on 31 embalmed cadavers and found the stellate ganglion was unilaterally present in 15 cadavers ,bilaterally in 4 cadavers. There were 11 thoracic ganglion in 11 cadavers. The highest origin of splanchnic nerve was from 4th thoracic ganglion and lowest from 11th ganglion. Lesser splanchnic nerve was seen originating from 10 &11th ganglia in 63% specimens. Least was seen originating from 11th in 27% and from 12th in 11% cases.13In the study done on 6 adult and [14] fetal cadavers, the origin of splanchnic nerve was bilaterally asymmetrical in all cases. The greater splanchnic nerve was seen in all cases whereas lesser and least were inconsistent. The splanchnic nerve were observed most frequently over range:GSN T6-T9 in 73%,LSN from T10-T11in 29% and Least From T11-T12 in 14% cases. The higher origin of greater splanchnic nerve above T5 has clinical complications in technique of taking thoracic splanchnicectomy.14Excision of the sympathetic chain during video assisted thoracic sympathectomy is a safe and effective method in treating hyperhidrosis, facial flushing and intractable angina with good long term results and satisfaction.[15]A variable number of thoracic splanchnic branches leave the chain, especially in the upper part of the thorax to join the cardiac and pulmonary plexus; others join the aortic plexus and are distributed through them. The thoracic cardiac branches contain about twice as many fibres as that reach the cardiac plexus by the larger cervical sympathetic cardiac branches.[16] Information on the variability of the anatomy of the thoracic sympathetic chain and splanchnic nerves may be important for the success of subdiaphragmatic neuroablative surgical approaches to pain control and splanchnic neurectomy for the management of chronic abdominal pain.[17]

In present study done on 50 preserved fetus specimens the number of ganglia was usually 11-12 at all the stages of gestational age.There were 10 thoracic ganglion in 7 cases,11 in 18 cases and 12 in 22 cases. The origin of splanchnic nerve was seen in fetus of higher gestational age and it was quite variable. The greater splanchnic nerve was seen originating from 7,8,and 9th thoracic ganglia in 37% ,lesser from 10-11th in 63% cases and least from 12th in 8% cases.

Kiran studied 90 samples of human fetal sympathetic chains ranging from 8th week to full term were analyzed. Serially cut paraffin sections were stained with H&E,Cresyl fast violet,Marshland silver impregnation method and neuron specific enolase immunohistochemical stain. Results demonstrated the sympathetic chain attained its adult position extending from cervical level to the sacral level by 12th week of gestation.Histologically, the sympathetic chain had a primitive appearance up to 10th week of gestation. The early sympathoblast stage extended from 12 to 16 weeks. The sympathoblasts were committed to form neurons by 18th week of gestation. This process of differentiation took 10 weeks from 18th to28th week of gestation. Maturation involved a further 6 weeks, from 30th to 36th weeks of gestation, at which time there was an increase in cell size, RER, neuronal filaments and number of dendrites.[18]

In present study the neuroblast were seen with perinuclear halo space surrounded by satellite cell sheath in group C(20 week onwards).In 11 weeks the capsule surrounding ganglia was clearly seen.Fully adult like mature neuron was seen from 25 week onwards.Hence,the study done on fetuses,the variation in the thoracic ganglion,splanchnic nerves and the cytoplasmic and nuclear changes at different gestational ages will add knowlegde to the existing literature.In forensic science the histology of ganglion could help to note the age of fetus.

Clinical importance:.T2 is the key ganglion for the palmar hyperhydrosis and in addition to stellectomy for Raynaud's disease.So it is essential to know the details, pattern, and variations of the sympathetic chain for thoracic dorsal sympathectomy.

Medico-legal aspect: The remains of fetus with sympathetic chain and histology of ganglion could be helpful in determining age .

Conclusion

The present work on examining the number of thoracic ganglion,its histogenesis and presence of splanchnic nerves their origin , it would be baseline for further research as work done on fetuses is very less. The variations in the thoracic sympathetic chain and the formation of splanchnic neural pattern were identified and Inconsistent results of splanchnectomies may be due to anatomical variations in the formation of splanchnic nerves.

Ethical Clearance:Taken from Institutional Ethical Committee Of GMCH Chandigarh and Maharishi Markandeswar Deemed university, Mullana(Ambala).

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Conflict of interest – Nil

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A MORPHOLOGCAL STUDY ON THE VARIATIONS OF SHAPE AND RELATIONS OF THE FETAL SPLEEN AT DIFFERENT GESTATIONAL AGES

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Abstract

Introduction: The thoracic sympathetic trunk possesses 12 ganglia, one corresponding to each thoracic nerve ,it lies anterior to head of ribs or side of the body of thoracic vertebrae. Splanchnic nerves arise from the thoracic ganglia and supply thoracic and abdominal viscera.

Material and Method: The present study included 50 preserved fetus specimens sent for routine autopsy in Department of Anatomy, Government medical college and hospital, Chandigarh. The thoracic and abdominal wall of the fetus was incised, then all organs were removed to expose the sympathetic chain .Morphological observations were noted. Next the thoracic ganglion was removed and fixed in paraffin for the histological processing in different gestational ages.

Observation: The fetus were divided into 4 age group (Group A=11-15weeks,Group B=15+_20weeks,Group C=20+_25weeks and Group D=25 weeks onwards)

Morphological observation: The length of thoracic chain was noted which was directly proportional to gestational age.The number of ganglia showed variability 12 in 22 cases,11 in 18 cases and 10 in 7 cases. The origin of splanchnic nerves from thoracic ganglia was quite variable.

Histological observation: In group A the neuroblast cells were observed with eccentric nucleus. Presence of satellite cells was noticed in group B surrounding neuroblasts. In group C, some neuroblasts were seen undergoing mitosis whereas others slowed more differentiation.In group D mature adult like neuroblasts were seen with processes, satellite cell sheath and perinuclear halo.

Keywords: Thoracic, splanchni ,Fetus, Ganglion, Neuroblast.

Introduction

Among the lymphoid organs, spleen is the largest one with rich blood supply. It serves to filter the blood, shows immune responses to antigens and in fetal life acts as a haematopoietic organ to produce erythrocytes and granulocytes (Eroschenko V et al 2013). It consist of an encapsulated mass of lymphoid and vascular tissue situated in the upper left quadrant of the abdominal cavity between the fundus of the stomach and the diaphragm (Standring S 2008) The spleen appears at about 5th week of intrauterine life as a mesenchymal condensation between the two layers of the dorsal mesogastrium (Moore K.L. et al 2008, Sadler T.W 2012, Schoenwolf B.C 2009).The spleen assumes its definitive morphological form in the 3rd month (Varga I et al. 2009). Between the fourth and fifth month the size of the spleen rapidly increases (Gray H. 1854). At birth the weight of spleen is 13 g. It doubles its weight in the 1st postnatal year and triples by end of 3rd year (Bannister LH et al. 2000, Standring S. 2008). Splenic size changes according to the age and weight. Configuration of the spleen is also variable according to the indentations of the organs including stomach, colon, pancreas, and kidney which are in close relation to the spleen. (Gayer G et al. 2001 ; Dodds WJ et al. 1990; Rabushka LS et al. 1994; Elsayes KM et al. 2005). In the literature, there is limited research about the morphological parameters of fetal spleen at different gestational ages.

Aims and objectives

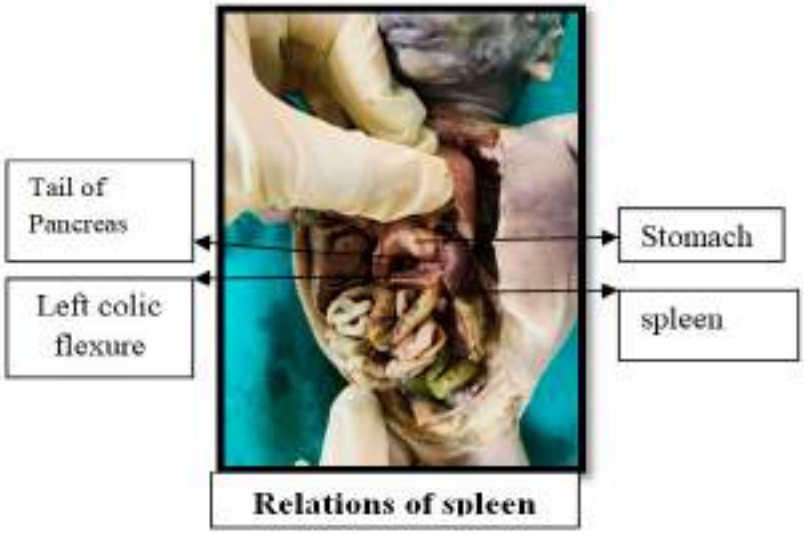
The aim of the study was desired to investigate and observe the variations in the morphology of spleen in human fetuses at different gestational ages. The results have been statistically analyzed and correlated with other parameters and the variables are documented in the light of the existing literature.

Materials and methods

The present study was carried out on 100 aborted preserved human fetuses of four different gestational age groups ranging from 11-30 weeks in the department of Anatomy, Government Medical College, 32 Chandigarh sent for routine autopsy. An approval from the research and Ethics committee of Government Medical College, 32 Chandigarh was taken prior to the commencement of the study. Congenitally malformed and macerated foetuses were excluded from the study. The spleen specimens have been categorized into following groups:

Group I - 11th to 15th gestational weeks.
Group II - 16th to 20th gestational weeks.
Group III - 21st to 25th gestational weeks.
Group IV - 26th weeks onwards

The spleen was exposed after the dissection of fetuses according to Cunningham's text book of Anatomy 12th edition (Romanes GJ. 1981). The position, shape and relations of the diaphragmatic and visceral surface was noted insitu. Thereafter, the spleen was removed from its position by dissecting the gastrosplenic and splenorenal ligaments for studying the shape of its hilum.



Gestational age	Groups	Number of Cases
12+ - 16 weeks	A	25
16+ - 21 weeks	B	25
21+- 26 weeks	C	25
26 week onwards	D	25

Table 1: Distribution of fetuses according to their gestational age.

Results:
All the spleens were found in its normal location in the left hypochondric region of abdomen and was intraperitoneal without any variation.

Gestation age group	Shape				Total Count (%)	P
	Tetrahedral	Triangular	Wedge	Segment of orange		
12+ - 16 weeks (A)	17(68%)	2(7.7%)	2(7.7%)	4(15.4%)	25(100.0%)	0.014
16+ - 21 weeks (B)	15(60%)	3(12.5%)	0(0.0%)	7(29.2%)	25(100.0%)	
21+- 26 weeks (C)	21(84.0%)	3(12.0%)	1(4.0%)	0(0.0%)	25(100.0%)	
26 week onwards (D)	9 (36.0%)	7(28.0%)	4(16.0%)	5(20.0%)	25(100.0%)	
Total	62(62.0%)	15(15.0%)	7(7.0%)	16(16.0%)	100(100.0%)	

Table 2: Shape of the fetal spleen in all the gestational age groups.
Concerning the shape of fetal spleen, 4 different shapes of spleen have been observed. Tetrahedral shaped spleen was seen in the majority of the fetuses (62%) whereas the wedged shape spleen was found only in 7 fetuses (7%). Two other shapes were also noticed i.e segment of an orange in 16% of cases and wedge shaped in 15% of cases. Splenic shape and size varies according to the age and weight. The organs which are in close relation to the spleen including stomach, colon, pancreas, and kidney may alter the configuration of the spleen. No association was found in the different shapes of the fetal spleen with that of the gestational age.

Gestation age group	HILUM				Total	p
	V-shape	Longitudinal	Irregular	Triangular		
12+ - 16 weeks (A)	2(8%)	17(68%)	3(12%)	3(12%)	25(100.0%)	0.363
16+ - 21 weeks (B)	0(0.0%)	20(80%)	4(16%)	1(4%)	25(100.0%)	
21+- 26 weeks (C)	1(4.0%)	15 (60.0%)	7(28.0%)	2(8.0%)	25(100.0%)	
26 week onwards (D)	0(0.0%)	18(72.0%)	6(24.0%)	1(4.0%)	25(100.0%)	
Total	4(4.0%)	69(69.0%)	20(20.0%)	7(7.0%)	100(100.0%)	

Table 3: Distribution of sample according to the Hilum in different gestation age groups

Out of 25 spleens in group A longitudinal shaped hilum was observed in maximum number of cases that is 17 which is followed by triangular (3), irregular (3) and V-shaped hilum (2). In group B, 80% had longitudinal shaped hilum, while 16% had irregular shaped hilum and 4% cases had triangular hilum. In group C, it was found that longitudinal shaped hilum was seen in 15 cases followed by irregular in 7 ,triangular in 2 and V shape in just 1 case. Similarly in group D, longitudinal hilum was noticed in maximum number of cases (18) followed by irregular shaped hilum in 6 cases and triangular in minimum number of cases(1). Although longitudinal shaped hilum was found in maximum number of cases but variation in shape of hilum with changing age groups was found to be insignificant (p=0.363).

Gestation age group	Liver			Total (Count(%)	p
	Absent (Count(%))	Partially Overlapping (Count (%)	Overlapping (Count (%)		
12+ - 16 weeks (A)	6(23.1%)	10 (42.3%)	9(34.6%)	25(100.0%)	0.38
16+ - 21 weeks (B)	13(52.0%)	6(24.0%)	6(24.0%)	25(100%)	
21+- 26 weeks (C)	11(44.0%)	7(28.0%)	7 (28.0%)	25(100.0%)	
26 week onwards (D)	10(40.0%)	11(44.0%)	4(16.0%)	25(100.0%)	
Total	39(39.0%)	35(35.0%)	26(26.0%)	100(100.0%)	

Table 4: Distribution of sample according to the impression of liver in different gestation age groups

In 39 cases, the liver did not have any contact with spleen while it was in contact in remaining 61 cases. The percentage of non-contact cases (52%) was highest in group B (16-20 weeks of gestation). In 35% of the cases liver was partially overlapping spleen that is only left lobe of liver is covering the spleen. The percentage of spleens with partially overlapping liver was maximum in group D (above 26 weeks of gestation). In 26 cases out of 100 the left lobe of liver was completely overlapping spleen reaching till midaxillary line. The maximum number belongs to group A that is initial period of development. In 100% cases, the tail of the pancreas was in contact with the visceral face of the.

In all cases, stomach and spleen have been established to be in contact with each other and spleen was located on the left and posterior according to the stomach. When we looked for the relation of the large intestine, it has been established that in 96% cases, left colic flexure was in contact with the spleen and not in contact in the rest 4% cases. These four cases belongs to Group A ranging from 12-16 weeks (at the early periods of fetal development).

Gestation age group	Suprarenal		Total (Count(%))
	Absent (Count (%))	Present (Count (%))	
12+ - 16 weeks (A)	0(0.0%)	25(100.0%)	25(100.0%)
16+ - 21 weeks (B)	3(12%)	22(88%)	25(100.0%)
21+- 26 weeks (C)	5(20.0%)	20(80.0%)	25(100.0%)
26 week onwards (D)	2(8.0%)	23(92.0%)	25(100.0%)
Total	10(10.0%)	90(90.0%)	100(100.0%)

Table 5: Distribution of sample according to the suprarenal in different gestation age groups

For the relation of left kidney with the spleen, there was contact in 45% cases while there was no contact in 55% cases. With the increase of gestational age, percentage value of contact was also increased. In all cases, left kidney was located posterior, inferior and medial to the spleen. The left suprarenal gland was in contact with the spleen in 90% of the cases and was located posterior, inferior and medial to the spleen. In 43% of the spleens, both renal as well as suprarenal impressions were found which fall in the category of group B and C ranging from 16-26 weeks of gestation. In all cases, the diaphragm was in contact with the spleen located superior and lateral to the spleen.

Discussion:

Review of the literature suggests that there are very few studies regarding position, shape and visceral relations of fetal spleen. According to Ungor et al. 2007 and studies done by Saheb et al. 2014 and Ramanujan et al. 2016, all the spleens were located in left hypochondrium of abdomen. In our study also, all the spleens were located in left hypochondrium and were intraperitoneal. In the present study, the relation of spleen with neighboring viscera was different as compared to adult spleen except its relation with the stomach and diaphragm which followed adult pattern. The relation of spleen with large intestine varied with gestational age. Left colic flexure was in contact with spleen in 96 % cases which belong to group A of our study. Similar to our finding in a study done by Ungor at el. 2007 large intestine was in relation with spleen in late second and third trimester and it was not in contact in first and early second trimester cases.

Regarding the relation of spleen with tail of pancreas, Skandalakis et al and Soyluoglu et al reported that pancreatic tail was in contact with spleen in all the cases they studied, though the position of tail varied with age of foetus. In another study, pancreatic tail was in contact with spleen in 93.6% of cases (Ungor et al. 2007). While in our study tail of pancreas was in contact with spleen in 100% of cases.

Srivani et al. (2019) conducted a study out of 40 spleen, 21 spleen

(52.5%) were wedge or segment of an orange, 14(35%) were tetrahedral, 3(7.5%) were triangular, one spleen showed twisted segment of an orange shape and one oval in shape respectively (2.5%) but in our study spleen was tetrahedral in maximum number of cases (62%) and wedge shaped in 7 cases, in 15 cases it was triangular and in 16% cases it was segment of an orange shape.

To the best of our knowledge, there is only one study regarding the shape of fetal splenic hilum by Ungor et al who reported longitudinal hilum in 69.5% cases, triangular in 20.6% cases, 2.8% had irregular shape and 2.8 % having V shaped hilum. In our study we also found 69% cases having longitudinal hilum, 7% cases it was triangular, in 4% cases it was V shaped and in 20% cases it was irregular in shape. We did not find T or bow shaped hilum in our study as was reported by Ungor et al in 4.2 percent cases.

Conclusion

The morphological study of fetal spleen provide necessary details to sonologist to access the stages of growth of the spleen in utero. Awareness of morphological variations, antenatal detection and diagnosis of splenic anomalies are helpful to elucidate developmental defects, early diagnosis and elicit treatment of intrauterine infections. The present study is of great importance to the clinicians, radiologists, Hematologists, surgeons and paediatric surgeon while performing surgical procedures on spleen.

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SOMATOTYPIC VARIATIONS IN PUNJABI URBAN AND RURAL WOMEN/ SOMATOTYPIC VARIATIONS AMONG ELDERLY WOMEN OF PUNJAB

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Abstract

Somatotype variations among elderly urban and rural women of Punjab have been investigated. A cross-sectional sample of 600 subjects (300 each group) ranging in age from 50-80 years, was measured from April, 2010 to April, 2012 from different areas of Punjab. The Heath- Carter anthropometric somatotype (1967) for different age groups is 6.75-4.41-0.62 (50-55 years), 8.23-4.71-0.88 (56-60 years), 6.16-4.12-0.91 (61-65 years), 6.414-4.06-0.82 (66-70 years), 5.28-3.09-1.37 (71-75 years) and 5.41-3.18-1.17 (76-80 years) for urban women and 6.60-4.23-1.09 (50-55 years), 6.59-4.12-1.04 (56-60 years), 5.9-3.24-1.77 (61-65 years), 5.46-3.62-1.43 (66-70 years), 5.55-3.08-1.35 (71-75 years), 5.92-3.13-0.99 (76-80 years). Thus pointing that all urban and rural women are endomorphic having maximum endomorphic value 8.23 (56-60 years) in urban and 6.60 (50-55 years) in rural women. Physique of both urban and rural women of age group 56-60 years is more diverse as reflected by higher value of SDM (7.41±4.26 and 6.37±3.30 respectively). Inter group differences for ectomorphy component are found to be relatively more than those for endomorphy and mesomorphy components of somatotype.

Keywords: Somatotype, Somatotype dispersion mean, Somatotype attitudinal mean, Endomorphy, Ectomorphy, Mesomorphy

Introduction

Visual appraisal has been often used to describe individuals as thin (ectomorphic), muscular (mesomorphic) and fatty (endomorphic). All these variations in the human body dimensions are caused and affected by various ecological, biological, geographical, racial, gender and age factors (Mibodi and Frahani, 1996 and Okupe et al., 1984).To study these variations, somatotyping is a well-established and excellent tool. It describes the physical characteristics of the human body and allows a definition of body type through the analysis of metric characters (Carter and Heath, 1990; Heath and Carter, 1967). It combines an appraisal of relative adiposity, musculo-skeletal robustness and linearity into three number rating: Endomorphy, Mesomorphy and Ectomorphy.

Apparent somatotypic differences that are observed may have their expression and incidence considerably variable within and between the groups of elderly people of similar or dissimilar genetic backgrounds.Changes in the patterns of growth and maturation have been associated to the urbanization of settlements, along with an improvement of public hygiene and education and a social rest ratification of family life (Bodzsár and Susanne, 1998). However, also psychic stress has increased; the rhythm of everyday life has become faster and is accompanied by changes in the customary style of life. Of the changes diminishing habitual exercise and a more sedentary style of leisure time activity are the most characteristic ones. Progressing sedentary behavior obviously means reduced energy expenditure. Missing regular exercise in childhood and adolescence affects unfavorably, not merely the existing health status and mental/ physical capacity of performance, but increases the risks of chronic adult diseases as well (Due et al., 2001). The activity performance and the mean level of energy expenditure from physical activities in females and males have a significant influence on their life expectancies also (Rougerie and Courtois, 1997).

Use of somatotype to study different populations has both heuristic and applied importance. It has clinical applications in relation to nutritional status, health conditions in elderly population (Malina, 1997 and Bolonchuck et al., 2000).Present study has been conducted with a view to highlight the somatotypic variations in elderly women of Punjab.

Material and Method

The present cross-sectional study was conducted on 600 healthy urban and rural house wives (300 each group) ranging in age from 50 to 80 years, of Punjab state including Amritsar, Bathinda, Faridkot, Ferozepur, Ludhiana, Moga, Patiala and Sri Mukatsar Sahib Districts.

Subjects were divided into six age groups (50-55 years; 56-60 years; 61-65 years; 66-70 years; 71-75 years; 76-80 years). Various anthropometric measurements were taken on the right side of each subject by following the methodology of Lohman et al. (1988).Sampling was done during April, 2010 to April, 2012.All the procedures and protocol were approved by Institutional clinical ethical committee (ICEC) of Punjabi university, Patiala.

All the three primary components of physique were calculated using equations given by Carter (1980).Somatotype dispersion mean (SDM), somatotype attitudinal mean (SAM) and somatotype differences between urban and rural women for three somatotype components are also calculated by using Ross and Wilson (1973, 1974) formulae.

Results:

The descriptive statistics of the somatotypes in overall sample are given in Table 1.The mean somatotype of the Punjabi urban and rural women is 6.75-4.41-0.62 (50-55 years), 8.23-4.71-0.88 (56-60 years), 6.16-4.12-0.91 (61-65 years), 6.414-4.06-0.82 (66-70 years),

5.28-3.09-1.37 (71-75 years) and 5.41-3.18-1.17 (76-80 years) and 6.60-4.23-1.09 (50-55 years), 6.59-4.12-1.04 (56-60 years), 5.9-3.24-1.77 (61-65 years), 5.46-3.62-1.43 (66-70 years), 5.55-3.08-1.35 (71-75 years), 5.92-3.13-0.99 (76-80 years) respectively. The distribution of the values shows that maximum value of endomorphy and mesomorphy is observed in the age group of 56-60 years (8.23-4.71) in urban and 50-55 years (6.60-4.23) in rural women. Maximum ectomorphic value is observed at the age group of 71-75 years (1.37) in urban and at the age group of 61-65 years (1.77) in rural women. Mean somato charts (Figure 1 and 2) showed that both urban and rural women are endomorphic but the value of endomorphic component is higher in urban women than the rural women at first four age groups thus suggesting the greater development of non-essential fat in their body build.Trends in mesomorphy shows that urban women are more mesomorphic at all the age groups than rural women.

The differences of the first component of somatotype (Endomorphy) are found to be statistically significant among 56-60 years, 66-70 years and 76-80 years of the age groups. Urban women have significantly higher mesomorphy at 61-65 years of the age group and rural women possess significantly higher ectomorphy component at the first four age groups than urban women (Table 2).

Somatotype distributions (Table 3) provide the information about the magnitude of dispersion or scatter of somatotypes about their mean values. Somatotype Dispersion Mean (SDM) is the average of the distance in two dimensions and somatotype attitudinal mean (SAM) in three dimensions, between any two somatoplots. The mean values of SDM for urban women are 6.54, 7.41, 5.71, 6.06, 4.77, 4.58 for all the age groups from 50-55 years till 76-80 years. 56-60 years of the age group possess maximum value for SDM among all the age groups of urban women. Similarly mean SDM values among rural women across all the age groups are 6.23, 6.37, 5.21, 5.02, 5.39, 4.72 having maximum value for 56-60 years of the age group. In case of somatotype attitudinal mean values lie in the range of 1.92 to 3.32 among urban women and 1.98 to 2.76 among rural women. However, maximum dispersion of somatotypes about their mean value has been observed in 56-60 years of the age group in both urban and rural women.

	Age Group (Years)		50-55	56-60	61-65	66-70	71-75	76-80
URBAN WOMEN	Endomorphy	Mean	6.75	8.23	6.16	6.14	5.28	5.41
		SD	1.26	1.64	1.43	1.44	1.25	0.99
		SEM	0.17	0.23	0.20	0.20	0.17	0.14
	Mesomorphy	Mean	4.41	4.71	4.12	4.06	3.09	3.18
		SD	1.71	2.13	1.59	1.93	1.66	1.20
		SEM	0.24	0.30	0.22	0.27	0.23	0.17
	Ectomorphy	Mean	0.62	0.88	0.91	0.82	1.37	1.17
		SD	0.73	1.01	1.30	1.15	1.27	0.95
		SEM	0.10	0.14	0.18	0.16	0.18	0.13
RURAL WOMEN	Endomorphy	Mean	6.60	6.59	5.9	5.46	5.55	5.92
		SD	1.13	1.04	1.46	1.45	1.04	0.98
		SEM	0.16	0.14	0.20	0.20	0.14	0.13
	Mesomorphy	Mean	4.23	4.12	3.24	3.62	3.08	3.13
		SD	1.95	1.82	1.72	1.27	1.05	1.13
		SEM	0.27	0.25	0.24	0.18	0.14	0.16
	Ectomorphy	Mean	1.09	1.04	1.77	1.43	1.35	0.99
		SD	1.08	0.99	1.55	1.18	1.12	1.15
		SEM	0.15	0.14	0.21	0.16	0.15	0.16

Table 1: Somatotype components of urban and rural women

Age Group (Years)	50-55	56-60	61-65	66-70	71-75	76-80
Endomorphy	0.65	6.30***	0.92	2.42*	1.22	2.68**
Mesomorphy	0.50	1.51	2.75**	1.37	0.03	0.21
Ectomorphy	2.61**	8.40***	3.18**	2.77**	0.08	0.90

*p<0.05, **p<0.01, ***p<0.001

Table 2: Statistical difference (t-values) for somatotype components between urban and rural women

	Age Group (Years)		50-55	56-60	61-65	66-70	71-75	76-80
URBAN WOMEN	Somatotype Dispersion Mean	Mean	6.54	7.41	5.71	6.06	4.77	4.58
		SD	3.63	4.26	3.26	3.51	2.67	2.61
		SEM	0.51	0.60	0.46	0.49	0.37	0.37
	Somatotype Attitudinal Mean	Mean	2.81	3.32	2.44	2.59	2.02	1.92
		SD	1.56	1.92	1.38	1.50	1.13	1.09
		SEM	0.22	0.27	0.19	0.21	0.16	0.15
RURAL WOMEN	Somatotype Dispersion Mean	Mean	6.23	6.37	5.21	5.02	5.39	4.72
		SD	3.33	3.30	2.70	2.59	3.05	2.71
		SEM	0.47	0.46	0.38	0.36	0.42	0.38
	Somatotype Attitudinal Mean	Mean	2.69	2.76	2.22	2.13	2.26	1.98
		SD	1.45	1.42	1.16	1.10	1.28	1.13
		SEM	0.20	0.20	0.16	0.15	0.18	0.16

Table 3: Somatotype distribution in urban and rural women

Singal and Sidhu (1984)					Present Study		
Age groups (yrs)	Bania Females			Age groups (yrs)	Urban Women		
	Endomorphy	Mesomorphy	Ectomorphy		Endomorphy	Mesomorphy	Ectomorphy
50-54	7.42	4.14	1.80	50-55	6.75	4.41	0.62
55-59	7.19	4.09	1.37	56-60	8.23	4.71	0.88
60-64	7.26	4.19	1.65	61-65	6.16	4.12	0.91
65-69	6.74	3.98	1.70	66-70	6.14	4.06	0.82
70+	5.72	3.74	1.96	71-75	5.28	3.09	1.37

Table 4: Comparative analysis of somatotype components of bania females of Singal and Sidhu (1984) with urban women of present study

Singal and Sidhu (1984)					Present Study		
Age groups (yrs)	Jat sikh Females			Age groups (yrs)	Rural women		
	Endomorphy	Mesomorphy	Ectomorphy		Endomorphy	Mesomorphy	Ectomorphy
50-54	6.09	3.50	2.50	50-55	6.60	4.23	1.09
55-59	6.30	3.66	2.47	56-60	6.59	4.12	1.04
60-64	6.85	3.77	2.00	61-65	5.90	3.24	1.77
65-69	6.20	3.52	2.42	66-70	5.46	3.62	1.43
70+	5.31	3.37	2.77	71-75	5.55	3.08	1.35

Table 5: Comparative analysis of somatotype components of jat sikh females of Singal and Sidhu (1984) with rural women of present study

SOMATOCHARTS

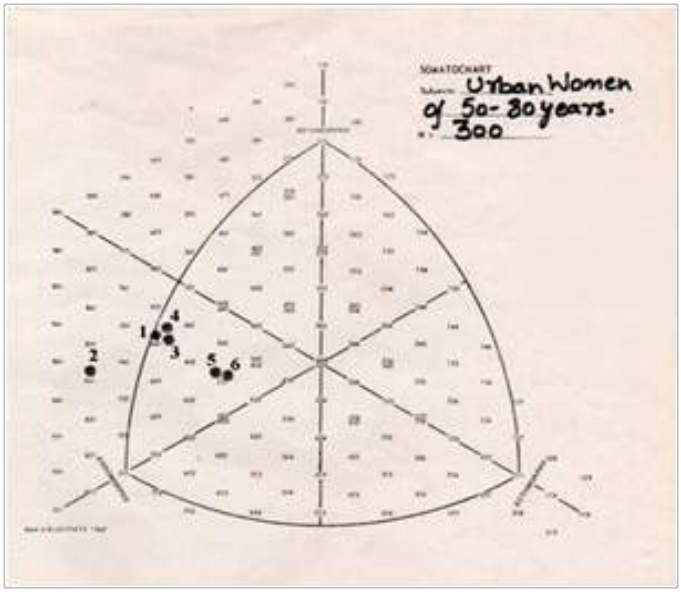

Figure:1

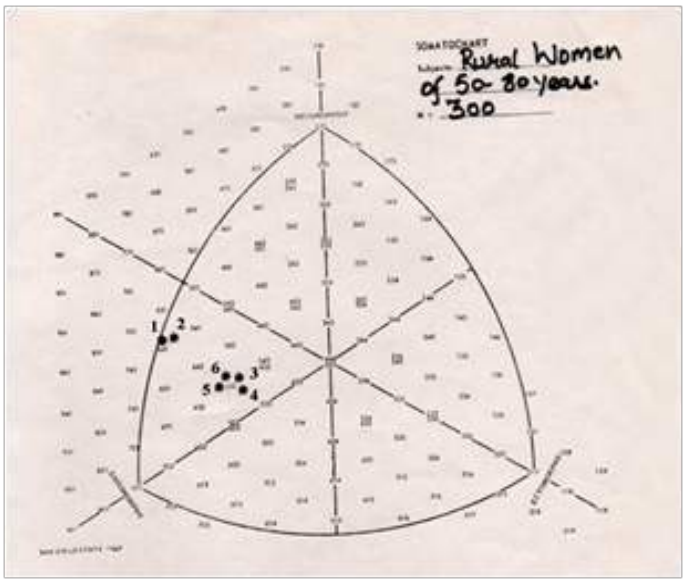

Figure :2

Figure 1: Mean Somatochart of 50 – 80 years of urban women. Figure 2: Mean Somatochart of 50 – 80 years of rural women
(1 = 50-55 yrs; 2 = 56-60 yrs; 3 = 61-65 yrs; 4 = 66-70 yrs; 5 = 71-75 yrs; 6 = 76-80 yrs)

Discussion:

There is little information about the somatotypes in elderly. However previous studies agree about the dominance of endo- and mesomorphic components and the low development of ectomorphy with respect to younger age groups (Bailey et al., 1982; Bufa et al., 2005; Gaur and Singh, 1997; Singal and Sidhu, 1984). Our results are consistent with those studies.

Dominance of endomorphic component in both the urban and rural women may be attributed to their sedentary life styles and lower energy expenditure. Significantly more predominance of endomorphic component in urban women of the age group of 56-60 years and 66-70 years might be due to their dietary habits, social status such that keeping maids at their homes for their daily house routines and more over they live in the polluted environment of cities under various life stresses. The rural females living in rural areas are adapted to a physically strenuous type of life. Apart from their household duties they also help their spouses in their routine work. Kumar et al. (1997) also reported that sedentary activities generally have little higher endomorphic values than for the persons involved in heavy and hard physical labor. Habitual physical activity plays a significant role in restricting the endomorphic component to a certain extent.

Compared with reference populations (Table 4, 5), urban women are less endomorphic than the Bania females except at the age group of 56-60 years where urban are more endomorphic (Singal and Sidhu, 1984) whereas rural women are more endomorphic at the age groups of 50-55 years, 56-60 years and 71-75 years only and at the other age groups jat sikh females are more endomorphic. Many studies had shown that somatotype ratings change with the age and physical activity in Indian populations too (Parizkova & Carter, 1976; Sodhi, 1976; Singh & Sidhu, 1980). The present study also shows that the somatotype ratings continue to change after 50 years of age.

Genetic and environmental factors also influence the somatotype of the individual. Various studies have highlighted the effects of environment and genetical factors on somatotype (Bouchard, 1977; Bouchard et al., 1980). Katzmarzyk et al. (2000) revealed specific familial resemblance for physique and heritabilities for somatotype components. Significant role of genetic factors and familial resemblance has been observed in explaining variations in body physique. Heritabilities component for endomorphy, mesomorphy and ectomorphy were 56%, 68% and 56% respectively.

Somatotype studies from around the world reflect extensive variations suggesting differences due to genetics (Singhand Singh, 2000), sex (Tanner, 1962; Parizkova andCarter, 1976), nutrition (Malik et al., 1986), physical activity (Carter, 1970;Parizkova, 1970) and ageing (Zuk, 1958; Walker, 1978).

Conclusion

The present study has shown that anthropometric somatotype can be effectively applied to the study of aging, finding difference in different groups, their nutritional status, physical activities. Urban and rural women of all the age groups dominate in endomorphy in comparison to its sister components. Endomorphy and mesomorphy components of somatotype decrease with age in both urban and rural women. This study opens the way to further investigations.

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TO DETERMINE THE ANTIMICROBIAL RESISTANCE PATTERN IN DENTAL PATIENTS

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Abstract

Aim: The aim of this study to determine the antimicrobial resistance pattern in dental patients.

Methods and Materials: This research involved 80 participants. Pus samples were collected at the department of microbiology for bacterial isolation and identification. Samples were put into MacConkey agar culture medium plates, which were then incubated for 24 hours to see whether any bacteria grew. Those samples that were positive after 24 hours were subjected to grams staining. Antibiotic disc diffusion techniques were utilised for manual assessment of sensitivity and resistance of bacteria. The diameter of the colony as measured in millimetres was used to detect and distinguish between sensitive and resistant conditions.

Results: The research found that the most patients were 45-65 years old, with 35 (43.75%), followed by 25-45 years old, with 26(32.5%), over 65 years old, with 15 (28.75%), and under 25 years old, with 4 (5%) patients. Out of 80 pus samples, 54 (67.5%) show positive culture whereas 26 (32.5%) samples yielded no growth. Apart from other isolates such as Escherichia coli (12.96%), Coagulase negative staphylococcus (29.63%), and Streptococcus sp (7.41%), the most prevalent grame positive bacteria identified were Staphylococcus aureus (33.33%) and Klebsiella pneumonia (16.67%). Most antibiotics were resistant, such as amikacin, gentamicin, imipenem, cefazolin, and others, while by manual method there was Staphylococcus aureus 88.89% sensitivity with Teigocycline, Colistin, and Fosfomycin, and both nitrofurantoin 16.67% and netilimycin 5.56% sensitivity. Most antibiotics, such as Amikacin, Gentamicin, Imipenem, cefazolin, and others, were resistant, however by manual technique, E.coli was responsive to Colistin 6(85.71%), Teigocycline 4(57.14%), Fosfomycin 6(85.71%), Nitrofurantoin 1(14.29%), and Netilimycin 1(14.29%), as indicated.

Conclusion: Antimicrobial resistance poses a significant risk to human health. Inappropriate antibiotic usage in healthcare and animal husbandry are major contributors to antimicrobial resistance. A concerted effort from all relevant authorities to fight antimicrobial resistance in all aspects is required to prevent bacteria from becoming resistant, resulting in serious consequences for human health and the future economy

Keywords: Pus, Resistance, Antibiotic, Sensitive

Introduction

AAntimicrobial resistance develops when germs live and proliferate in the presence of antimicrobial medicines. Paul Ehrlich, the pioneer of modern chemotherapy, noticed in 1907 that the organism in trypanosome infections seemed to be resistant to the chemical employed at times. He discovered that a fuchsin dye-resistant strain was nevertheless vulnerable to an arsenic compound due to specific resistance, whilst a strain resistant to the arsenic compound preserved sensitivity to the dye. Later in 1908, he claimed that once acquired, resistance might be progressively inherited. [1]

Antibiotic-resistant bacteria are a severe public health concern.[2] Because of the lack of strength of the treatments against common diseases, developed nations have moved their drugs to more costly ones. Meanwhile, owing to budgetary restrictions, underdeveloped and least developed nations choose alternative medications, resulting in increased morbidity and death. [3]

The World Health Organization (WHO) has developed a surveillance system known as GLASS (Global Antimicrobial Surveillance System). An early release of the data revealed a significant frequency of antibiotic resistance in both high-income and low-income nations, with up to 500,000 instances occurring across 22 countries. [4]

According to a World Bank research on antimicrobial resistance published in 2016, the financial burden would be borne mostly by low- and middle-income nations.[5] Antimicrobial resistance has more than doubled in the previous 20 years, killing around 700,000 people worldwide each year. The figure is expected to rise to 10 million fatalities per year by 2050, with a financial cost of up to US$100 trillion (RM416.65 trillion).[6] This circumstance emphasises the need of developing a thorough action plan to address the problem.

Methods and Materials

This study was conducted at the department of microbiology at Genesis Institute of Dental Science and Research Centre with the assistance of Anil Baghi Hospital in Firozpur, Punjab, India, after receiving ethical permission from the institutional ethics council. All patients' demographic information, such as age, gender, and medical history, was recorded. This research involved 80 participants. Pus samples were collected at the department of microbiology for bacterial isolation and identification. Samples were put into MacConkey agar culture medium plates, which were then incubated for 24 hours to see whether any bacteria grew. Those samples that were positive after 24 hours were subjected to grammes staining. For 24 hours, the B D Phoenix sophisticated automated microbiology system was employed for bacterial identification and sensitivity. Antibiotic disc diffusion techniques were utilised for manual assessment of sensitivity and resistance of bacteria. In the disc technique, a little quantity of culture is disseminated on Mueller hinton agar medium and a standardised antibiotic disc is put on the plate surface and the culture media plate is incubated overnight. If the antibiotic is able to block the development of the microorganism, it does not grow around the bacterial disc, indicating that it is sensitive; if the mi-

croorganism grows around the antibiotic disc, indicating organism resistance to this antibiotic. The diameter of the colony as measured in millimetres was used to detect and distinguish between sensitive and resistant conditions.

Following manual antibiotic were used in this study

Imipenem, Meropenem, cefepim, Ciprofloxacin, Amikacin, Ceftazidime, Ceftriaxon, Cefotaxime, Ampicilin, Colistine , Fosfomycin and tigecyclin.

Statically analysis

For statically analysis SPSS version 25.0 were used.

Results

The research found that the most patients were 45-65 years old, with 35 (43.75%), followed by 25-45 years old, with 26(32.5%), over 65 years old, with 15 (28.75%), and under 25 years old, with 4 (5%) patients. Table 1 shows that the number of male patients is 49 (61.25%) more than the number of females is 31 (38.75%).

Age	Number of patients =80	Percentage
Below 25	4	5
25-45	26	32.5
45-65	35	43.75
Above 65	15	18.75
Gender		
Male	49	61.25
Female	31	38.75

Table 1: Age and gender of the patients

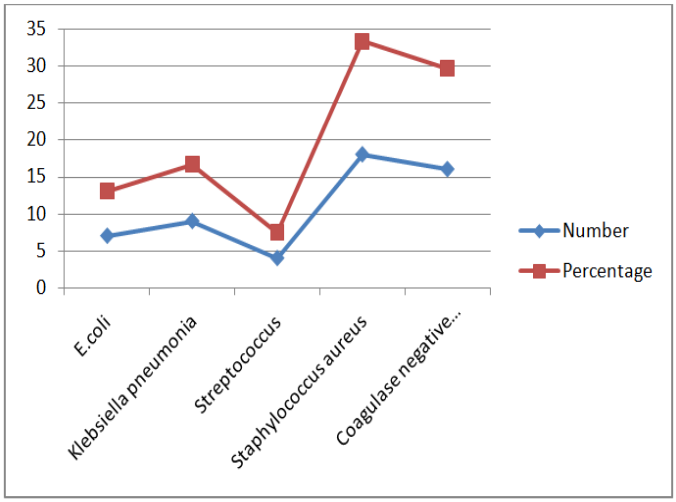
Culture	Number of sample	Percentage
Positive	54	67.5
Negative	26	32.5

Table 2: Bacterial culture status

Out of 80 pus samples, 54 (67.5%) show positive culture whereas 26 (32.5%) samples yielded no growth.

Bacteria	Number	Percentage
E.coli	7	12.96
Klebsiella pneumonia	9	16.67
Streptococcus	4	7.41
Staphylococcus aureus	18	33.33
Coagulase negative staphylococcus	16	29.63

Table 3: Isolated bacteria form pus sample



Graph 1: Isolated bacteria form pus sample

Apart from other isolates such as Escherichia coli (12.96%), Coagulase negative staphylococcus (29.63%), and Streptococcus sp (7.41%), the most prevalent grame positive bacteria identified were Staphylococcus aureus (33.33%) and Klebsiella pneumonia (16.67%). Most antibiotics were resistant, such as Amikacin, Gentamicin, Imipenem, cefazolin, and others, while by manual method there was Staphylococcus Aureus 88.89% sensitivity with Teigocycline, Colistin, and Fosfomycin, and both Nitrofurantoin 16.67% and Netilimycin 5.56% sensitivity, as shown in Tables 4 and 5.

Antibiotic	Staphylococcus aureus=18		Coagulase negative staphylococcus=16		Streptococcus=4	
	Sensitive	Resistances	Sensitive	Resistances	Sensitive	Resistances
Amikacin	0	18(100%)	0	16(100%)	0	4 (100%)
Gentamicin	0	18 (100%)	0	16(100%)	0	4 (100%)
Imipenem	1 (5.56%)	17 (94.44%)	0	16(100%)	0	4 (100%)
Meropenem	1 (5.56%)	17 (94.44%)	0	16(100%)	0	4 (100%)
Cefazolin	0	18 (100%)	1(6.25%)	15 (93.75%)	0	4(100%)
Cefoxitin	2 (11.11%)	16(88.89%)	1(6.25%)	15 (93.75%)	0	4 (100%)
Ceftadizime	0	18(100%)	2(12.50%)	14 (87.50%)	1 (25%)	3 (75%)
Cefotaxime	1 (5.56%)	17 (94.44%)	0	16(100%)	2(50%)	2 (50%)
Cefepime	3 (16.67%)	15 (83.33%)	0	16(100%)	0	4(100%)
Aztreonam	0	18 (100%)	0	16(100%)	0	4 (100%)
Ampicillin	0	18 (100%)	0	16(100%)	1(25%)	3 (75%)
Piperacillin	1 (5.56%)	17 (94.44%)	1(6.25%)	15 (93.75%)	0	4(100%)
Amoxycillin- clavulanate	2 (11.11%)	16(88.89%)	1(6.25%)	15 (93.75%)	0	4 (100%)
Piperacillin- tazobactum	4(22.22%)	14 (77.78%)	2(12.50%)	14 (87.50%)	0	4 (100%)
Trimethoprim- sulfamethoxazole	8 (44.44%)	10 (55.56%)	4(25%)	12(75%)	0	4 (100%)
Chloramphenicol	0	18 (100%)	0	16(100%)	0	4 (100%)
Ciprofloxacin	0	18 (100%)	0	16(100%)	0	4 (100%)
Levofloxacin	0	18 (100%)	1(6.25%)	15 (93.75%)	2(50%)	2 (50%)
Tetracycline	0	18(100%)	0	16(100%)	0	4 (100%)

Table 4: The sensitivity and resistance for antibiotics

	Staphylococcus aureus=18		Coagulase negative staphylococcus=16		Streptococcus=4	
	Sensitive	Resistances	Sensitive	Resistances	Sensitive	Resistances
Colistin	16(88.89%)	2(11.11%)	14(87.5%)	2(12.5%)	3(75%)	1(25%)
Teigocycline	16(88.89%)	2(11.11%)	9(56.25%)	7(43.75%)	2(50%)	2(50%)
Fosfomycin	16(88.89%)	2(11.11%)	15(93.75%)	1(6.25%)	4(100%)	0
Nitrofurantoin	3(16.67%)	15(83.33%)	2(12.5%)	14(87.5%)	0	4(100%)
Netilimycin	1(5.56%)	17(94.44%)	2(12.5%)	14(87.5%)	0	4(100%)

Table 5 : Manual method for gram positive bacteria

Most antibiotics, such as Amikacin, Gentamicin, Imipenem, cefazolin, and others, were resistant, however by manual technique, E.coli was responsive to Colistin 6(85.71%), Teigocycline 4(57.14%), Fosfomycin 6(85.71%), Nitrofurantoin 1(14.29%), and Netilimycin 1(14.29%), as indicated in Tables 6 and 7.

Antibiotic	E.coli=7		Klebsiella pneumonia=9	
	Sensitive	Resistances	Sensitive	Resistances
Amikacin	0	7(100%)	0	9(100%)
Gentamicin	0	7(100%)	0	9(100%)
Imipenem	0	7(100%)	0	9(100%)
Meropenem	0	7(100%)	0	9(100%)
Cefazolin	1(14.29%)	6(85.71%)	0	9(100%)
Cefoxitin	0	7(100%)	0	9(100%)
Ceftadizime	1(14.29%)	6(85.71%)	0	9(100%)
Cefotaxime	0	7(100%)	0	9(100%)
Cefepime	0	7(100%)	0	9(100%)
Aztreonam	0	7(100%)	0	9(100%)
Ampicillin	0	7(100%)	0	9(100%)
Piperacillin	0	7(100%)	0	9(100%)
Amoxycillin- clavulanate	0	7(100%)	0	9(100%)
Piperacillin-				
tazobactum	1(14.29%)	6(85.71%)	0	9(100%)
Trimethoprim-				
sulfamethoxazole	0	7(100%)	0	9(100%)
Chloramphenicol	0	7(100%)	0	9(100%)
Ciprofloxacin	0	7(100%)	0	9(100%)
Levofloxacin	0	7(100%)	0	9(100%)
Tetracycline	0	7(100%)	0	9(100%)

Table 6: The sensitivity and resistance for antibiotics for gram negative bacteria

Antibiotic	E.coli=7		Klebsiella pneumonia=9	
	Sensitive	Resistances	Sensitive	Resistances
Colistin	6(85.71%)	1(14.29%)	8(88.89%)	1(11.11%)
Teigocycline	4(57.14%)	3(42.86%)	5(56.25%)	4(43.75%)
Fosfomycin	6(85.71%)	1(14.29%)	8(88.89%)	1(11.11%)
Nitrofurantoin	1(14.29%)	6(85.71%)	1(11.11%)	8(88.89%)
Netilimycin	1(14.29%)	6(85.71%)	1(11.11%)	8(88.89%)

Table 7: Manual method for gram negative bacteria

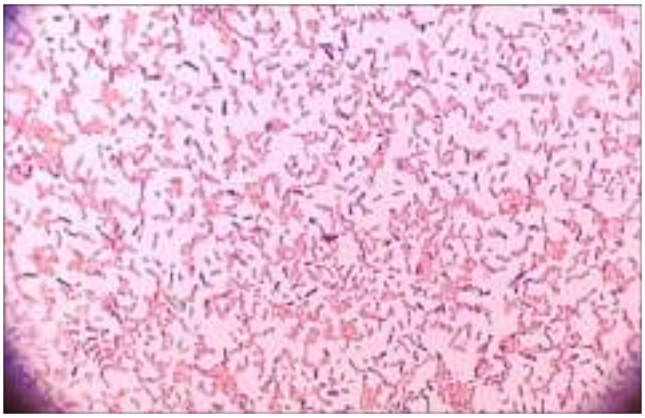


Figure 1: Gram Negative bacteria under microscope

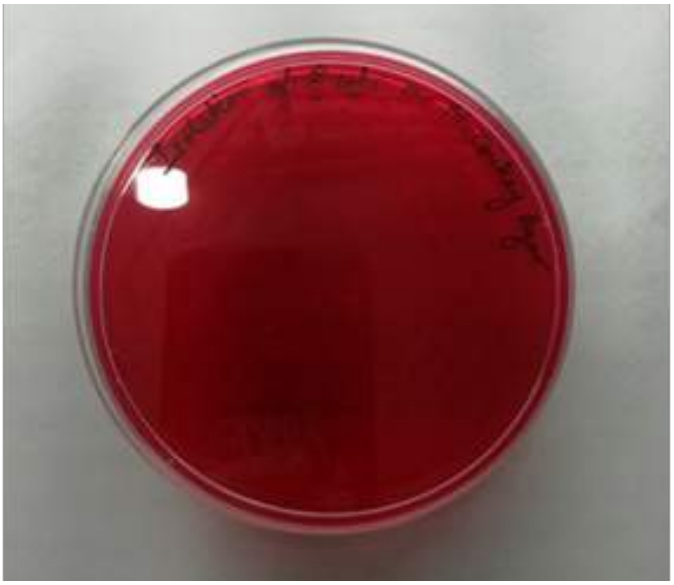


Figure 2: Growth of E.coli on MacConkey agar media

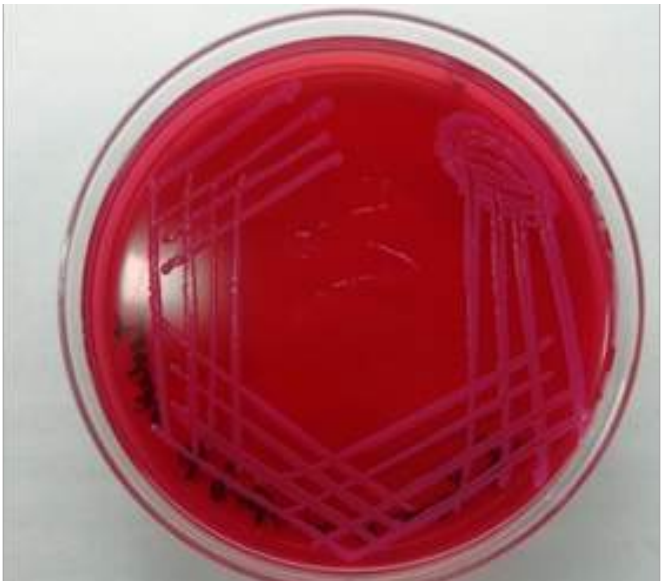


Figure 3: Growth of Klebsiella on MacConkey agar media

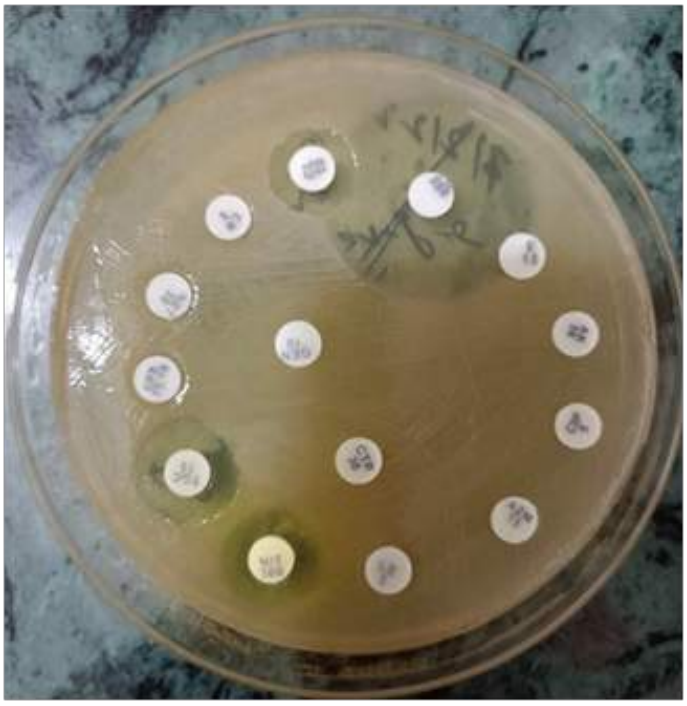


Figure 4: Sensitivity effect of Fo, Tgc, Nit, Cl on Staphylococcus aureus on mueller hinton agar media

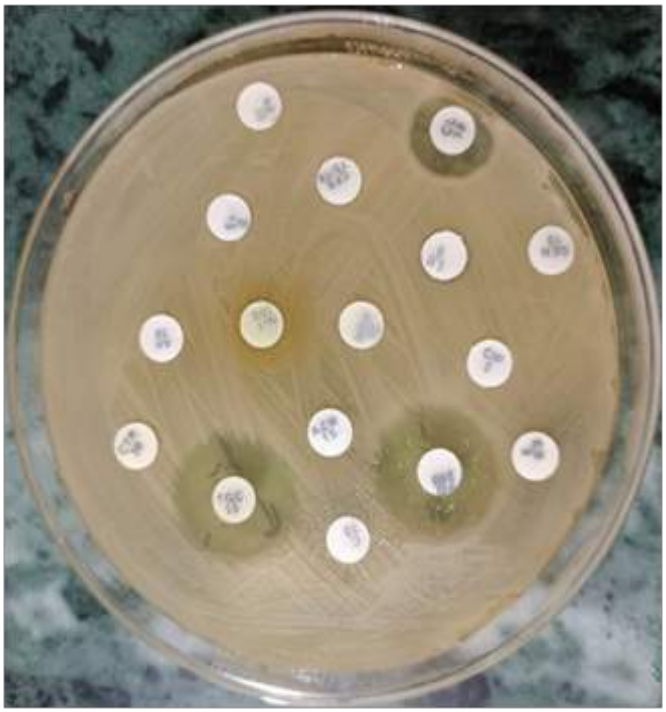


Figure 5: Sensitivity effect of Fo, Tgc, Nit, Cl on Klebsiella sp. on mueller hinton agar media

Discussion

Gram negative bacteria like E. coli and Klebsiella spp. and grame positive cocci like Staphylococcus aureus are the most prevalent causal agents of pyogenic infections. The emergence of resistance genes in such bacteria through multiple pathways is cause for worry. In our investigation, gramme negative bacteria predominated as the primary agent of pyogenic lesions, which is corroborated by Zubair et al. [7] According to Tiwari et al.[8] and Lee C Y et al.[9], Staphylococcus aureus (33.33%) is the most prevalent gramme positive isolate in our investigation. Similarly to Pramila et al.9, the prevalence of MRSA is 35.90%. According to the findings of Basu et al., Klebsiella pneumonia (16.67%) is the most prevalent gramme negative bacterial isolate. [10] The current investigation found that the male: female ratio of pus isolates was 1.58:1, which is consistent with the findings of Pappu A.K. et al. In contrast to Samra et alinvestigation, .'s [11] Staphylococcus aureus were sensitive to Teigocycline (88.89%) and Fosfomycin (88.89%). [12] An antibiotic sensitivity profile of gramme negative bacteria revealed susceptibility to

Teigocycline (57.14%) and Fosfomycin (85.71%), as previously shown by Balan et al. [13] Given the limited number of antimicrobial medicines now available or in the pharmaceutical industry's drug development pipelines to tackle these organisms, the introduction and multiplication of these highly resistant microbes identified from pus samples is quite concerning. Every effort should be made to carefully pick antibiotics, balancing the necessity for wide empirical coverage of possible bacteria with the need to conserve existing antibiotics for when they are really essential. [14]

Conclusion

Antimicrobial resistance poses a significant risk to human health. Inappropriate antibiotic usage in healthcare and animal husbandry are major contributors to antimicrobial resistance. A concerted effort from all relevant authorities to fight antimicrobial resistance in all aspects is required to prevent bacteria from becoming resistant, resulting in serious consequences for human health and the future economy.

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COMPARISON OF ANTERIOR AND POSTERIOR SURGICAL DECOMPRESSION APPROACHES IN QUADRANGULAR SPACE SYNDROME: A PILOT CADAVERIC STUDY

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Abstract

Introduction: Quadrangular space syndrome includes compression of the axillary nerve and posterior circumflex humeral artery and its administration in couple of cases, requires careful decompression.

Aim: To compare the anterior and posterior surgical decompression approaches and to determine the scoring for both the approaches in QSS.

Marterials and methods: A pilot study was conducted from January 2020 to August 2021 academic session of the first-year medical students in the Department of Anatomy in which four human cadavers were dissected in the Axillae and the Scapular region by the senior residents of the Department of Anatomy and Department of Orthopedics, who dissected quadrangular space in the eight upper limbs, using anterior and posterior surgical approaches.

Results: Posterior approach to identify the quadrangular space and secure its contents was recognized as the easier and much quicker method by both the Anatomy and Orthopedic residents, but the incision/reflection of deltoid muscle in this approach results in increased postoperative morbidity. Whereas the anterior (Delto-pectoral) approach involves more skill but reduces postoperative morbidity.

Conclusions: Anterior (Delto-pectoral) approach with suggested modifications can prove as an effective method in surgical decompression of quadrangular space syndrome. The authors suggest more cadaveric studies to facilitate anatomists and surgeons with the opportunities to practice and evaluate older and newer surgical approaches.

Keywords: Invasive approach, Anatomical approach, axillary nerve, quadrilateral space.

Introduction

Quadrilateral Space Syndrome (QSS) is an uncommon neuro-vascular entrapment condition involving axillary nerve (AXN), or/and posterior humeral circumflex course (PHCA) in the quadrilateral space due to injury, fibrous bands, or hypertrophy of muscular border [1]. The management involves a decompression procedure which involves various approaches which remains unevaluated, especially in the Indian population

The syndrome usually affects the dominant arm of the young adults of 20 to 35 years old, particularly athletes involved in overhead sports like volleyball [2], baseball [3],swimming [4], and other activitieswith frequent abduction and external rotation, such as yoga [5] orwindow cleaning [6]. Neurogenic QSS is portrayed by paraesthesia, fasciculations, weakness, or neurogenic pain in a nonspecific manner. Indications of intense ischemia reminiscent of vascular QSS incorporate pain, pallor, absent pulses, thrombosis, or embolism (coolness or cyanosis of the hand or digits). Notwithstanding vascular and neurogenic indications, patients with QSS sufferfrom muscular atrophy and associated weakness, due to denervation [7,8,9].

The intermuscular space (as shown in table/fig. 1) is borderedsuperiorly by subscapularis muscle and capsule of the shoulder joint and inferiorly by the teres major muscle. It is confined medially by the long head of the triceps and laterally by the surgical neck of the humerus [10]. It contains loose connective tissue, fat, veins, the AXN, and the PHCA.

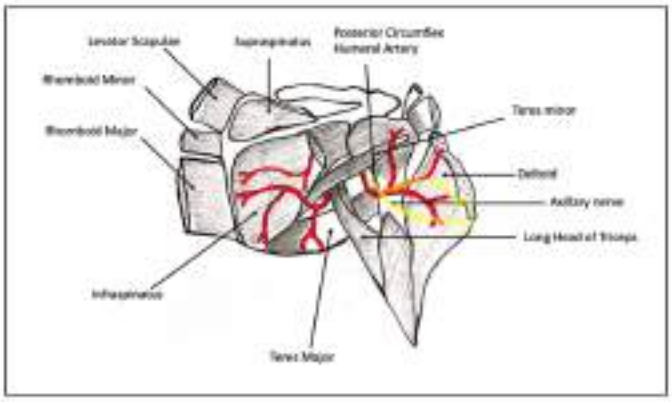

Figure 1: Boundaries of Quadrangular space

Typically, conservative measures such as physical therapy and physical activity modification are first recommended to patients [2]. Surgical decompression

is considered when patients are unresponsive to conservative measures for at least six months [11]. . The current study aims to analyze all the various surgical approaches used in the decompression of neurovascular structures in QSS and present the reflections and recommendations.

Materials and Methods:

A pilot study was conducted from January to August month of the 2020-21 academic session of the first-year medical students in the Department of Anatomy at an Institute of National Importance. IEC approval was not required in this study as this cadaveric study was conducted during the routine dissection session of First-year medical students in the Department of Anatomy.

Inclusion criteria: The cadavers available in the department of Anatomy, with history of pectoral girdle pathologies or scapular region complaints were included for the study.

exclusion criteria: Cadavers without any history of pectoral girdle pathologies or scapular region complaints were excluded.

Sample size: Four cadavers (8 upper limbs) were used for dissection during the routine academic session.

This study shall be continued over the next few academic sessions using fresh cadavers as per the availability and feasibility and using new dissecting personnel till substantial quantity of statistically significant data is collected to enable its standardization. So, this pilot study is a part of our project and the results obtained are the proposed suggestions.

Parameters like anatomical ease of identifying involved neuro-vascular structures, technical expertise required to execute the procedure, probabilities of injury to neuro-vascular structures, probabilities of post-operative fibrosis and other complications, and time duration required to complete the procedure were noted.The grading system determined for every parameter studied is given in[table/fig-2] The Anterior and Posterior surgical approaches involved in decompression procedure were confirmed and conducted on the cadavers by the residents and were assisted by the faculty from Orthopedic and Anatomy departments [12]. The observations noted by the faculty during the session were analyzed and documented.

Statistical analysis: Statistical analysis of the observations recorded is not required/applicablein this study.

Results: All of the four cadavers (8 upper limbs)used for dissection during the routine academic session,all were used for the study. The anterior surgical approach was conducted on 4 upper limbs and the posterior approach was performed on the other 4 upper limbs.

Newer approach:

The anterior approach which is the preferred approach for shoulder arthroplasty is proposed for QSS. In this approach, cadavers were placed in a supine position with the right-sided arm in 90-degree abduction. On the right side, using the bony and
surface landmarks (acromion, clavicle, coracoid process, deltoid), a 12 cm long incision extending
from the lateral margin of the coracoid process
towards the proximal humeral shaft close to the deltoid tuberosity is to be taken [12]. (table/fig. 3).

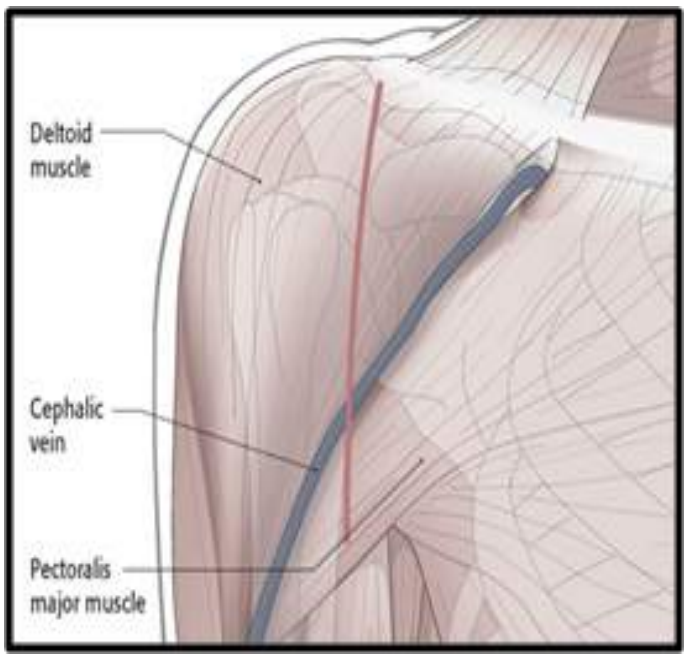

Figure 2: Surgical incision taken in Anterior (Delto-pectoral) approach (Courtesy: AO Surgery Reference: Jonas Andermahr, Michael McKee, Diane Nam. AO Surgery Reference. First edition. 2015. Deltopectoral approach [12].)

The residents exposed and incised the clavipectoral membrane within the Delto-pectoral groove. After retracting the deltoid muscle laterally and the conjoint tendon medially, the subscapularis muscle was exposed. The AXN was identified over the surface of the subscapularis muscle and it was traced close to its lower border.

The lower border of subscapularis muscle is the most critical point, as it is related intimately to the teres minor belly inferiorly.

The skin incision is then extended below, and lower border of teres minor is identified and using blunt dissection, quadrangular space is traced by inserting a

fingertip horizontally forwards along the plane of the lower border of the teres minor. After identifying the QS, the contents of the QS can be dissected by blunt dissection.

The teres major muscle need not be exposed and by using blunt dissection, the contents of the QS (AXN and PHCA) can be identified and traced within the QS.

The QS and its contents can be cleared of any fibrous strands or adhesions (table/fig. 4). No muscle is cut in this approach [12].

Currently preferred approach:

The contralateral left-sided axillae of the cadavers were approached posteriorly, during which the cadavers were placed in a lateral decubitus position, and a longitudinal incision of approximately 4 cm is made over the posterior shoulder. The posterior border of the deltoid is secured and reflected supero-laterally to reveal the underlying fat within the QS between the teres and also the teres major. The axillary nerve and the posterior circumflex humeral vessels will then be palpated as they exit the QS and the QS was identified and secured(table/fig. 5)[13].

Parameters like anatomical ease of identifying involved neuro-vascular structures, technical expertise required to execute the procedure, probabilities of injury to neuro-vascular structures, probabilities of post-operative fibrosis and other complications, and time duration required to complete the procedure were assessed and compared between both the procedures[table/fig-6]

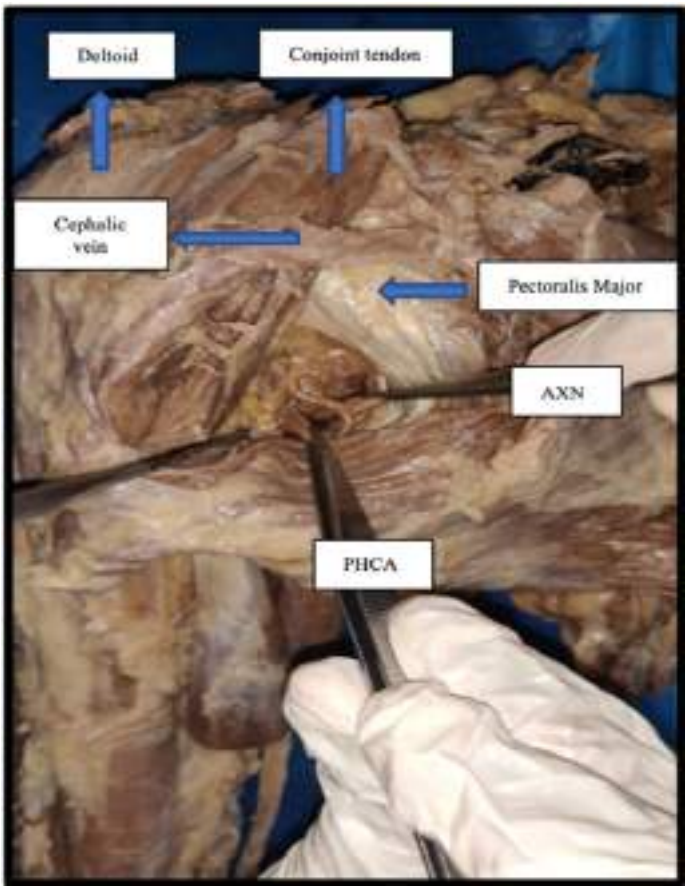

Figure 3:Anterior approach showing quadrangular space between Delto-pectoral groove along with the contents (AXN and PHCA) passing through it. (AXN: Axillary nerve; PHCA: Posterior Humeral Circumflex Artery)

Sr. No	Parameters on which the approach is tested	Anterior/ Delto-pectoral approach (Score : 10)	Posterior approach (Score : 10)
1	Anatomical ease of performing the procedure	06 (+++)	08 (++++)
2	Requirement to incise any structure like muscle, vessels, etc.	Nil	Yes
3	Anatomical ease in identifying involved neuro-vascular structures	06 (+++)	08 (++++)
4	Time duration required to complete the procedure	More than 15 min.	Less than 10 min.
5	Technical expertise required to execute the procedure	high++++)	Less (++)
6	Probability of injury to neuro-vascular structures	06 (+++)	08 (++++)
7	Probability of post-operative fibrosis and other complications	Minimal (+)	Significant (+++++)

Table 1: Assessment of parameters of both the approaches studied

Sl. No	Name of the parameter studied/ observed	The grades were given as a score of 10				
		2 points	4 points	6 points	8 points	10 points
1	Anatomical ease of performing the procedure	Significantly Easy +	Easy ++	Average +++	Difficult ++++	Significant Difficult +++++
2	Requirement to incise any structure like muscle, vessels, etc.	No requirement to incise any structure at all (Nil)			Requirement to incise either 1 or more neurovascular structures (Yes)	
3	Anatomical ease in identifying involved neuro-vascular structures	Very Easy +	Easy ++	Average +++	Difficult ++++	Very Difficult +++++
4	Time duration required to complete the procedure	Less than 10 minutes		10-15 minutes	More than 15 minutes	
5	Technical expertise required to execute the procedure	Minimal +	Less ++	Average +++	High ++++	Significant +++++
6	Probability of injury to neuro-vascular structures	Minimal+	Less ++	Average +++	High ++++	Significant +++++
7	Probability of post-operative fibrosis and other complications	Minimal +	Less ++	Average +++	High ++++	Significant +++++

Table 2: The grading system determined for every parameter studied is as follows [12,13]

Discussion: Before discussing the various surgical approaches used for decompression in QSS, and the studies conducted on it; an overview about the functional anatomy of AXN and PCHA needs to be taken.

Functional Anatomy of Axillary nerve:

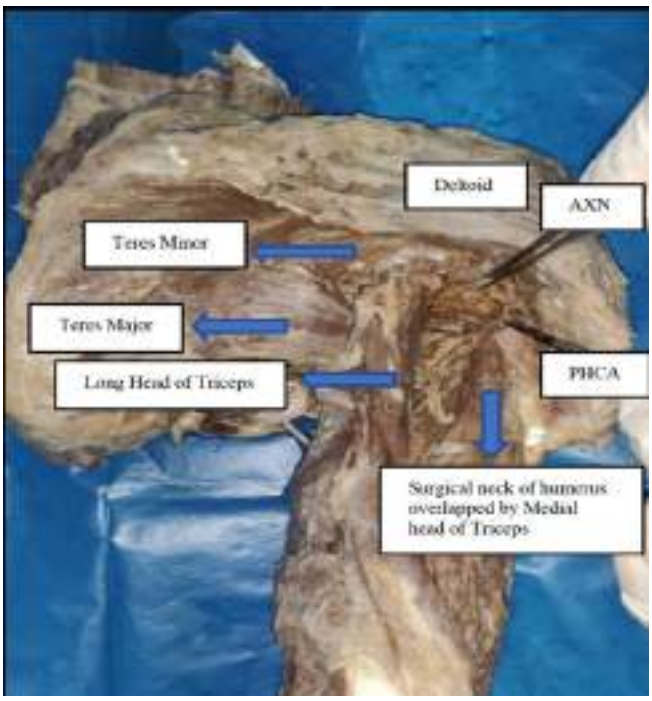

Figure 4: Posterior approach to the Axilla showing quadrangular space along with the contents (AXN and PHCA) passing through it. (AXN: Axillary nerve; PHCA: Posterior Humeral Circumflex Artery)

The AXN, is found anterior to the subscapularis, posterior to the brachial artery, and lateral to the radial nerve. At the inferior aspect of the subscapularis, the AXN runs posterior, close to the joint capsule, passing through the quadrangular space with the posterior circumflex humeral artery, sandwiched between the lateral and long heads of the triceps muscle.

The anterior branch of AXN innervates the deltoid muscle whereas its posterior branch innervates the teres minor and the deltoid. The posterior branch also innervates the skin over the inferior two-thirds of the deltoid muscle at its posterior aspect [14].

Functional Anatomy of Posterior Humeral Circumflex Artery (PHCA):

It enters the posterior scapular region by passing through the quadrangular space. It divides into anterior and posterior branches within the quadrangular space, wraps antecedently around the surgical neck of the humerus to give blood force to the superior, inferior, and side portions of the humeral head, the glenohumeral joint, and the surrounding shoulder muscles [15,16].

Cahill BR and Palmer RE (1983) in their study proposed a posterior approach in which a transverse incision was taken parallel and just inferior to the spine of the scapula,

and curved it inferiorly over the posterior aspect of the humerus. Later, the deltoid was removed from the spine of the scapula. Teres minor was detached at its insertion into the rotator cuff and reflected medially. Decompression of quadrangular space was conducted by blunt and sharp dissection. They reported satisfactory results in 16 out of 18 patients by this approach[13]. Similar observations were confirmed by the authors while conducting this posterior approach in the present study.

Pitfalls of this technique:

1. Removal of Deltoid and Teres Minor resulted in excess bleeding intra-operatively [13].
2. Division of teres minor weakened the rotator cuff and the lateral arm rotation [13].
3. The post-operative wide scar may itself compress the neurovascular bundle [13].
4. Post-operative chronic pain and formation of poor quality tissue [17,18]

Thomas J. Francel, A. Lee Dellon and James N. Campbell (1991) in their study suggested another posterior approach in which a vertical or S-shaped incision was made on the point of maximum tenderness i.e. quadrangular space and skin flaps raised to expose the inferior border of the deltoid. The deltoid was retracted superiorly, after incising the deltoid fascia and the teres muscle bellies were exposed. The fascia between the teres muscle bellies was opened, and the quadrilateral space was entered. Deltoid and Teres Minor muscles were not divided during this technique. The AXN and the PHCA were identified and isolated. Nerve stimulation and the motor response of teres minor and deltoid were confirmed. Fibrous bands are divided and space is decompressed by finger insertion [18]. Similar observations were confirmed by the authors while conducting this posterior approach in the present study.

Advantages of this technique:

1. Intact Deltoid and Teres Minor reduced bleeding and quick postoperative shoulder movement is possible [13].
2. Fibrous atrophy of the deltoid was prevented [13].
3. The postoperative scar was smaller [13].

Jonas Andermahr, Michael McKee, Diane Nam (2015) in their study mentioned the (anterior) deltopectoral approach which wasusually/regularly used for almost any shoulder fracture treatment and was often the preferred approach, especially in anterior glenoid fractures [12]. Similar approach was followed by the authorsin the present study and similar observations/results were obtained. Refer to Table/Fig. 6.

G. Feigl et al. (2018) also used the (Anterior) Delto-pectoral approach to visualize the AXN anteriorly. In their cadaveric study, amongst 91 out of 92 limbs, AXN was identified at the inferolateral border of the subscapular muscle to enter the QS. In this approach, the insertion of the subscapular muscle at the lesser tubercle defines the roof of the space [19]. The present study authors also achieved similar observations as those stated by G. Feigl et al.

Reflections and Recommendations:

The Anatomists commented that the posterior approach was a comparatively easier and quicker method (dissection-wise) to dissect the QS thereby identifying the AXN and PHCA. But it is associated with postoperative complications related to the innervation and detachment of Deltoid muscle. The functional deficits associated with these problems often result in chronic pain. During the cadaveric study, the Anatomists observed and Orthopedicians agreed that the anterior (Delto-pectoral) approach, which is the preferred approach for shoulder arthroplasty and proximal humeral pathologies, could be effectively used for decompression in QSS. The anterior approach can easily be combined with an ultrasound-guided anesthetic block to AXN. The authors suggest more cadaveric studies to facilitate anatomists and surgeons with increased opportunities to practice and appraise older and newer surgical approaches.

Limitations: The study was conducted on less number of cadavers and hence this study will be followed up every academic year with more cadavers to obtain generalizable findings.

Conclusions: From this pilot study conducted, it has been proposed that anterior approach is technically more easier to conduct and can be used for decompression in QSS. Moreover, this approach can easily be combined with an ultrasound-guided anesthetic block to AXN.

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WET MOUNT MICROSCOPY OF HUMAN SKELETAL MUSCLE; UNVEILS THE ULTRA-STRUCTURAL PATTERN

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Abstract

Wet mount microscopy employs water as a mounting medium for viewing the living micro-organisms of different kind. The refractive index of water not only enhances the image quality but also produces image in natural color with no or little artifacts. A qualitative observational study was done in which wet mount slide of the formalin fixed skeletal muscle from the human cadaver was prepared, and examined under light microscope. The images showed very fine striated sarcomeric pattern in myofibrils with quiet resemblance to the ultra-structure. The study was helpful in the better comprehension of histological structure of skeletal muscle and gave prevision for further melioration and application in the field of anatomy.

Keywords: Wet mount microscopy, skeletal muscle, Ultra structure, Striations, Sarcomere.

Introduction

Wet mount microscopy remained as a "Forgotten art" in the modern era of medicine. It primarily uses water as a mounting media in order to see living micro-organisms useful in diagnostic and clinical research.2 Being temporary in nature, it enticed few researchers for the advancement, despite of simple and minimal infrastructure requirements. The present study employs wet mount of formalin fixed skeletal muscle to describe its micro-architecture.

Microstructure of Skeletal muscle: The skeletal muscle consists of unbranched longitudinal myofibrils with peripherally located flattened nuclei, surrounded by endomysial connective tissue.4 The myofibrils show faint striations (sarcomeres) post tissue processing and H and E staining (Fig 1). The ultra structure reveals repeated pattern of sarcomere, the structural and functional unit of the skeletal muscle. Each sarcomere bounded within Z lines comprises of thick myosin (A band) and thin actin (I band) filaments.3, 4

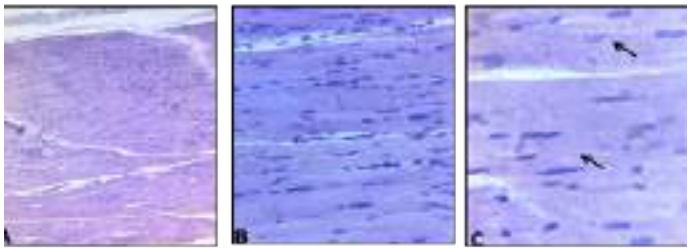

Figure 1: Human skeletal muscle as seen in light microscope (H and E Stain preparation A-10 X, B-40X, C- 100X Magnification respectively). The striations are faintly visible (marked with arrows) in C. Objective

A qualitative observational study to develop a simple wet mount of the formalin fixed skeletal muscle from the human cadaver and its observation under different magnifications of light compound microscope. The study anticipates its further betterment and application in the modern science.

Materials and Methods

Formalin-fixed Deltoid muscle was procured from the human cadaver voluntarily donated to the Anatomy department of the ABC institute for teaching and research purpose. The specimen procured was dissected using dissection microscope (Fig-3C) into thin myofibrils with the help of tweezers and fine syringe needles. The sample was made to stick on the surface of microscope glass slide and made wet by pouring few drops of distilled water with the help of dropper (Fig 2).

Figure 2: Wet mounting of skeletal myofibrils

A cover glass was placed over the wet mount preparation and is viewed under 10X (low power) and 40X (high power) of light (compound) microscope (Fig 3B).

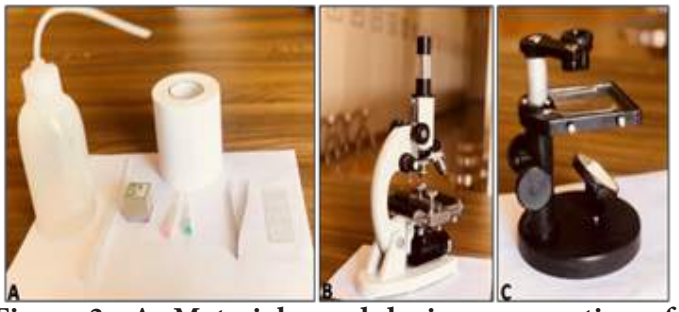

Figure 3: A- Materials used during preparation of wet mount microscope slide. B- Monocular light microscope (Compound) C- Dissection microscope

Results

The wet mount slide of skeletal muscle under low magnification (10X) revealed a fine longitudinal structure of myofibril with striations (Fig 4A). A single myofibril too depicted similar striation pattern (Fig 4B)

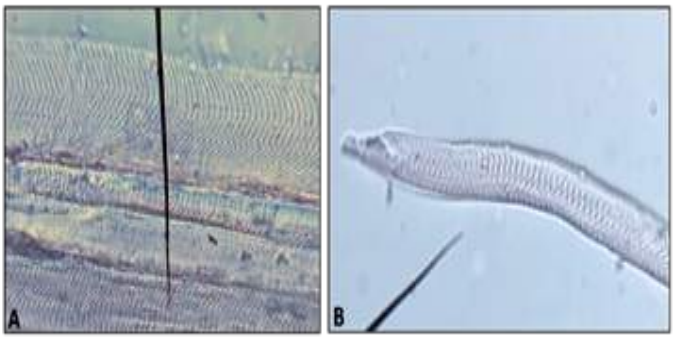

Figure 4: Wet mount microscopic slide of skeletal myofibrils (10X Magnification). A- Bundle of myofibrils with clearly visible pattern of striations (black pointer) B- Single myofibril with striations.

Under higher magnification (40X), similar repeated sracomeric pattern was seen with vivid internal architecture depicting Z lines as well as A and I bands (Fig 5 and 6)

Figure. 5: Myofibril (single) of skeletal muscle seen in wet mount preparation (40X Magnification).

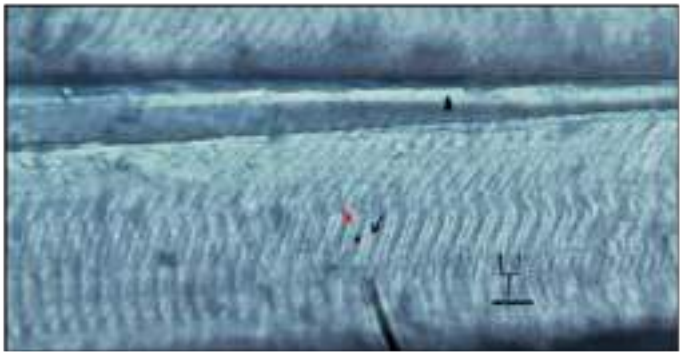

Figure 6: Myofibrils of skeletal muscle seen in wet mount preparation (40X Magnification). Striations (Sarcomeres) are clearly visible with dark A-Band (*), Z-Line (red arrow), light I-Band (black arrow). The connective tissue is also seen between myofibrils (black solid arrow).

Discussion

The present study acknowledges vivid and distinct skeletal muscle striation pattern which is two of a kind as ultra structural srcomeric pattern. The clearly visible thin and dark encircling Z lines10. of Krause bilaterally (Fig 6) forms the boundary of the sarcomere with an intervening space occupied by one dense and dark (A band- thick myosfilaments) and equally bisected light (I bands- thin action filaments).5, 9 Myofibril bundle as well as single myofibril at low magnification (Fig 4B) showed well defined striations than the H an E histology. Wet mount microscopy delivers no or minimum artifacts with a natural color of the tissues.1 The same is significantly consistent with the present study. The endomysial connective tissue appears white between two myofibrils (Fig 6) as viewable under electron microscopy.8 The circularly arranged striations clearly visible (Fig 5) conform double hexagonal configuration7 and the "sliding filament" theory of muscle contraction.6 The study provided new insight and will prompt future researchers for the development and utilization of the wet mount technique in anatomy teaching and research.

Conclusion

Wet mount microscopy of human cadaveric tissue can contribute significantly in the comprehension of its histological structure.

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