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CONTENTS

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EDITORIAL

NO RESPONSE !! WHY ?

No attention has been focused on the issue that I raised in my last editorial.

Are we really asleep.....

Lack of suitable material has become a major barrier in publishing our professional journal "Sri Lanka Dental Journal". Our members seem to have no interest in sharing their experiences with fellow practitioners by publishing interesting clinical material that they encounter in day to day practice. As professionals, this is one of the serious problems that have to be addressed promptly. What is the reason for this? How do we change this scenario? Has the culture of professional writing not been inculcated in the dental community or is this because of lack of interest? May be that dental surgeons have no time to spend on writing and publishing, because of their heavy workload? However, as members of this noble profession all of us have a moral responsibility of contributing towards improvement and progress in dentistry in Sri Lanka. Distribution of information and sharing knowledge play a very significant role in the development of a profession especially in the context of the modern day world. This is a vital need of our profession. Therefore, a dialogue on this issue among the members of the profession is the need of the hour. Let us all rise up to the occasion.

Upul B Dissanayake
Editor

Review Article

Sri Lanka Dental Journal 2009; 39(03) 48-51

A situational review of forensic odontological service in Sri Lanka : challenges, opportunities and the way forward

Induwara Goonerathne

Introduction

The aim of this paper is to examine and review the forensic dental service in Sri Lanka with a view to identifying its weaknesses, strengths, obstacles and threats. It is assumed that this study will shed light to open up new opportunities and avenues for improvements in forensic dental service in Sri Lanka resulting in high quality in both administration of justice and research.

Forensic Dentistry or Odontology is a specialized branch in forensic medicine that deals with the application of dental knowledge and skills in solving a legal issue. According to the literature, forensic dentistry has a long history. It goes back as far back as 66 A.D. to the time of Nero. As the story goes, Nero's mother, Agrippina, had her soldiers kill Lollia Paulina, with instructions to bring back her head as proof that she was dead. Agrippina, unable to positively identify the head, examined the front teeth and on finding the discolored front tooth confirmed the identity of the victim. In the US the first remarkable case where forensic odontologic evidence were taken in to account goes back to 1775. In UK and other developed countries too, this discipline has evolved for over centuries. However, unfortunately, the forensic odontological service is not all that developed in Sri Lanka from an international stand point.

The scope

The aim of forensic odontology primarily involves identifying individuals in forensic and disaster contexts. These involves mass graves, mass disasters, unknown remains etc. Second important aim of forensic odontology is bite marks analysis. Bite marks may be the only evidence available in a crime scene, analysis of which will lead to convict wrong doers. Thirdly the analysis and interpretation of dental and facial trauma for medico-legal purposes. In addition contributions to age assessment, dental fraud and negligence assessment, child abuse, dental ethics , expert testimony and research are pertinent. A forensic odontologist is expected to work in a team of experts, therefore, one should possess team spirit and leadership approaches.

All developed countries have post graduate specialization in forensic odontology. These include board certification in the specialty, for example American Board of Forensic Odontology. There are sufficient number of forensic odontologists and defense odontologists working in developed countries. There is a continuous training process and quality assurance.

Many wrong doers have been convicted based on bite marks evidence alone in developed countries, for example in the famous Ted Bunty

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case in the US. In the US, large number of 9/11 New York blast victims and other mass disaster victims were identified because this discipline is highly developed. It was possible to identify almost all foreign victims in Sri Lanka at the recent Tsunami disaster. This construes the fact that this science is well established in the west. Unfortunately none of the Sri Lankans affected were identified using odontologic method, as this discipline which is low cost and highly reliable is not well established in Sri Lanka.

Forensic odontology has not gained much popularity or attention in Sri Lanka. There are many reasons for this. One main reason is that it is not financially rewarding, as it does not encourage any private practice. Another reason is that there are no career paths in forensic odontology in the ministry of health. However there is a growing demand and an enthusiasm about this dicipline amongst dental, medical and legal fraternities at present.

Undergraduate dental curriculum of the Faculty of Dental Sciences Peradeniya University gives a basic understanding in forensic dentistry for the undergraduate dental students. This aspect was designated as ethics and jurisprudence in the curriculum. It can be viewed as a strength to have taught forensic dentistry at least for a few hours just to sensitize the practitioners in this specialty. In the proposed dental curriculum, there is a specific input of forensic odontology in which a fare amount of introduction to forensic odontology is included. It is expected to have an improved forensic odontology program with a practical clinical component in the proposed five year dental curriculum. However, with the limited allocated hours, only a basic theoretical knowledge can be imparted.

One reason as to why there is not much emphasis to forensic odontology either in undergraduate or post graduate level is because not many are aware of its scope and the application. Also there aren't many forensic odontologists in the country.

As a strength it can be noted that there are a few practicing forensic odontologists in Sri Lanka with post graduate qualifications. There are two practicing forensic odontologist in the ministry of health at the moment in addition to the one who is working in the university. Brigadier Jayaweera, at the Sri Lanka Army was the first to receive a foreign training in forensic odontology and he has now retired from service. It must be mentioned that all forensic odontology practitioners in Sri Lanka underwent their training abroad, out of their own interest. Neither the government nor the profession or institutes had motivated to pursue in these dimensions. However, foreign trainings are very costly and not many wanted to pursue them.

It is also noticed that there is a growing demand and interest for this subject by the medico-legal community as well as from students. The faculty of Dental science at Peradeniya has made a step forward in recognizing the importance of this discipline in the undergraduate curriculum by introducing a fare amount of subject material in the final year dental curriculum. Further, the faculty of dental science has shown enthusiasm and motivation regarding this by makeing arrangments to develop a post graduate masters degree program in forensic odontology. This MSc program in forensic odontology has been approved by the faculty and awaiting to be started soon. Parallel to this, the Post Graduate Institute of Medicine (PGIM), the apex body of post graduate medical and dental education has recognized the importance and timely relevance of this discipline and formed a interim committee comprising members from boards of study in dental surgery and forensic medicine to work out a postgraduate programme. This is a milestone in the forensic odontology of Sri Lanka.

One of the main steps taken concerning the development of this discipline in the ministry of health is that it recognized and designated two dental surgeons who has qualifications in forensic odontology to look into matters pertaining to

forensic dentistry. Thus, there will be more positions created and a new specialty will be available in the dental job market in the future.

As per weaknesses, not many are aware of the nature, scope and the extent of this practice. Therefore I observe a limited commitment by the state and the medico-legal community. Lack of training opportunities for local dental surgeons and lack of experts in Sri lanka is also an issue.This may be addressed with the introduction of new post graduate courses. The field work, court visits, report preparation, post mortem smells, excavations, scene visits and such issues will further hinder the selection of forensic dentistry as a career. However, the inherent detective nature of this discipline and self satisfaction it renders will definitely attract those who are genuinely interested in administration of justice. Also, at the moment there is no special job market for forensic odontology in Sri Lanka, unless a lobbying creates a few more positions.

One of the other weaknesses in dental practice that affect forensics is the inadequate and inaccurate dental charting and recording of treatment. As the odontological method of identification strongly depend on ante mortem and post mortem dental data comparison, if the ante mortem data are not recorded or inaccurately recorded (which is the case in Sri Lanka) the forensic investigations become futile.

There are no up to date facilities for existing forensic odontology practitioners. It is the obligation of the state to provide such facilities to improve medico-legal investigations in the name of justice.

It is surprised to observe that there are no court cases successful in bite marks or positive identifications using dental evidence. There are multiple obstacles to this. One being the lack of expertise and facilities, the second is the inadequacies in dental records and medico-legal investigations. In addition medico-legal experts police or ordinary dental surgeons are not trained on bite marks handling therefore this will get minimul attention in forensic practice in Sri Lanka. Therefore, the way forward is that this service be properly coordinated.

On the other hand, most of the times the judicial medical officers(JMO) are handling oral and dento facial trauma cases. All trained JMOs are aware but they find it difficult to refer cases from far away places, due to logistical reasons. Some times they get the opinion of the dental surgeon who work in the area. JMOs have a large number of other case work to handle more effectively. If dental and facial trauma cases are referred to the forensic odontologist, they could handle it effectively. This reduces a part of the heavy workload of the JMO.

A national level forensic odontology laboratory is a prim requirement of country which has not yet been fullfilled. However, thre is a laboratory established in the Department of Forensic Medicine, University of Peradeniya which is also under-equipped due to lack of funds.

There will be opportunities in the future to pursue post graduate studies in forensic odontology in Sri Lanka, both through the faculty of dental science and via PGIM.

The graduates from these post graduate courses will have the opportunities to work abroad. Also there may be on call assignments when there are disasters in other countries.

The way forward

It is important to recognize this specialty both by the state and the medico-legal and dental communities. The MSc course offered by the faculty and the PGIM programs must produce more experts in Sri Lanka as well as in the region. The PGIM should offer a MSc and subsequently a MD course in Forensic Odontology which will train competent board certified specialists in forensic odontology for this country. In order to

sustain these programs existing forensic odontology practitioners should be recognized and provide with the responsibility of training the future generation. With these two programs moving simultaneously will produce a substantial development in the field of forensic odontology in Sri Lanka. This will invariably develop a research culture among the practitioners.

Similarly, outhorities must creat more posts at least at provincial level initially to employ those who have obtained post graduate qualifications in forensic odontology. The forensic pathologists, police and others should work hand in hand with forensic odontologists to bring justice. The existing laboratories have to be equipped and facilities must be granted for a quality service.

On the other hand all dental practitioners must be educated to maintain accurate dental records. Computer assisted dental record keeping must be encouraged among hospitals and private practices. With these innovations, Sri Lanka will have an adequate specialists in forensic odontology and the research out come too will be increased. However, it may be relevant to educate the medico-legal communities, police, legal communities and the dental profession about the importance of this discipline. I am sure with all these we could be a leader in forensic dental education in the region.

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SENSODYNE

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* *Frequent vomiting*
* *Gum disease*
* *Previous dental work or*
* *The use of dental products with abrasive ingredients*

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Research Article I

Sri Lanka Dental Journal 2009; 39(03) 52-62

Dental students' knowledge and attitudes towards HIV/AIDS in Sri Lanka

Arjuna N.B. Ellepola [1], Devipriya B. Sundaram [2], J.A.M.S. Jayatilake[3], Bobby K. Joseph[2], Prem N. Sharma[4]

Abstract

Objective: To determine the knowledge and attitudes of dental students of the University of Peradeniya, Sri Lanka towards HIV/AIDS.

Material and methods: A cross-sectional survey was conducted among the clinical dental students using a structured questionnaire with 60 questions to examine their knowledge in various aspects of HIV/AIDS and 13 questions to examine their attitudes towards the disease. The collected data were analyzed using SPSS 16.0.

Results: The response rate of the survey was 85.6%. The overall mean knowledge score was 43.56(±4.72S.D) out of 60. About 88.7% of the study group was willing to treat HIV/AIDS patients. The majority of the respondents reported mass media to be their major source of information about HIV/AIDS.

Conclusion: The results of the present study suggest that HIV-related knowledge of the dental students is at an acceptable level and that they generally hold positive attitudes towards people living with HIV/AIDS. The study also revealed certain important misconceptions and knowledge deficits among the students. The study highlights the need to alleviate specific fears regarding the disease as well as to focus on specific aspects of HIV/AIDS education in the dental curriculum.

Key words: HIV, AIDS, Dental students, Knowledge, Attitudes, Sri Lanka.

Introduction

The Human Immunodeficiency Virus (HIV) infection and Acquired Immunodeficiency Syndrome (AIDS) together constitute one of the most important public health problems of the present day. Since 1981, HIV/AIDS has gradually reached epidemic status, touching every society in the world to varying degrees.

Health care professionals have the ethical responsibility to care for HIV/AIDS patients and educate the high risk populations to minimize the spread of infection. As health care professionals, dentists and dental students should be knowledgeable of the disease process, modes of

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transmission and the oral manifestations of HIV disease.[1-3] Dental therapeutic procedures frequently involve blood and saliva that may contain a variety of blood borne pathogens including HIV.[1,2,4] Although the possibility of HIV transmission in the oral health care setting is very low, dentists fall into the high risk category for cross contamination.[5-7]

Sri Lanka is classified as a country with a low level epidemic of HIV in the South-East Asia region.[8] Ever since the first HIV case was reported in 1987, there has been a gradual increasing trend in the cumulative number of reported HIV cases in the island. According to the HIV/AIDS surveillance report by the National STD/AIDS control programme in Sri Lanka, 3,000 were living with HIV/AIDS in Sri Lanka at the end of 2009, yielding an adult prevalence of less than 0.1%. As of the end of March 2010, the reported cumulative number of HIV cases was 1,223 (725 male and 498 female) with a male to female ratio of 1.4:1.[9]

Despite the low prevalence in Sri Lanka, the presence of important risk factors such as low condom use, high prevalence of commercial sex as well as increased internal and external migration suggests that there is a potential risk of HIV infection turning into epidemic proportions if adequate measures are not taken to control them.[8]

Though HIV prevalence is low among the general population, it is significantly higher among those who are engaged in high risk behavior. The female sex workers and their clients, men who have sex with men and injecting drug users are identified as the most at risk populations in the country based on epidemiological evidence and regional experiences.[8]

Dental students can expect to encounter AIDS patients with ever increasing frequency even in the early years of their professional careers. The attitudes that these future oral health care providers develop towards the disease and people living with HIV/AIDS (PLWHA) will ultimately affect their ability to provide competent and compassionate care to AIDS patients. Increased knowledge and improved attitudes would increase their willingness to treat HIV/AIDS patients.[10] Researchers in countries like South Africa, Brazil, Sudan and Iran have found that dental students had insufficient knowledge about HIV/AIDS-related information and management of HIV/AIDS patients.[1,2,11,12]

The Faculty of Dental Sciences, University of Peradeniya, is the only educational institution in Sri Lanka, which conducts an undergraduate dental program. To the best of our knowledge, no comprehensive data has been published previously on the knowledge and attitudes of the dental students towards HIV/AIDS in Sri Lanka till date. Accordingly, a cross-sectional survey was conducted to assess the knowledge and attitudes of the University of Peradeniya dental students towards HIV/AIDS.

Material and methods

The Dental program of 4 years duration leads to a B.D.S. degree (Bachelor of Dental Surgery). The first two years are preclinical years. The dental students undergo dental theoretical teaching and clinical training in specialty based dental clinics during the 3rd and 4th years. The sample for the present study consisted of three groups, 3rd year students (Group 1), 4th year students (Group 2) and students who had just completed their 4th year (Group 3). The survey instrument consisted of a structured questionnaire with 60 questions to examine their knowledge and 13 questions to examine their attitudes towards the disease. The questionnaires were distributed to all students. The students were notified that the questionnaire was intended for research purposes and that strict confidentiality of the collected data would be maintained. Ethical clearance for the research protocol was obtained from the Research and ethical review committee of the Faculty of Dental Sciences, University of Peradeniya, Sri Lanka.

The demographic characteristics of students such as gender and year of study were obtained. The knowledge of the students was tested under the following categories:

1. The virus (HIV) and the disease (AIDS)
2. Potential routes of transmission
3. Oral lesions associated with HIV
4. Risk groups
5. HIV transmission in the dental setting

The attitudes of the dental students towards the HIV/AIDS patients and data regarding their sources of information pertaining to HIV/AIDS were also obtained.

The data analysis was performed with Statistical Package for Social Sciences (SPSS) version 16.0.[13] A total knowledge score was computed for each respondent, with 'Don't know' responses being counted as an incorrect response. The mean scores have been presented as mean ± standard deviation (SD). The mean knowledge scores were calculated and compared among the three groups of students using one-way ANOVA with Bonferroni post-hoc test and the gender differences using the Independent samples t-test. A probability value 'p' less than 0.05 was considered statistically significant.

Results

A total of 160 questionnaires were completed out of 187 questionnaires distributed to the students giving a response rate of 85.6%. The respondents included 56 (35%) males and 104 (65%) females. Out of the total 160 respondents, 62 (39%), 64 (40%) and 34 (21%) belonged to groups I, II and III respectively.

Knowledge of HIV/AIDS:

1. ***Knowledge related to the virus (HIV) and the disease (AIDS):*** The mean knowledge score for this category was 7.3(±1.4S.D) out of a maximum possible score of 10. The mean score was found to increase gradually as the year of study increased. Only 4 students answered all the questions about the virus and disease process correctly.

2. ***Knowledge related to potential transmission routes:*** The mean knowledge score for this category was 13.8(±2.5S.D) out of a maximum possible score of 17. Only 14 students answered all the questions in this category correctly. Group I scored highest among the three groups and their mean knowledge score for this category was significantly higher than that of Group II (p=0.019).

3. ***Knowledge of oral lesions associated with HIV:*** This is shown in Table 1. None of the students answered all the items in this section correctly and 2 students did not answer even one question correctly. The mean knowledge score for this category was 6(±2.6S.D) out of a maximum possible score of 12. Group III scored highest among the three groups and their mean score for this section was significantly higher than the other 2 groups (p<0.001).

4. ***Knowledge of HIV/AIDS risk groups:*** More than 80% of the students correctly identified all the high risk groups except hairdressers (25.6%) and pregnant women (68.8%). The mean knowledge score for this category was 9.9(±1.4S.D) out of a maximum possible score of 12. Only 14 students correctly identified all the high risk groups.

5. ***HIV transmission in the dental setting:*** The percentage of correct responses to items in this knowledge category is shown in Figure.1.The mean knowledge score for this category was 6.3(±1.1S.D) out of a maximum possible score of 9. Only 5.5% knew that HIV transmission is

possible through aerosols produced by a dental hand piece. 40% of the students erroneously considered that the HIV transmission risk from a patient to dentist is very high. The female students scored significantly higher 6.5(±0.96S.D) than the male students 6.1(±1.2S.D) in this category (p=0.018).

The overall mean knowledge score was 43.56(±4.72S.D) with a significant difference among the mean scores between three groups (p=0.042). The group III (45.2±5.3S.D) scored significantly higher (p=0.036) than group I (42.7±4.5S.D). No significant difference was observed between mean scores of group I and group II (43.5± 4.4S.D). Female students had a significantly higher (p=0.014) total mean knowledge score of 44.3 (±3.97S.D) than that of the male students 42.18(±5.64S.D). The mean knowledge scores of dental students belonging to the three groups are shown in Figure 2.

Attitudes towards HIV/AIDS patients

Table.2 shows the attitudes of the students towards the disease. 65% of the students were concerned that working with AIDS patients may endanger their health and 46.3% mentioned that they would inform an AIDS patient's disease status to their sexual partner against the patient's wishes. Though 28.1% believed that they had the right to refuse treatment to an AIDS patient, only 11.3% actually refused to treat them.

Sources of HIV/AIDS information

The majority of the respondents reported that mass media (television- 88.75%, newspapers- 81.25% and magazines – 53.12%) were their major sources of information about HIV/AIDS. Most of them (93.75%) indicated their desire to learn more about the disease.

Discussion

The results of the present survey suggest that the dental students in Sri Lanka have an acceptable level of knowledge pertaining to HIV/AIDS and generally hold positive attitudes towards PLWHA. The results are in agreement with that of Erasmus and Seacat, that the students' knowledge regarding HIV/AIDS increased as the level of study increased throughout the curriculum.[1,10] The study revealed certain important misconceptions and knowledge deficits among the students.

In the present study, only 43.8% of the students recognized an individual carrying anti-HIV antibodies to be a HIV carrier. HIV-antibody testing is the most appropriate test used for routine diagnosis of HIV among adults. Also, only 25% of the students knew the "window-period" (the average time interval between contracting HIV and production of antibodies) to be 6-12 weeks. During this period, HIV-antibody test usually yields a "false-negative" result. However, as the person is infected with HIV, he can still transmit the virus to others during this period. The fact that only a quarter of the respondents knew this signifies that most of the students would not know the exact time to recommend HIV testing for accurate diagnosis.

Overall, the students' knowledge regarding the various routes of transmission of HIV was good. Surprisingly, only 46.9% of the students knew that breast milk of an infected person can transmit the infection. Mother-to-child transmission (MTCT), which can occur in-utero, during delivery or post-partum or as a result of breastfeeding, has been found to be the major cause of HIV in children. Transmission through breastfeeding has been well-documented and the approximate risk of transmission has been estimated to be 15%, in the absence of anti-retroviral (ARV) interventions.[14] In Sri Lanka, MTCT accounts for 5.4% of the total HIV transmission.[8]

HIV-associated oral lesions not only indicate infection but also predict progression of HIV disease to AIDS.[15] It is critically important for dental students in all parts of the world to be

competent in the diagnosis and treatment of HIV-associated oral lesions and be trained to provide patients with an appropriate referral for diagnosis and medical management, if undiagnosed HIV infection is suspected.

In the present study, the students' knowledge regarding the oral manifestations of HIV/AIDS was inadequate. However, it was found to improve with their level of study. Group 3 students scored significantly higher than the rest of them. More than 90% of the group 3 students identified the most common HIV-associated oral lesions such as Oral Candidiasis and Oral Kaposi's Sarcoma. But this is not sufficient and the students need to have a broader knowledge of all the other oral lesions also. The results of the present study is in contrast to studies from Brazil, Iran and Nigeria where the dental students were well aware of the oral lesions associated with HIV/AIDS.[2,12,16]

The knowledge regarding high-risk groups was also good. However only a quarter of the students knew that infection can occur during hairdressing procedures. In 1985, CDC issued routine precautions that all personal-service workers (such as hairdressers, barbers, cosmetologists, and massage therapists) should follow. Even though there is no evidence of transmission from a personal-service worker to a client or vice versa, they should use the same cleaning procedures that are recommended for health care personnel.[17]

The students revealed several discrepancies in their knowledge regarding HIV transmission in the dental setting. Regarding the possible risk of transmission through saliva, about 79.4% knew that contact with saliva contaminated with blood of AIDS patient is a possible route. However, only half (51.25%) considered that HIV could be transmitted when broken skin is in contact with saliva of HIV positive patient. Although contact with saliva has never been shown to transmit HIV, exposure to saliva in a dental setting always carries the risk as it is usually contaminated with blood even though it is not visible. Hence, the CDC recommends the application of universal precautions to saliva in a dental setting.[18]

In the present survey, only a quarter of the respondents knew that HIV could be transmitted through aerosols produced by a hand piece. Although transmission through this route is reported rarely, the students should know that such a possibility exists.[19] A patient's oral fluids and blood can be aspirated into a hand piece or a dental unit waterline and unless water quality is controlled, a practitioner or a new patient could be exposed to the microbes of previous patients.[20]

Hence, adequate infection control procedures should be adapted to minimize transmission.

The risk for HIV transmission from patient to dentist and vice-versa is minimal in a setting where standard precautions are strictly obeyed. The average risk following percutaneous exposure to HIV-infected blood in health care settings is about 3 per 1000 injuries, less than 1:1000 following mucocutaneous exposure and has never been recorded following contact of HIV blood with intact skin. The risk after exposure of non-intact skin to HIV-infected blood is estimated to be less than 0.1%.[5] Almost 71.2% of the students in the present survey felt that the risk of HIV transmission in the dental setting is very high. Overestimation of the transmission risk of HIV has been found to be the most important reason for fear in providing dental care to HIV/AIDS patients.[4]

The most interesting finding from this survey was the fact that the students generally showed a more positive attitude towards AIDS and PLWHA. About 92.5% of the students agreed that PLWHA should be supported and treated and 79.4% of the students disagreed with the idea of isolating them in a special center. 88.8% did not have any concern about using the same chair/desk used

by a person with AIDS and 70% disagreed that students with AIDS should attend special schools.

However, there was substantial negative attitude expressed by the students also. One-half of the respondents (50%) felt that everyone should know about people with AIDS by means of national media. It is true that the media has a critical role to play in helping to halt and reverse the further spread of HIV in the world. This should be done by spreading knowledge about HIV/AIDS and its impact on individuals, community, society and economy. The students in the present survey, have themselves reported that mass media is their major source of information about HIV/AIDS. However, the media should not be used to project individuals with AIDS, unless they themselves volunteer, as it would promote stigma and discriminatory attitudes towards them.

Fear of the contagion has been found to significantly affect the attitudes towards PLWHA.[21] In this study, 65% of the students expressed concern that working with AIDS patients might endanger their health. This finding is similar to that of a study conducted among medical students where 62% expressed similar concerns.[22] Despite demonstrating an acceptable knowledge of HIV transmission, 46.5% of the students in the present survey were concerned that in future, new modes of transmission of the virus may be found. This shows that attitudes and prejudices towards the disease may be resistant to change through mere acquisition of facts alone.

Surprisingly, less than one-fourth (22.5%) of the students were willing to perform mouth to mouth resuscitation in AIDS patients when the need arises. The CDC recommends that resuscitation bags and other disposable devices should be made available to every AIDS patient and should be used even though saliva has not been implicated in HIV transmission.[23] However, in instances where resuscitation equipment is unavailable, the decision to do mouth to mouth resuscitation is a personal one influenced by a variety of factors.[24] The fact that only a small proportion of the students were willing to do this indicates their fear of disease transmission. Hence, it can be concluded from our study results that the students expressed no reservations about social contact with HIV/AIDS patients but were more concerned about delivering treatment to these patients.

All health care workers including dentists have a moral and legal duty to protect the right to confidentiality and privacy of all patients. About 46.3% of the students mentioned that they would inform the AIDS patients' sexual partner against the patient's wishes. A recent study revealed that fear of HIV status disclosure continues to be a significant barrier to accessing oral health care. Any breach of confidentiality in the part of the dentist would disrupt further dentist-patient relationship.[25]

Interestingly, only 28.1% of the dental students felt that they had the right to refuse to treat an AIDS patient. Almost 78.8% of the students agreed that their professional education provided them with enough information to treat AIDS patients and an overwhelming 73.1% were willing to treat AIDS patients. But, it may be of particular interest to note that as the students progressed in their curriculum, their willingness to treat HIV/AIDS patients reduced.

The results of the present study indicate that the dental students in Sri Lanka, in spite of their willingness, are less prepared for their future task of treating PLWHA. Also, it highlights a need for changing certain aspects of curriculum regarding the same. Mere presentation of facts and figures definitely is not enough.

Corrigan and colleagues reported that negative attitudes towards a person with a stigmatizing condition can be reduced with face-to-face contact.[26] Efforts should be made to invite PLWHA to come to colleges and talk to students about their illnesses. Reports from Australia and

Guam have indicated positive changes in student perceptions towards PLWHA after such talks.[27,28]

By learning from real stories, it is hoped that students will allay their fears of contracting the virus and show more empathy towards PLWHA. In a survey by Seacat and Inglehart, dental and dental hygiene students indicated that treatment with clinical supervision of HIV-positive patients would give them more confidence in treating these patients in future.[10]

Focus should be on the diagnosis and treatment of HIV-associated oral lesions, occupational vulnerability to HIV and the use of standard precautions and appropriate infection control measures to prevent transmission. Special attention should be given to alleviate their fear and concerns as well as to clarify the specific misconceptions regarding the disease.

(Authors acknowledge the Dental students who participated in the study)

Table 1. Percent correct among three study groups regarding HIV - associated oral lesions

Oral Lesion	Group I (n=62)	Group II (n=64)	Group III (n=34)	Total (n=160)
Oral Kaposi's sarcoma (A)	12.9	65.6	97.1	51.9
Oral candidiasis (A)	90.3	89.1	91.2	90
Oral hairy leukoplakia (A)	69.4	56.3	79.4	66.3
Salivary gland enlargement (A)	27.4	34.4	85.3	42.5
Xerostomia (A)	17.7	32.8	67.6	34.4
Idiopathic Thrombocytopenic Purpura (A)	27.4	25	26.5	26.3
Crohn's disease (NA)	25.8	35.9	61.8	37.5
Necrotising gingivitis (A)	58.1	63.5	70.6	62.9
Herpes simplex (A)	27.4	37.5	52.9	36.9
Non Hodgkin's lymphoma (A)	19.4	46.9	61.8	39.4
Aphthous ulceration (A)	45.2	53.1	55.9	50.6
Aggressive periodontitis (A)	54.8	73.4	70.6	65.6

A = Associated with HIV **NA** = Not associated with HIV

Table 2. Attitudes of dental students towards HIV/AIDS.

Attitudes of dental students	Percentage*
Students with AIDS should go to special schools for those with AIDS. **(D)**	11.3
I would not sit in the same armchair or desk with a person with AIDS. **(D)**	8.8
People infected with HIV should be isolated in a special center. **(D)**	15.6
They must be supported, treated and helped. **(A)**	92.5
Everybody must know about those with AIDS by means of national media. **(D)**	50
I am concerned that in future we will find that AIDS can be transmitted in ways now thought to be safe. **(D)**	46.9
My professional education has provided me with enough information to work safely with AIDS patients. **(A)**	78.8
I am concerned that working with AIDS patients may endanger my health. **(D)**	65
I would be willing to perform mouth-to-mouth resuscitation on an AIDS patient in respiratory arrest. **(A)**	22.5
I would inform an AIDS patient's sexual partner against the patient's wishes **(D)**	46.3
The probability of working with AIDS patients will play a role in the choice of geographic location of my residency. **(D)**	21.3
I believe I have the right to refuse to treat an AIDS patient. **(D)**	28.1
I would refuse to treat an AIDS patient. **(D)**	11.3

* Percentage of students who responded with "agree" to the above statements.
(The desirable response is given within brackets. **A**- Agree, **D**-Disagree)

Figure 1. Percent correct responses regarding HIV transmission in the dental setting.

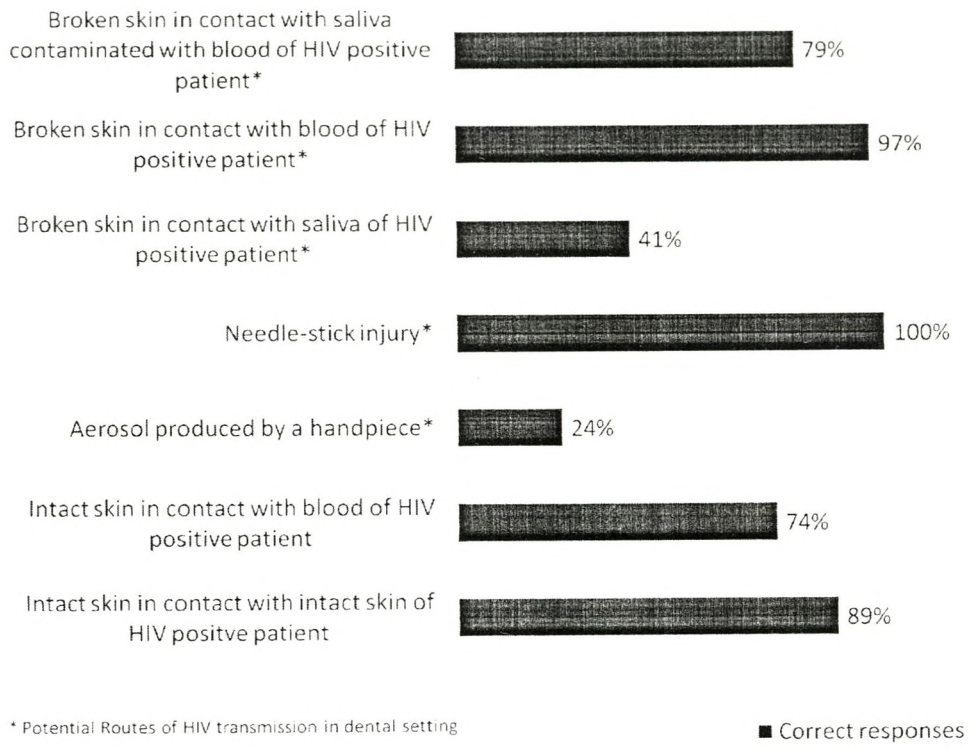
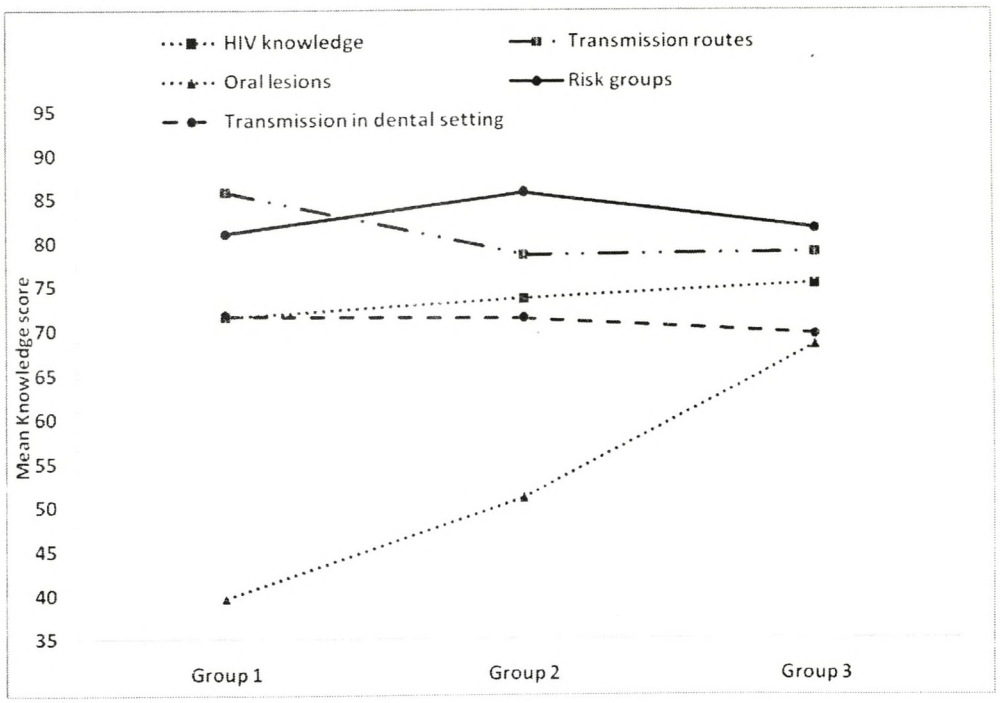


Figure 2. Mean Knowledge scores of the three study groups regarding HIV/AIDS



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Research Article II

Sri Lanka Dental Journal 2009; 39(03) 63-67

Computer literacy and usage among undergraduate dental students in Sri Lanka

W.M.P.S.K. Wijekoon

Abstract

Objective: The purpose of the present study was to investigate the computer literacy and the usage among the undergraduate dental students in Sri Lanka.

Material and methods: Total of 171 dental students who studied in the Faculty of Dental Sciences in 2006, representing first to final year batches were included in the study. Utilization of information technology, employment of computers and usage of different software operating systems during the undergraduate studies, were assessed in this study by means of a self administered questionnaire.

Results: Forty seven percent of the dental students owned a computer but only 42% of them used computers for educational purposes. Majority of them (72%) felt that computer facilities available in the faculty were inadequate. Fifty-two percent out of the total agreed to the fact that their computer skills were average whereas 40 % felt that their knowledge was inadequate. Only 8% was satisfied with their knowledge about computers. The frequency of computer usage among the dental students showed a great variation and only 9% of them used computers daily, 35% weekly, 20% monthly and 30% rarely. However, 6% of the dental students never used computers.

Conclusion: Computer usage among Dental students seemed to be only 47%. This could be due to lack of individual motivation and inadequacy of facilities.

Introduction

As dental practice management becomes more computers based, the efficient functioning of the dentist will be dependent on adequate computer literacy. Furthermore, in recent years, medical and dental education has been going through a transformation from the traditional instructive education system to self centered learning in which students take a more active role in their education.[1] In this context, computer-aided and internet based learning has become more and more popular.[2,3,4,5,6]

The rapid development of computer technology and the availability of personal computers, together with the internet, e-mail and variety of medical literature retrieval applications, have changed both the study and practice environment in dentistry, as in other disciplines. With these developments, International Medical Informatics Association (IMIA) has recommended that all health care professionals should have adequate knowledge and skills in information technology.[1,5,8]

With reference to computer application, the approach of the students, whose motivation is usually passing examinations, would be

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characterized as "wait and see".[7] Question is how long to wait and then what to look for. However, access to computers along with the internet at home and in the campus, is equally important for the purpose of computer based learning process. In addition, the issue of students' literacy in information technology (IT) is even more important in achieving this objective. It is often thought that acquiring skills and knowledge on computers is only a matter of time until majority of the student population becomes familiar in the use of computers and hence IT training will no longer be necessary in higher education.[8] The usage of computers for educational purposes among the dental students in developed countries seems to be very high. A study carried out in 16 European dental schools reveled that 96% of the students have their personal computers and almost all of them are used for educational purposes.[8] In Sri Lanka, there is only one dental school and the duration of the Bachelor of Dentistry course extends over a four years. However, there is no proper computer training programme for dental undergraduates during their four year study period. Further, no data is available to show the level of computer literacy and computer usage among Sri Lankan dental students.

The aims of the present study were to evaluate the usage of information technology/computers by the students of the Dental Faculty for the educational purposes, and find out their knowledge and skills in different software and the operating systems.

Material and method

The study sample (n=270) comprised of all the undergraduates (from first year to final year) of the Faculty of Dental Sciences (FDS), University of Peradeniya, Sri Lanka who studied in the year 2006. IT survey in the present assessment was carried out as a cross sectional study using self administered questionnaire (MCQ type). Designing of the Questionnaire of this survey was based on a performa used for the study of computer literacy in 16 dental schools of the West.[8] Adaptation and alteration of the original questionnaire according to the local context was done by the help of a computer expert. Adequacy of computer facility of the faculty, frequency of usage of computers during the undergraduate dental studies, the students' skills and knowledge in different software operating systems and skills and knowledge in literature retrieval were the key items incorporated in the questionnaire.

The questionnaire was delivered to the students in each batch just before the beginning of a lecture after explaining the purpose and obtaining the consent. Prior explanation of the questionnaire was given to the students and they were encouraged to answer carefully. Students were informed to submit the answer scripts anonymously. Adequate time was given to answer the questionnaire at the end of the lecture and completed form was collected.

Results

Out of the total 270 students 240 submitted the answer scripts voluntarily. Sixty nine out of 240 had to be excluded due to incompleteness and only remaining 171 scripts were analyzed. There were 95 males and 76 females in the responded cohort (Table 1). Analysis showed that 47% of the students had computers at their homes but only 10% had the access to the computers freely. Percentage of students who used computers for their educational activities was 42.

Majority (72%) felt that computer facilities in the FDS were inadequate. Fifty-two percent believed the fact that their computer skills were average. Another 40% proclaimed that their computer knowledge was inadequate. Only 8% was satisfied about their computer knowledge and they thought that the computer knowledge of them is adequate (Figure 1).

When analyzed the frequency of usage, it showed that 9% of the students used computers daily 35% used computers only once a week. One fifth (20%) of the students used computers only once

a month. Students who used computers rarely were 30%. However, 6% of them never used computers for education or any other purposes (Figure 2). Out of the students who used computers, majority (91%) employed the windows operating system and only few (9%) could use other operating systems such as Linux (Figure 3).

Discussion

Computer usage among the students in the FDS, Sri Lanka seemed to be lower than that in the developed countries.[8] Lack of individual motivation and inadequate facilities to acquire hands on experience and knowledge are seemed to be the two main limitations for low level of computer utility. Limitations in the internet access for undergraduates in the faculty may be an added disadvantage. At present, there are only ten computers with internet facilities allocated for students in the computer aided learning unit FDS. Although there is an extensive computer facility available at the IT centre of the university, it is not located in close proximity to the FDS.

Electronic dental curricula with computer-based learning material from number of European dental schools are available on line for students. Availability of these web sites not only encourage the students to use computers but also facilitate the dental education.[6,7,8] However, developing an electronic curricular is not an easy task due to number of reason including financial constrains and technical limitations.

In other countries, many dental schools have home pages with dental educational materials together with useful internet links. Further, online learning is becoming a recognized method for delivering educational content throughout dental schools in Northern America.[9,10,11] However, the home page of our faculty web does not provide adequate information to the students. Interactive online learning through web-based courses should also be implemented in the FDS which may facilitate the self motivated computer based learning. Computer utility could be further popularized among students by incorporating IT into the curriculum and making computer facilities further available to the students by developing well equipped computer laboratories with continuous and free of charge access to the internet.

In conclusion, computer usage among dental students of our faculty is not at a satisfactory level. Incorporating information technology in the dental curriculum, development of comprehensive home page for the faculty, improving computer facilities in the faculty and providing free access to the internet are the suggestive remedies that will be useful in overcoming this barrier.

Acknowledgements, I would like to thank Mr. AGAS Gamage (CAL unit) and Mr. KMTN Bandara (System analyst) for their assistance.

Table 1. Stratification of students according to gender and year of study

Year of study	Total No of students	No. of students participated	No. of Females	No. of Males
1st Year	68	44	20	24
2nd Year	69	39	21	18
3rd Year	66	45	21	24
4th Year	67	43	22	21
Total	270	171	84	87

Figure 1. Level of computer skills and knowledge among the dental students

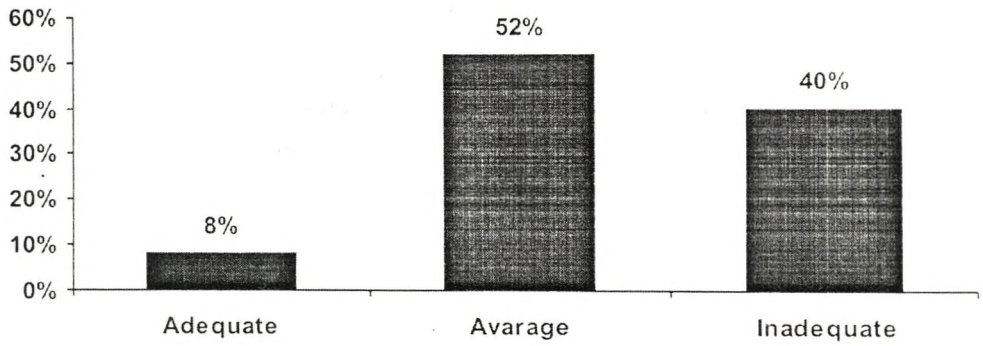


Figure 2. Frequency of computer usage among the dental students

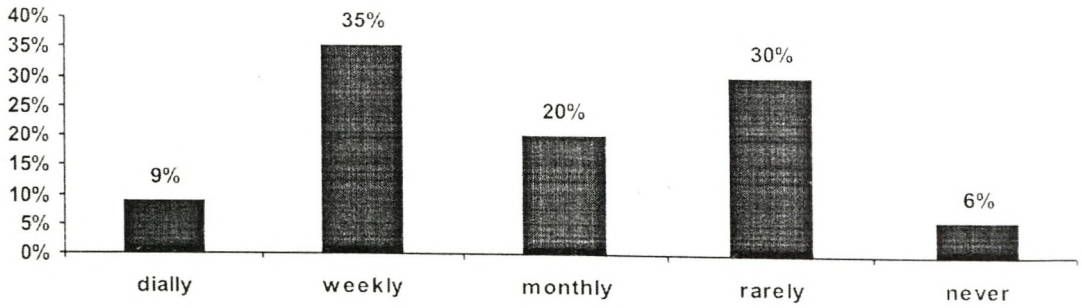
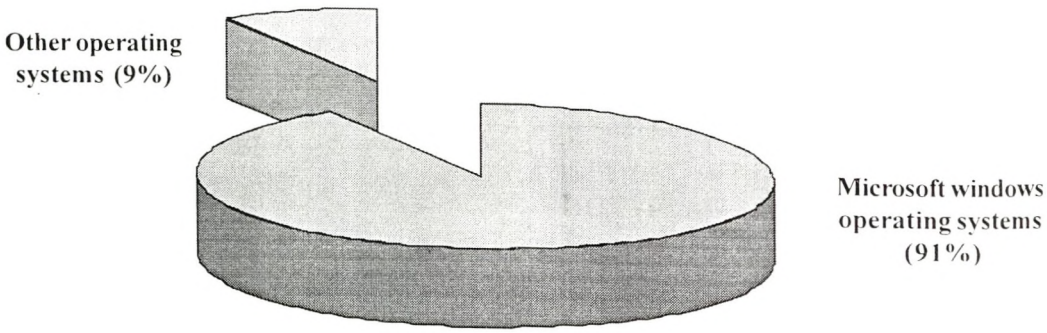


Figure 3. Computer operating systems used by the dental students



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Sri Lanka Dental Journal 2009; 39(03) 68-72

Gender differences in mandibular canine teeth

Isurani Ilayperuma and Gananda Nanayakkara

Objective: Objectives of the present investigation were to study the sexual dimorphism of mandibular canines and establish the effectiveness of mandibular canine index in predicting the sex in an adult Sri Lankan population.

Material and methods: A total of forty five adult dry skulls (30 male skulls and 15 female skulls) were used for the study. The following parameters were recorded: mesio-distal width of the right mandibular canine, mesio-distal width of the left mandibular canine and inter-canine distance using a sliding caliper (Mitutoyo, Japan) with a capacity of measuring to the nearest 0.01mm.

Results: The mesio-distal width of the mandibular canine teeth was significantly larger in males than in females. The inter-canine distance of the mandible was greater in males than in females and the difference was statistically significant.

Conclusions: This study establishes the existence of a statistically significant sexual dimorphism in the morphometry of mandibular canines in adults of the Sri Lankan population. Further studies on different age groups with bigger sample sizes are recommended to confirm the findings.

Keywords : mandibular canine teeth, sexual dimorphism

Introduction

Establishing the gender of an individual is a crucial step in personal identification. In massive disasters where cranial bones are fragmented, morphometric analysis of teeth provides evidence of identity in including sex of the individual.[1,2] Teeth in general provide an excellent material for anthropological, genetic, odontologic and forensic investigations. They are readily accessible for examination and moreover being the hardest and chemically the most stable tissues in the body they are selectively preserved and fossilized. Their durability against the fire and bacterial decomposition makes them invaluable for identification.[3]

Tooth size standards based on odontometric measurements are used in gender and age determination. The study of the permanent mandibular canine teeth offers certain advantages over the other teeth. It has been stated that permanent canine teeth are the least frequently extracted teeth and less affected by periodontal disease.[4,5] Evidence suggests that the magnitude of canine tooth sexual dimorphism varied among different ethnic groups.[1,2] Furthermore it has been stated that the mandibular canine showed a

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greater degree of sexual dimorphism in their mesio-distal width amongst all teeth.[2,6] Despite its significance, little is known about the mandibular canine index, intercanine distance and its sexual dimorphism in Sri Lankans. Hence, the present study was undertaken to investigate whether dimorphism of permanent mandibular canine teeth as well as intercanine distance play a role in establishing gender identity in adults of the Sri Lankan population.

Material and methods

A total of forty five adult dry skulls consisting of 30 males and 15 females collected from the Department of Anatomy, Faculty of Medicine, University of Ruhuna, Sri Lanka, were used. Subjects only who had fully erupted mandibular canine teeth without aberration, erosion or any other defect affecting the morphology of the teeth were included. Skulls that showed malpositioning of teeth or lack of normal canine molar relationship were excluded.

The following parameters were recorded on both sides in males and females: mesio-distal width of the right mandibular canine, mesio-distal width of the left mandibular canine and inter-canine distance. The mesio-distal width of the mandibular canines was defined as the greatest width between the contact points of the teeth. The inter-canine distance was defined as the distance between the tips of right and left canines in the lower jaw. Using the above data right and left mandibular canine indices were calculated.[7] Right mandibular canine index = right mesio-distal width of mandibular canine/ inter-canine distance and left mandibular canine index = left mesio-distal width of mandibular canine/ inter-canine distance. All the measurements were obtained using a sliding caliper (Mitutoyo, Japan) capable of measuring to the nearest 0.01mm. The measurements were repeated thrice and the mean was taken for further analysis. Furthermore, the measurements were recorded by the same person to minimize the errors in methodology. Results were expressed as mean ± SD and analyzed using the Statistical Package for Social Sciences (SPSS), 15th version. A comparison of the mean values between sides and genders was performed using the t-test. P value < 0.05 was considered statistically significant.

Results

The mean values for left and right mandibular canine mesio-distal widths were significantly less ($P<0.05$) for females than for males (Table 1). The mean value for mandibular inter-canine distances for females were less than for males and the differences were statistically significant ($P<0.05$) (Table 1). The mesio-distal width of the mandibular canine was almost bilaterally symmetrical ($P>0.05$) in both the males and females (Table 1).

The mean value of inter-canine distance for females was less than that of males and the difference was statistically significant ($P<0.05$) (Table 1). The right and left mandibular canine indices were significantly higher in males than that of the females ($P<0.05$) (Table 1).

Discussion

The present study provides new data on the morphometry of mandibular canines and establishes the existence of sexual dimorphism in mandibular canines in this adult Sri Lankan population. Tooth morphology is known to be influenced by cultural, environmental and racial factors.[8] Patterns of geographical variation of the human skeleton are used to identify the ethnic groups or race or ancestry of an individual. Skeletal indicators of race focus primarily on skull and dental traits. Racial indicators of skull are both non-metric and metric traits, which include lengths and widths of skull features and population specific dental features.[9]

The dimensions of canine teeth were studied by several methods which include Moire's topography and Fourier's analysis and measurement of linear dimensions, such as mesio-distal width, bucco-lingual width and inciso-

cervical height.[1,2,7,10,11] The use of Moire's topography and Fourier's analysis were limited to small samples. On the other hand the measurements of linear dimensions of canine teeth were employed in larger population groups mainly because of the simplicity and reliability of the method. The findings of the present study indicate that the width of the right and left mandibular canines were bilaterally symmetrical, both in males and females. This is in agreement with the observations of previous studies.[1,12,13,14]

Evidence supports sexual dimorphism in tooth size among American black, European, Mongoloid, South and North Indians and Saudi and French populations.[12,13,14,15,16] Furthermore, the degree of sexual dimorphism of the mandibular canine width was shown to be more in Caucasians and Australian aborigines than in the Pima Indians and Tristanite population.[2] This study also points to statistically significant differences in mesio-distal width of the mandibular canine teeth between the genders.

The canine arch width of the mandible (inter-canine distance) was more in Sri Lankan males than in females and the difference was statistically significant. Our results are in agreement with the pervious observations.[1,11,15]

The present study establishes the impact of gender difference on the morphometry of the mandibular canines in an adult Sri Lankan population. It confirms that the inter-canine distance and mandibular canine index as a useful parameter in differentiating the sexes. The size of a tooth is determined by the Y chromosome by controlling the thickness of dentine whereas the X chromosome is thought to be responsible for the thickness of enamel.[2]

Conclusion

The data will be of immense medico-legal use in establishing personal identity of victims with bodies mutilated beyond recognition. However, further investigations on different age groups to substantiate these findings are needed. In the present study mandibular canine index was calculated and the gender differences were proven significant.

Table 1. Inter-canine distance, right and left mesio-distal canine width and right and left mandibular canine index in males and females ($P<0.05$).

Parameter	Male (mean and SD)	Female (mean and SD)
Inter canine distance	26.24 ± 1.02	25.09 ± 1.14
Right canine mesio-distal width	7.68 ± 0.16	6.26 ± 0.18
Left canine mesio-distal width	7.58 ± 0.19	6.24 ± 0.27
Right mandibular canine index	0.29 ± 0.01	0.24 ± 0.1
Left mandibular canine index	0.28 ± 0.01	0.24 ± 0.01

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SENSODYNE

What is Dentine Hypersensitivity?

Dentine hypersensitivity is a common condition characterized by short, sharp tooth pain.

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What causes Dentine Hypersensitivity?
Your teeth become hypersensitive when dentine - the inner, hard tissue of teeth - becomes uncovered, exposing the tooth's sensitive surface.

Dentine can be exposed by gum recession or enamel loss caused by:

* *Harsh tooth brushing*
* *Excessive flossing*
* *Intake of acidic food and drink*
* *Frequent vomiting*
* *Gum disease*
* *Previous dental work or*
* *The use of dental products with abrasive ingredients*

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Case Report

Sri Lanka Dental Journal 2009; 39(03) 73-77

Adenomatoid odontogenic tumour mimicking a periodontal intrabony defect: unusual case report

Santosh Patil, Nitin Kalla, D.N.S.V. Ramesh

Abstract

Adenomatoid odontogenic tumour (AOT) is relatively a rare odontogenic tumour seen in younger age group, with site predilection for anterior maxilla exhibiting female predominance. We herein report a rare case of AOT mimicking a periodontal intrabony defect in a young female, which was managed through conservative surgical approach with follow up results. This paper also highlights various clinical manifestations, histological features and management aspects of AOT.

Key words: Adenomatoid odontogenic tumour, odontogenic tumours, case report.

Introduction

Adenomatoid odontogenic tumour (AOT) was denominated as "cystic adamantoma" by Harbitz in 1915 and Stafne considered it as a distinct entity in 1948. Philipsen and Birn proposed the name adenomatoid odontogenic tumour in 1969 and suggested that it cannot be regarded as a variant of ameloblastoma because of its different behaviour.[1] This term was accepted by the WHO classification in 1971.[2] The lesion was initially referred to as adenoameloblastoma, ameloblastic adenomatoid tumour, glandular ameloblastoma, or adenomatoid ameloblastoma.[3] AOT comprises of only 0.1% tumours and cysts of jaws and constitutes about 3% of all odontogenic tumours.[4] The tumour predominantly occurs in anterior maxilla related to lateral incisor and canine region with female bias.[5] AOT occurs as peripheral and central variants, the central being of follicular (with embedded tooth) and extrafollicular types (with non embedded tooth). Out of all follicular variety is considered more common.[6] This article illustrates a case of AOT in the maxillary anterior region resembling a periodontal defect in a young female.

Case history

A sixteen year old girl reported with displacement of maxillary left lateral incisor. There was no correlating history of pain, swelling or trauma. Intraoral examination revealed full complement of teeth except the third molars. The maxillary left lateral incisor was displaced labially and gingiva related to the tooth was normal in appearance with no evidence of expansion of cortical plates. Deep defect was noted on the palatal aspect on periodontal probing (Figure 1). Radiographic examination revealed a well defined homogenous radiolucency with regular corticated borders distal to maxillary left lateral incisor, extending apically, causing displacement of the teeth contralaterally with no evidence of root

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resorption (Figure 2). The tumour was completely enucleated with thorough curettage of the region under local anaesthesia by raising a palatal flap. Histopathological examination revealed proliferating odontogenic cells arranged into duct like pattern, whorled masses and sheets. Amorphous eosinophilic material is seen between the cells. The intervening connective tissue is scanty and shows foci of calcification. Fibrous connective tissue capsule and areas of haemorrhage are seen in the periphery (Figure 3). Follow up conducted after six months revealed a healing postoperative defect (Figure 4) and at twelve months showed uneventful healing with radiographic evidence of defect resolution. There was no signs of recurrence (Figure 5,6).

Discussion

AOT is considered as a rare cause of jaw swelling, affecting more commonly the females than males with the ratio of 2:1.[7] In contrast, Chattopadhyay reported thirty cases of AOT from India in which he found male predominance.[8] AOT is more prevalent in young patients, especially during second decade of life.[9] The features as observed in our patient correlates with the data mentioned above. These tumours are usually asymptomatic, may cause cortical expansion, displacement of teeth and rarely root resorption.[2] Radiographically the lesion appears as a unilocular radiolucency, with occasional mild radioopaque foci. The origin of AOT is controversial, although few researchers consider this entity as hamartomatous proliferation of odontogenic tissues.[10] Majority of the authors believe that AOT originates from odontogenic tissues, as it occurs within the tooth bearing areas in association with teeth and having histological features similar to those of odontogenic components.[1]

Similar and consistent histological features have been observed in all the variants of AOT. It is described as a tumour of odontogenic epithelium with duct like structures and variable degree of inductive changes in connective tissue. The tumour is partly cystic however, in some cases the solid lesions may be present as masses in the wall of a large cyst. Pools of amyloid like material and globular masses of calcified material have been noted as components of AOT.[5] The features seen in our case were consistent with those reported in the literature. Immuno-histological studies of the lesion shows expression of the keratin and vimentin in the tumour cells at the periphery of the ductal, tubular or whorled structures along with small mineralized foci of amelogenin and enamelin found in the tumor cells and in hyaline droplets.[2]

Encapsulation and benign biological behaviour point towards conservative surgical treatment or curettage as the treatment of choice, with minimal chances of recurrence.[9] Keeping these aspects in view, our case was managed in the similar way which yielded remarkable results.

Conclusion

Only few cases of AOT resembling periodontal bone defect have been reported in the literature. The report described here was a case of extra follicular variant of AOT, which is managed through conservative intervention with positive outcome. We conclude that AOT should be considered in the differential diagnosis of various jaw lesions of odontogenic origin.

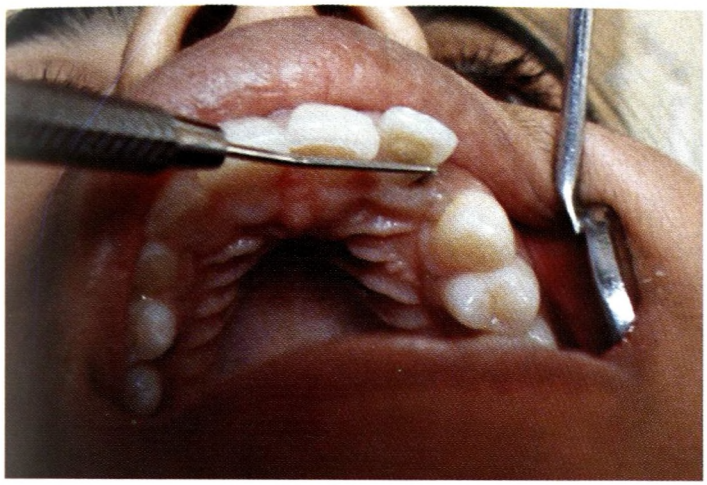

Figure 1. Deep palatal pocket

Figure 2. Preoperative IOPA radiograph shows well defined deep palatal defect

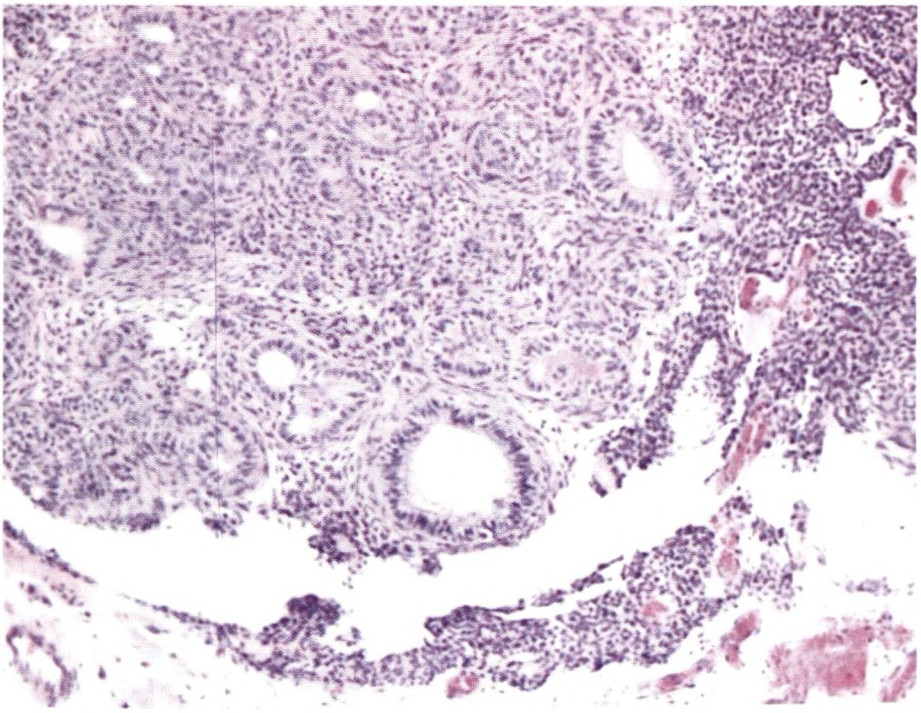

Figure 3. Photo micrograph (X 10) showing proliferating odontogenic cells arranged in duct like pattern, eosinophilic amorphous material and fibrous capsule.

Figure 4. Postoperative IOPA radiograph (Six months after surgery)

Figure 5. Postoperative IOPA radiograph (Twelve months after surgery)

Figure 6. Occlusal radiograph showing uneventful healing

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Sri Lanka Dental Journal 2009; 39(03) 78

Self Assessment - Oral Diagnosis (SAOD)

The specimen shows carious lower first molars extracted from a 20 year old male.

1. What is your diagnosis?
   a. Taurodontism
   b. Macrodontia
   c. Fusion
   d. Hypercementosis
   e. Turner's tooth

2. At which stage of tooth development does this abnormality occur?
   a. Bud stage
   b. Cap stage
   c. Early bell stage
   d. Late bell stage
   d. Maturation

3. Indicate the surgical/restorative procedures in which difficulties may occur due to above condition
   a. Root canal treatment
   b. Root surface debridement
   c. Tooth extraction
   d. Crown preparation for advanced restorative procedures
   e. Restoration of a Class 1 cavity

4. What are the other syndromes/diseases associated with the above condition?
   a. Amelogenesis imperfecta
   b. Klinefelter syndrome
   c. Gardner syndrome
   d. Cowden syndrome
   e. Sturge-Weber syndrome

Answers

1. a
2. c
3. a, d, e
4. a, b

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