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                              Editor, Academic Committee

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EDITORIAL

Enamel and Dentine Bonding Systems - Past, Present and Future

The prime objective of the dentistry is to keep the dental arch in a healthy functional state. All the various disciplines of Dental science have been thriving to uphold this objective. In addition, the conservative of tooth structure especially those which were damaged by carious lesions and other causes has been advocated. Therefore the preparation of tooth by minimal invasive technique for restoration has been the main purpose of the conservative dentistry. One of the aids to achieve this minimal invasive technique is the invention of adhesive dental technique. The adhesion of restorative material to tooth structure is either through chemical adhesion or micromechanical adhesion. The success of restoration depends largely on the principles of bonding and the bonding agent used. In recent years adhesive dentistry has progressed at a tremendous rate and we have seen transition from first generation to seventh generation, namely, from three steps multi-components systems to two steps self priming and self etching adhesive, to simplified one bottle adhesive system. This recent technique enables the dentists to etch, prime and bond simultaneously. Dental adhesive have become more user-friendly and less technique sensitive.

As the first-generation dentine bonding system, numerous dentine adhesive with complex chemical formulas were designed and developed with the objective of promoting chemical adhesion. However the bond strengths attained with this system were only 2 to 3 MPa. Then the second-generation adhesives were developed based on phosphorous esters of methacrylate derivatives in which the adhesive mechanism involved ionic interaction between phosphate groups and calcium. These products had modest bond strengths, seldom exceeding 5 to 6 MPa, and the clinical results were still poor due to the fact that their primary bonding was to the smear layer rather than to the underlying dentine.

The development of third-generation adhesives was based on total-etch concept when the Japanese philosophy of etching dentine to remove the smear layer postulated that the etched dentine would provide micromechanical retention for the resin composite restoratives. In the systems of this generation, the use of hydrophilic monomer in both etching agents and adhesive resin enabled more consistent and durable results.

Significant advances in adhesive dentistry were made with the development of the multistep dentine adhesive systems, which are also known as fourth-generation adhesives. The systems of this generation are still in wide use to day, and their application steps basically include conditioning, priming, and application of adhesive resin. With the multi-step application procedure for the fourth-generation adhesives, the term bonding agent was replaced by the term adhesive system.

Because of the complexity and number of steps or compound involved with the fourth-generation systems, researchers and manufacturers have worked to develop simpler adhesive systems by reducing application steps with fewer bottles. As clinical testing and improvement of these systems continue to develop, fifth-, sixth-, and seventh-generation adhesive systems have come to evolve in adhesive dentistry. The fifth-generation bonding systems, namely self-priming and self-etching systems, appears to have fewer steps than fourth-generations, but their bond strengths are comparable to those of fourth-generation systems.

In sixth-generation adhesives, the components of the systems are manufactured in multi-components, either two or three separate containers, and the contents of the components are mixed prior to application. But in the seventh-generation adhesives, the systems are manufactured in single component, and they are self-etching, self-priming, and no mixing is required. Moreover, it is said to be moisture independent and its bond strength to dentine is recorded as 18-25 MPA.

Despite these developments and drastic changes in the composition and principles and concepts of adhesion, there are some difference of opinions amongst the dental practitioners as to which type of bonding system (generation) is the most effective and reliable one.

One of the problems with these bonding systems is postoperative dentine sensitivity after restoration with composite material. Patients sometimes complain of inability to chew on either side of the mouth because of extreme sensitivity in the restored tooth. Sadly, researches on dentine bonding system focus mainly on bonding strength to dentine and enamel, rather than means to reduce dentine sensitivity. Some of the reports are based on research done by "person or company paying for the research".

Practitioner should be wary of information given out by commercial company, a non referred dental literature, described as *infomercial*. If the clinician decisions are based on this type of dental *infomercial*, our patients will not get the best and appropriate treatment. Therefore it is most important to the dental surgeons to be aware of the existence of the evidence-based dentistry which provides a coherent approach to the information needs of the clinician and thereby improves clinical judgement and skill and provides the best quality care for the patients.

Some of the practicing dentists have resorted to use the fourth generation bonding systems and they had found it to be most successful and give a satisfactory result, if meticulous care is taking to follow the manufacture's specifications stringently. Is this a good phenomenon? What is the future of bonding system after the present seventh generation? Some clinicians and researchers speculated that there will be improved changes in the composition as well as in the bonding mechanism. Bonding mechanism could be both chemical as well as micromechanical adhesion, resulting in bonding system with increased bond strength to enamel and dentine. They could also possibly have an anticariogenic property by inclusion of free fluoride ions. This would be also of an advantage because most of the restorative materials show microleakages at one time or other. Are we going to see a "merry-go-round" concerning the bonding system?

The future dental surgeons must be well informed and rely on his or her clinical experiences and other circumstances such as patient characteristics and/or preferences in making all clinical decisions.

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Contents

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Diagnostic Flowcharts of Oral Mucosal Lesions

Complied by

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White or White and Red Spots and Plaques

These lesions must be differentiated from the papillary-verrucous lesions, whose appearance is often white or white and red, is shown in this section and for which there is a different flowchart. If it has been established that the lesions are non-papillary-verrucous then the first question would be:

Figure 1
Clinical aspect of **thrush**.

Figure 2
The same patient after the removal of the **white patches** with gauze.

Single White Spot or Single White Plaque

Note

A plaque is flatter than a papillaryverrucous lesion ands its surface presents a flat/irregular appearance.

Figure 3

A **white macule** is a flat lesion simply reflecting a change of the mucosal colour; it may be smooth or finely granular in texture.

Figure 4

A white **plaque** is a thickened lesion (thickness ranging from 1 or few millimeters) with a slightly wavy surface, which is usually rough, at times crossed by lines. It can be a few millimetres or many centimetres wide, it varies.

Multiple White Spots and Multiple White Plaques

Figure 5

The **white sports** are similar to those described earlier on but spread over one area or several or the whole mucous membrane.

Figure 6

The **papules (1)** are round white lesion, of small diameter and quite numerous that tend to merge thus creating multiform geometric patterns. Amongst which **white stripes (2)** or the actual **plaques (3)** do stand out clearly.

White and Red Spots and Plaques

Figure 7

These are uaually restricted to one area (e.g the edge of the tongue, one of the buccal mucosa, the anterior floor of the mouth), and they are made of **single white plaques,** although often **multiple,** surrounded by red spots.

Note

Consider them carefully because this is one of the most frequent appearances of early oral cancer.

Figure 8

Another possible aspect is papules, plaques and white stripes associated to multiple red spots, spread over the mucosa or just over the buccal mucosa symmetrically (see **a** and **b**). As it will be obvious from following the diagnostic flowchart, this is the typical appearance of lichen.
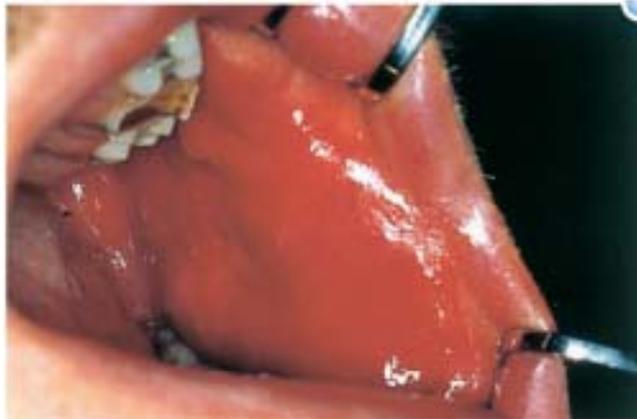
Red Lesions

These lesions are defined by the change of the mucosa, which turns red. An important feature of all these lesions is the epithelium being intact.

Generalised erythema, echymoses and petechiae

Figure 9

Generalised erythema is great areas of redness in the oral mucosa that could be spread to all oral sites as in this case.

Figure 10

Generalised erythema may well be localised in one area, such as the gums as it is the case here.

Figure 11

The **ecchymoses** and **petechlae** are small and widespread red lesions caused by haemorrchage in the mucous membranes. They tend to change colour over time. The difference with small haemangiomas, for which they might be mistaken, is that those do not disappear with vitropression.

Locallsed Red Spots (Single or Multiple)

These are localised and distinguished only by the alteration of colour (genuine spots). If they are slightly on relief (red plaques) or depressed (atrophic), they have the same significance.

Occupational Hazards in Dentistry

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Occupational Hazard

Occupational hazard can be defined as a risk to a person usually arising out of employment. It can also refer to a work, material, substance, process, or situation that predisposes, or itself causes accidents or disease, at a work place. The history of occupational hazard awareness can be traced back to the 18th century when **Bernadino Ramazzini,** who is referred to as the father of occupational medicine, recognized the role of occupation in the dynamics of health and diseases and published his systematic study of occupational disease in a book in 1713 entitled, "*De Morbis Artificum Diatriba,*" (The Diseases of Workmen) in which he recognized three principal causes of occupational hazards. These would now be referred to as repetitive "*strain injuries*" and include:

- A fixed working posture
- A continuous repetitive motion
- Psychological stress

Many occupations involve exposure to special and peculiar hazards. The most pernicious are not those where the effects appear immediately, as in accidents, but rather those that run an insidious course over a period of years. As clinical dental personnel adapt to the workplace and rutine functions over a long period of time, they are exposed to potential hazards with the constant handling of potentially dangerous materials and working in a potentially polluted atmosphere. Being unaware of the potential hazards in the work environment makes dental care professionals more vulnerable to injury. A worker's safety may be severely jeopardized if adequate safety measures are not taken.

Health risks in dentistry may arise as new technologies and materials are developed. However, once identified and recognized as risk, new guidelines, precautions, and protocols are often rapidly instituted to greatly reduce or even eliminate the occupational hazard. A good example is the WHO/FDI consesus statement on dental amalgam. In a survey carried out on the health of dentists in the United Kingdom and United States of America, it was found the most common manifestation of organic disease among this group included backache, hemorrhoids, chronic indigestion, and disease of the circulatory systems. These maladies tend to occur in larger percentages among this group than in the general population.

Although identification of risks to dental health-care workers has been explored in several industrialized nations, very little data is available from developing countries. The practice of dentistry exposes dental professionals to a variety of work-related hazards. These include:

❖ Working long hours at a high level of concentration

❖ Working in a sedentary state

❖ Working with anxious patients

❖ Exposure to microbial aerosols generated by high-speed rotary hand pieces

❖ Exposure to various chemicals used in clinical dental practice

❖ Other hazards

These hazards can pose significant risks to dental practitioners. The occupational hazards found among dentists and other clinical dental workers are similar worldwide and include a wide range of risks and sometimes even legal hazards. The source of these hazards is the work environment which can include physical, chemical, biological, mechanical, ergonomic, legal and social aspects.

Physical Hazards

The dentists and the clinical staffs are at risk of physical injuries during many dental procedures. Sources of physical injury can include debris from the oral cavity striking the eyes, cuts from sharp instruments, or puncture wounds from needles or other sharp instruments.

Such injuries can result in the transmission of serious infectious disease to the dental worker. Needle stick injuries and cuts from sharp objects and instruments (percutaneous injuries) have been reported in 1-15% of surgical procedures mostly associated with suturing. In the United States more than 800,000 needle stick injuries occur each year despite continuing education and efforts to prevent them. Eye injuries may occur from projectiles such as bits of calculus during scaling procedures and splatters from body fluids (bacterial and viral aerosols) while using high-speed hand pieces. Another potential source of eye injury is the intense dental curing light. Users of dental curing lights should be advised to employ protective eye-wear during use.

Chemical Harzards

The chemical environment is one of the most rapidly expanding components of the work environment because new chemicals and solutions are being introduced regularly. Many of these chemicals are among those whose health effects may not be known and may pose health problems taking years to manifest. Many biomaterials and auxiliary products used in dentistry are chemically reactive. Hazardous chemical agents used in clinical dentistry include mercury, methyl methacrylate, electroplating chemicals, metals such as beryllium, chromium, cobalt and nickel, chemical sterilants, silica

dust, powdered natural rubber latex (NRL), disinfectants, and nitrous oxide (N_2O).

By far the most important and most dangerous of these agents is mercury. Its use in dental amalgam has the potential for continuous occupational exposure of a dental practitioner to mercurial vapor which can be absorbed via the skin and the lungs. The active component in the mercurial vapor has a particular affinity for brain tissue. Mercury poisoning can be characterized by tumors of the face, arms, or legs and can also be associated with progressive, tremulous illegible handwriting and slurred speech. The exposure risks for mercury can be minimized by careful handling procedures. Methyl methacrylate are used in making dentures and plates, it can be absorbed into the body by inhalation, through the skin, and by ingestion. It is irritating to the eyes, skin, and repiratory tract. Repeated and prolonged exposure can cause skin sensitization and asthma, as well as adverse effects on the nervous system. The process of electroplating can release hazardous contaminants into the air that pose a variety of risks to the dental lab worker. The contaminants include various acid and alkaline mists that can cause respiratory and skin problems.

Metals such as beryllium, chromium, cobalt, and nickel in alloys used for castings of bridge framework and other dental prosthesis components can cause a variety of lung problems. Chemical sterilants are used to sterilize impressions and prosthetic devices, received from detanl offices, contaminated with blood and saliva. Sterilant chemicals include aldehydes, phenols, and quaternary ammonium compounds. These chemicals may cause lung problems and dermatitis. Sometimes dental personnel can get exposure to beryllium, which can cause chronic beryllim disease (CBD), a debilitating and often fatal lung disease, or lung cancer. Inhaling Beryllium dust at some concentrations is extremely hazardous-sometimes deadly. The dental lab technicians are continuing to contract the disease associated with Bery llium exposure. Dental laboratory technicians can develop CBD may develop within months after initial exposure to beryllium or may have a very slow onset and not develop until years exposure to beryllium has occurred. Not all dental alloys contain beryllium.

Silica dust may cause silicosis. Silica content in porcelain varies and its exposure can occur when mixing porcelian powders or when grinding or polishing dried porcelain material. Moreover exposure can also occur when mixing investment materials and during divestment of castings. Investment materials often contain large amounts of cristobalite which is a very toxic form of crystalline silica. Silicosis is a disabling and incurable lung disease. However, it is preventable! Silicos is caused by breathing

in fine dust containing crystalline silica. once in the lungs, this dust causes damage that stops the body from using oxygen properly. Breathing in dust containing cry stalline silica has been linked to other diseases such as tuberculosis, kidney disease, and lung cancer. Silicosis begins with few, if any, symptoms. Once in the lungs, this dust causes damage that stops the body from using oxygen properly. Breating in dust containing crystalline silica has been linked to other diseases such as tuberculosis, kidney disease, and lung cancer. Silicosis begins with few, if any, symptoms. Once present, these symptoms can include shortness of breath, severe cough, wheezing, and chest tightness. Silicosis can get wore even after exposure has stopped. In the case of silicosis, disease symptoms and clinical signs are usually delayed. They may not show up for as many as 20 years after the first exposure. If you think you have been exposed or begin to notice symptoms such as cough and shortness of breath.

The continued use of powdered NRL gloves and disinfectants has predisposed clinical dental workers to hand dermatitis, contact urticaria, and allergic dermatitis. The most serious potential hazard associated with the continued use of powdered NRL gloves in dental practice is latex sensitization caused by exposure to aerosolized NRL protein. This can result in dermatitis on the hands. This occurs with such frequency that it is now recognized as an occupational hazard in dentistry, and many dental offices have had to stop using latex materials such as gloves and rubber dams. In recent studies, the frequency of occupational related dermatosis varied from 21% to 43% depending on the prevailing material used in the various specialties.

Transient irritative reactions of the eyes and air ways have been observed mostly associated with exposure to volatiles from resin based materials, X-ray chemicals, and cleansers. These include procine, soaps, eugenol, iodine, formalin, phenol, and other disinfectants. More reactions to methyl metacrylate monomer and elastomeric impression materials have been described and are the focus of intensive research. Although N_2O was for many years believed to have no toxicity other than that associated with its anaesthetic actions, the neurological abnormalities in healthcare workers chronically exposed to N_2O have disproved this notion. Retrospective surveys of dental and medical personnel have linked occupational exposure to N_2O with a number of health problems and reproductive derangements. Thus, adequate pollution control mechanisms in accordance with the Federation Dentaire Internationale (FDI) should be adopted.

Biological (Cross-Infection) Hazards

Dentistry is unique in that clinical staffs are in direct or indirect contact with traumatized tissues, saliva, and blood on a daily basis. All members of the dental

team are at risk of exposure to Hepatitis B virus (HBV), HIV infection, and other types of communicable infections. In the United Kingdom for example, the carrier rate HBV in the general population is 0.5%, while dentsist have a carrier rate of approximately 1.6%. Several of the common viral agents that can cause hepatitis have been detected in body fluids including saliva and blood. The viruses most commonly implicated include hepatitis A Virus (HAV), HBV, and hepatitis C. These blood borne pathogens can occur when handling impressions and other items if contaminated with blood or saliva. In a study done by Watt HIV/AIDS was believed to be very similar to eye injury and mercurial poisoning in terms of concern amongst dental personnel.

Ergonomic Hazards

Some hazards arise from poorly designed job tasks and working environment. Any of those conditions can cause ergonomic hazards such as excessive vibration and noise, eye strain, repetitive motions or constant positions and heavy force using problems. Improperly designed tools, equipments and working environment also can be ergonomic hazards. Noise produced from grinding, sandblasting, and other dental lab machinery can make noise that may cause hearing loss. Repetitive motion disorders might cause a range of injuries to the

muscles, tendons, nerves, ligaments and joints of arms, hands, wrists, shoulders, neck, and upper back. These injuries result from damage to the body over a period of time. If not treated they can result in chronic pain and permanent disability. The most common injuries reportedly experienced by the dental hygienist are musculoskeletal in nature. The need to work in a fixed work position using a continuous repetitive motion can predispose the clinical dental worker to wrist ache, lower backache, and neck ache.

Legal Hazards

In every country there relevant states ad regulations which apply to the practice of dentistry. The contra vention of any of these may warrant that legal actions be brought against a dental practitioner particularly in developed countries where the citizens appear more aware of their rights. To help assure a safe work environment in citizens appear more aware of their rights. To help assure a safe work environement in dental treatment, the hazard awareness and prevention of legal should be made known to all clinical workers of the dental hospital.

Prevention

Education is one of the important strategies for the prevention of occupational injuries and diseases. The role of one's occupation as an important

factor in maintaing personal health needs to be constantly emphasized so workers understand any possible negative health implications of their jobs and how to minimize them. It was also discovered the majority of the respondents were without health insurance to insurance to protect them from financial loss in the event of a job-related injury or health condition. Although the majority of the participants were aware they were at risk for exposure to injuries from sharps, and hepatitis B infection, not all of them were vaccinated against Hepatitis B infection despite the high risk to the entire dental team.

The use of protective eyewear is an important means of preventing occupational injury related to the use of dental curing lights and high-speed rotary instruments. Injury from spalatters and projectiles including calculus and flying debris during cavity preparation is a common cause of damage to the eyes, and the use of protective eyewear should be emphasized. The cross infection control mechanisms employed by the majority of the clinical staff include ensuring all instruments are sterilized before they used, changing gloves between patients, use of facemasks, and hand washing before and after gloving.

The preventive measures provided by the FDI against mercurial poisoning are advisable to conduct regular mercury vapor level assessments in clinical settings; receive episodic individual amalgam blood level tests; and use goggles, water spray, and suction during the removal of old amalgam restorations. Therefore, recommended regular workshops and seminars on occupational hazards are organized for all clinical dental staff periodically to update their knowledge and, hopefully, influece their work practices. More effort should be made by management officials to educate the staff about the importance of Hepatitis B vaccination. All staff members should also be alerted to the danger of chronic mercurial poisoning and its prevention.

There is no known medical treatment to reverse silicosis or stop its progress. This dise can only be prevented by controlling exposure to silica dust. Workers who have been exposed to silica should stop smoking to reduce their risk of developing lung cancer. Cleaning and maintenance involve cleaning dusts that contain silica pose a major hazard if dust is raised. The same is true when maintaining local exhaust ventilation or dust collection systems. Subsitution ideal mehod to stop exposure is to eliminate materials containing cry stalline silica. This method is most feasible for sandblasting metals. The worker should wear a respirator when other control methods are missing or do not work. The type of respirator recommended is, at a minimum, a half-mask air-purifying resirator with type N-100 particulate filters. Good housekeeping such as wet

wiping, wet moping, and vacuuming with a HEPA vacuum are recommended. Dry sweeping, dry dusting, use of compressed air, and use of ordinary vacuum cleaners should be avoided because they reintroduce the dust into the air. The dental professionals who have exposure to silica should have medical exmainations especially respiratory system including pulmonary function tests and chest X-ray. A skin test for tuberculosis is also recommended because people with silicosis are more susceptible to this disease. Ergonomic hazards are avoided primarily by the effective or better design of instruments, equipments and working areas.

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Oral Health and the Quality of life Among Elderly Citizens of Old Folks Home in Yangon, Myanmar

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Abstract

OBJECTIVES: To assess the oral health status and oral health related quality of life in institutionalized Myanmar senior citizens by using the Oral Health Impact Profile (OHIP) 14 item versions. METHODS: In this cross sectional study data was collected among 100 elderly aged 65 years and over residing at Hinn Si Gone Old Aged Home during November and December 2006. The oral examination was performed to record dental caries experience and periodontal condition using the World Health Organization criteria. Denture wearing status was recorded by enquiring the subject's perception and denture cleanliness was observed visually. Oral Health Related Quality of Life (OHRQOL) was measured with the 14-items short form of the oral health impact profile (OHIP) by face to face interview. RESULTS : The mean number of decay teeth and missing teeth were 3.5 (SD 3.78) and 13.7 (SD 8.95) respectively. Only 4.9% of participants had healthy gingivae, 49.4% had calculus deposition and 35.8% had periodontal pocket of 4-5mm depth. Persons with remaining teeth more than 20 were 40%. Nineteen percent of participants were edentulous and 2 persons were not wearing denture. Most of the participants had high percentage in OHIP score 0 at domains of functional limitation; psychological discomfort, social disability and handicap. Fifty-seven percent had no pain and aching due to teeth, mouth and dentures and 53% were free of discomfort in eating. The OHRQOL was not related with number of remaining teeth and denture wearing. CONCLUSION : These results suggest that the number of remaining teeth and denture is not associated with OHRQOL Myanmar institutionalized elders and their oral health has low impact on quality of life.

Introduction

Geriatric population is the most rapidly growing segment of the population. Old age has been described as a 'season of losses'[1]. It is not only the time of losses of spouse, friends, job identity and income but also the loss of physical fitness. Both physiological changes and pathological changes in all organs and systems cause the old people disability or discomfort in performing the activities involved with daily life. In spite of this, today people live longer than at any other time in the history due to tremendously advance in medical technology and medical care. As people live longer, more dental problem will be experienced because the dentition is longer at risk.

Age changes and disease conditions in oral cavity deteriorate the elders' oral health. Globally, poor oral health amongst older people has been particularly evident in high levels of tooth loss, dental caries, and high prevalence of periodontal disease, xerostomia, oral precancerous lesions and oral cancer[2]. Additionally, a number of studies are showing that oral disorders can have a significant impact on the functional, social and psychological well-being of older adults[3].

Various oral conditions, including extensive tooth loss, failure to replace the missing teeth, poorly fitting prostheses, pain and discomfort are the cause of masticatory inefficiency and inadequate nutritional status in old people. Moreover, these conditions can affect the elderly people's speech function as well. Deterioration of dentition and unsightly dentures are also the facts of affecting the person's appearance and self-esteem. Subsequently, functional, psychological factors and pain /discomfort might have an effect on the social aspects such as intimacy; communication and social interactions.

Hence, it is suggested that health-related Quality of Life (QOL) be defined as a person's assessment of how

(i) functional factors

(ii) psychological factors,

(iii) social factors and

(iv) the experience of pain and discomfort affecting the person's quality of life[4].

Oral health-related quality of life (OHRQOL) measures are developed and used in research on various groups identified with poor OHRQOL including aging populations. Gift et al indicated that an OHRQOL research approach benefits

1) clinical practitioners in selecting treatments and monitoring patient outcomes;

2) researchers in identifying determinants of health, tracking levels of health risk factors, and determining use of services in populations; and

3) policy-makers in establishing program and institutional priorities, policies and funding decisions[5].

People's perceptions of the social impact of oral disorders on their well-being are measured by The Oral Health Impact

Profile (OHIP) questionnaire [6] which consisted of 49 items. From it Slade derived a subset (OHIP-14) questionnaire and its validity was evaluated [7]. Studies had shown that OHIP-14 is a valid and reliable instrument to measure oral health related quality of life in older adults [8, 9]. Soe et al used the OHIP-14 in assessing the oral impacts of 14 years old Myanmar students and suggested that it is a useful instrument to discriminate between groups with and without impacts in population surveys [10].

Information on the oral health of institutionalized elderly populations in a number of countries is available but, no data is available or published on the institutionalized Myanmar elderly population of Yangon Hnin Si Gone old aged home. This old aged home is located in Capital City of Myanmar, Yangon, and is funded by government. This Institute accepts elderly aged 65 and above from various part of the country who do not have relatives or anyone to take care for them.

This study was carried out to identify the oral health status and oral health related quality of life in institutionalized senior citizens at the Hnin Si Gone Old Aged Home.

Methodology

This is a cross-sectional study involving clinical oral examinations and face-to-face interviews with 65 years old and above residents at the Hnin Si Gone Old Aged Home in November to December 2005. Each participant gave written informed consent prior to enrolment. After excluding the seriously ill elders, a population totaling 100 of elderly residents participated in the study.

Data Collection

Demographic variables (age, gender, education and occupation before institutionalized) were recorded prior to clinical examination. Oral examination was carried out in the dental clinic of the Institution by one examiner. Dental caries status was examined following WHO criteria [11] and recorded by using Decayed, Missing, and Filled Teeth (DMFT) index, and periodontal status was recorded using Community Periodontal Treatment Needs (CPITN) index [11]. Oral examination also registered the present number of teeth and presence or absence of prosthesis including prostheses for edentulous and partially dentate subjects. After the clinical examination the elderly were interviewed about the impact of oral health on life quality by using 14-item Oral Health Impact Profile measure (OHIP-14).

OHIP-14

The questionnaire was translated into Myanmar language. The translation was then revised and was back- translated to English by candidates who had never seen the original version of the OHIP. The back translation and original version of OHIP were then compared in order to identify conceptual difference. The four quality of

life dimensions and the subjects of the questions were:

1) Functional limitation : trouble pronouncing words, affecting taste.

2) Pain and discomfort : painful aching, uncomfortable to eat, been self conscious.

3) Disability : unsatisfactory in the way diet consumed, interrupted meals, difficult to relax, embarrassed, irritable, difficulty doing jobs.

4) Handicap : unsatisfied with life, unable to function. The subjects were asked how often they had experienced each impact during the last 12 months. Responses were made on Likert-type scale (0) = never, (1) = hardly ever, (2) = occasionally, (3) = fairly often, and (4) = very often. The percentage of OHIP scores were calculated by a simple count method and overall score was calculated by summing response of all 14 items.

Data Analysis

Data were entered and analyzed using SPSS 12.0.1 for Windows (SPSS Inc., 2003)[12]. Variables were described using mean and standard deviation (SD) or median and interquartile range (IQR) for numerical variables. For categorical variables, frequency and percentage were used to describe. Independent t test was used to compare means for those normally distributed data.

Results

Demographic variable of the study population was shown in Table 1.

Table 1

Demographic Characteristics of 100 Elderly

Variables	n (%)
Gender	
Male	53 (53.0)
Female	47 (47.0)
Race	
Myanmar	93 (93.0)
Other ethnic	6 (6.0)
Highest education level	
Primary school	44 (44.0)
Junior high school	25 (25.0)
High school	18 (18.0)
College	5 (5.0)
Illiterate	8 (8.0)
Age (year)	81.21 (5.99) [a]

[a] Mean (SD)

Teeth Count and Denture Wearing Status

Among 100 participants 19 elderly were edentulous and the rest 81 were dentate. Three participants still possess full 32 teeth of set. Among partially dentate and edentulous subjects 24% of them were denture wearers. Table 2 shows the dentition status of the study population. Among the full denture wearers 58.8% of their dentures were found to be cleaned and the denture hygiene of 41.2% were poor. The denture hygiene status of all removable partial dentures was found to be fair.

Table 2

Teeth Count and Denture Wearing Status

Variable	*n* (%)
Dentition status	
1 – 10 teeth	18 (18.0)
11 -19 teeth	23 (23.0)
$\geq$ 20 teeth	40 (40.0)
edentulous	19 (19.0)
Denture wearing status	
Partial denture wearer [a] (n = 81)	6 (7.4)
A single partial denture (n = 81)	1 (1.2)
Full denture wearer [a]	17 (89.5)
Edentulous without denture	2 (10.5)
Fixed prosthesis (n = 81)	4 (4.9)

[a] both upper and lower

Perception on their Denture

Total 24 removable denture wearers were asked whether they satisfy their dentures. Within the denture wearer, 10 (41.7%) were happy with their dentures and 14 (58.3%) of them were not satisfied with their dentures for various reasons. The frequency of the reasons for not satisfying the denture was shown in Table 3.

Table 3
Reasons of Unsatisfied Denture in Participants

Reasons of not satisfying the denture	n (%)
Loosening of denture	6 (46.6%)
Not able to speak properly with dentures	5 (38.5%)
Not able to chew properly with dentures	3 (22.1%)
Total	**14 (100.0%)**

Dental Caries Status

Among dentate subjects mean number of decay teeth and missing teeth were 3.5 (SD 3.78) and 13.7 (SD 8.95) respectively. Decayed teeth were left untreated and no filled teeth were detected in the subjects.

Periodontal Condition

Dentate subjects who had healthy gingival (CPI score 0) was 4.93%. Subjects with calculus deposition were 49.4% and having pocket depth 4-5 mm were 35.8%.

Oral Health Impact Profile

While asking the problems with teeth, mouth and dentures by using the OHIIP 14 items, more than 90% of elders had never felt tense, self conscious, embarrassed, irritable with other people, difficult doing usual jobs, unable to function and had never felt that life was less satisfying because of problems in the teeth, mouth and dentures. All most none of them were handicapped because of oral problems. Less than 20% had trouble pronouncing word, and taste changes. However, nearly half of the elders had physical pain specifically, painful aching (43%) and uncomfortable to eat any foods (47%) with the range of hardly ever to very often. Only 1% had claimed to be very often. More than 76% of elderly were free from functional limitations, physical and psychological disability and less than 30% were unsatisfied with diet and interrupted meals due to teeth mouth and denture problems. Detail distribution of responses was shown in Table 4.

Table 4
Distribution of OHIP Items

0 =never, 1 = hardly ever,   2 = occasionally,   3 = fairly often,   4 = very often

Item	Description of items	Distribution of responses %				
	How often in the last year have you had problem with your teeth mouth and dentures?	**0**	**1**	**2**	**3**	**4**
OHIP 1	Have you had <u>trouble pronouncing any word</u> because of problems with your teeth, mouth or dentures?	80	5	11	3	1
OHIP 2	Have you felt that your <u>sense of taste</u> has worsened because of problems with your teeth, mouth or dentures?	82	8	8	2	0
OHIP 3	Have you had <u>painful aching</u> in your mouth?	57	21	18	3	1
OHIP 4	Have you found it <u>uncomfortable to eat any foods</u> because of problems with your teeth, mouth or dentures?	53	15	24	7	1
OHIP 5	Have you felt <u>self conscious</u> because of problems with your teeth, mouth or dentures?	91	5	3	1	0
OHIP 6	Have you <u>felt tense</u> because of problems with our teeth, mouth or dentures?	92	6	1	1	0
OHIP 7	Has your <u>diet been unsatisfied</u> because of problems with your teeth, mouth or dentures?	71	18	10	1	0
OHIP 8	Have you had to <u>interrupt meals</u> because of problems with your teeth, mouth or dentures?	76	13	6	5	0
OHIP 9	Have you found is <u>difficult to relax</u> because of problems with your teeth, mouth or dentures?	83	12	5	0	0
OHIP 10	Have you been <u>a bit embarrassed</u> because of problems with your teeth, mouth or dentures?	96	4	0	0	0
OHIP 11	Have you been <u>a bit irritable with other people</u> because of problems with your teeth, mouth or dentures?	97	1	2	0	0
OHIP 12	Have you had <u>difficult doing your usual jobs</u> because of problems with your teeth, mouth or dentures?	92	2	4	1	1
OHIP 13	Have you felt that <u>life in general was less satisfying</u> because of problems with your teeth, mouth or dentures?	91	1	5	3	0
OHIP 14	Have you been <u>totally unable to function</u> because of problems with your teeth, mouth or dentures?	99	0	1	0	0

Edentulous and Dentate Relation to OHIP

The relation of mean OHIP score among dentate and edentulous subjects and between subjects who had teeth more than 20 and who had less than 20 were tested by **independent t test.** We found out that OHIP score was not associated with remaining functional teeth (P = 0.704) and dentate or edentulism (P = 0.458) (Table 5, Table 6).

Table 5

Comparing Total OHIP Score between Subjects with 20 and More Teeth and Subjects with less than 20 teeth.

Variable	Teeth count ≥ 20 (n = 40) Mean (SD)	Teeth count < 20 (n = 60) Mean (SD)	Mean differ (95% CI)	t statistic (df)	P value
Total OHIP score	0.28 (0.75)	0.33 (0.75)	0.06 (-0.2, 0.4)	0.4 (98)	0.704

Table 6

Comparing Total OHIP Score Between Dentate and Edentulous Subjects

Variable	Edentulous (n = 19) Mean (SD)	Dentate (n = 81) Mean (SD)	Mean differ. (95% CI)	t statistic (df)	P value
Total OHIP score	0.47 (1.12)	0.27 (0.63)	0.2 (-0.3,0.7)	0.76 (21)[a]	0.458

[a] population variance were significantly different (Levene's test *P* value = 0.026), therefore *t'* test/statistic without assuming equal variance was used

Discussion

Despite the improvements in treatment and preventive programmes in developing countries partial and complete tooth loss are still substantial. The data from World Health Organization Division of Non-Communicable Diseases/Oral Health had shown that the high prevalence of edentulous population of over 65 year olds in Portugal was 70% in 2000. In our neighbouring countries such as China, India and Thailand the prevalence of edentulism among over 65 year were 10.5%, 19.4% and 16.3% respectively[13]. Similarly the present study showed 19% of edentulousness among the elderly of Hinn Si Gone Old Folks Home. It is well established as functional dentition is measured by presence of at least 20 natural teeth. Unfortunately, most of the partially edentulous subjects in this study remained without removable partial denture and two edentulous elderly did not wear denture.

Denture stability, masticatory and speech efficacy are the main obligatory for dentures though, the denture wearers in this study were having these problems. People who have ill-fitting prostheses, those who need dentures but do not have them are at an increased risk of experiencing malnutrition[14]. In addition, denture-related lesions such as denture hyperplasia and traumatic ulcer are frequent in persons with ill-fitting and/or unretensive dentures. Hence, dental team must be aware of these potential detrimental effects of dental treatment and provide counteractive dietary guidance[15]. Furthermore, denture hygiene instruction should be stressed to prevent denture stomatitis where prevalence is correlated strongly to denture hygiene or the amount of denture plaque[16]. A natural assumption would be that nursing staff should undertake more of the responsibility for denture cleaning and denture related problems[16] especially since the manual dexterity and vision may be poor[17].

High prevalence of coronal dental caries and root surface caries are found among old-age populations in several countries worldwide[18]. In the survey of Oral health among children and adults in Madagascar, Petersen et al found that 65-75 year old age had mean number of DMFT 20.2, untreated caries 5.3 and filled teeth 0.4[19]. Mean number of decayed teeth of elderly population in South India was 2.5[20] and this result was greater than the subjects of this study as well as 60 year old and above elderly population of Kyimyindine township which was 1.8[21]. No filled teeth were observed in the present study and this indicated the lack of oral health care among the study members.

Globally, the percentage of the subjects with Community Periodontal Index scores 4 (deep pockets) range from approximately 4 to 70% among older people[22]. Conversely, severe loss of periodontal attachment (6 mm or more) was not encountered in the remaining

teeth of the elderly examined. They had no more than calculus formation and periodontal pocket depth of 4 - 5 mm (CPITN 3).

The Oral Health Impact Profile (OHIP) was developed to collect information on the nature and extent of this impact, and to facilitate the use of such data in oral health surveys, the evaluation of dental procedures and the clinical evaluation of patients[23]. It is one of the most sophisticated[24] and most popular instruments for measuring OHRQOL[25]. Steele et al studied how age and tooth loss affect the impact of oral health on daily living among dentate adults from UK and Australia by using the (OHIP-14). High OHIP scores were found in UK elderly who had fewer than 17 natural teeth and likewise Australian elderly who possessed fewer than 21 teeth had worse OHIP scores. The authors concluded that age, number of teeth and cultural background are important variables influencing oral health-related quality[26]. Allen and McMillan studied the impact of tooth loss in complete denture wearers using the Oral Health Impact Profile (OHIP) among edentulous patients where their results showed the presence of teeth influencing the impact on psychological discomfort[27]. Similar study result was shown that person with more than remaining 20 teeth were more active in leisure sports and travel than those with fewer than 20 teeth. The number of

remaining teeth is associated with physical activity in elderly person[28] and tooth loss has effect on the physical, psychological and social quality of life and the presence of teeth is very closely related to one's daily activities[29].

Denture status is also strong predictor for impaired OHRQOL measured by OHIP[30]. Wearing conventional complete dentures has a significant impact on OHRQOL[31]. Edentulous elderly people who are well satisfied with their daily lives are also satisfied with their complete dentures[32]. On contrary, the results of the present study showed teeth, mouth and dentures of elders had very little impact on quality of life. Majority of study members did not have impact in terms of psychological and social discomfort and disability. Functional limitation such as pronouncing word and feeling taste sense worsened was also in the minority. Although they were having untreated carious teeth, possessing teeth fewer than 20 and also unsatisfied dentures, not more than half of the study members claimed to be having problems. Statistically these problems were not associated with quality of life. This finding is agreed with the study of John et al where the denture status - OHRQOL association suggested that loss of all teeth might not be equally important in their influence on OHRQOL[30]. This might be the fact that many elderly people still view tooth loss and problems related to denture wear as a part of the

natural aging process and will tolerate inconvenience and discomfort without complaint. The elderly may not identify denture and oral discomfort and difficulties with speech, chewing and appearance as causes for complaint [32]. Besides, it might be the cause that Myanmar elderly have more endurance and perseverance in facing pain and illness.

Conclusion

This study highlighted the problems in elderly residing in Hinn Si Gone old age home. Since older people agree with the view that one must expect more illness and aches and pains as one gets older, they hardly report the real perceptions which could deteriorate their oral conditions. The results of the present study suggests caretakers should be instructed on how to improve elders' oral health and periodic dental check up and appropriate treatment should be provided by dental professionals.

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The Effectiveness of Oral Health Educational Program on Basic Health Staffs in Taunggyi Township

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Abract

The effectiveness of oral health eucational programme was assessed among 34 basic health staffs (BHS) in Taunggyi township. All BHS except those with oral health care training from 3 MCH and 2 RHC, participated in the study. The baseline assessment of oral health KAP and performance was asked using the structured questionnaire and found that satisfactory level but still had a room for improvement. The scores were not associated with their socio-demographic characteristics. Then, all BHS were given three hour lecture and onsite clinical demonstration concerning with the common oral health problems and preventive strategy by the researcher.After one month, the follow up assessment was done and compare with the baseline scores. The significant progress in each sector of the questionnaire was found among all the participants. That kind of short educational programme is likely to improve the level of oral health knowledge of BHS who are the cornerstone of health care services of Myanmar.

Introduction

Although oral diseases are not life threatening, they constitute an important public health problem in Myanmar. Oral diseases have a negative impact on the quality of life. The lack of an equally distributed simple curative oral care system allows diseases and pain to become chronic and this condition withdraws people for extended period from economic activities. Because proper little treatments of oral diseases were not readily available, poor people spend their money unnecessarily for local medicines, which subsequently become a chronic condition. It also leads to misuse of antibiotics and to be treated by traditional healers, who rarely practice cross-infection control. [1]

Most oral diseases can be prevented. However, the virtual absence of basic community-oriented preventive oral care for the under-served allows a higher incidence of oral diseases. [1]

When Primary Health Care *(PHC) was developed, oral health care has not been given attention in the essential activities of PHC as it deserves. Resultantly, oral health of the people living in underserved communities of both industrialized and developing countries have been neglected and dental diseases became a debt to pay for the health sector. It makes the dental profession to define and formulate primary oral health care concept, parallel or in addition to the PHC.[4]

The population of Myanmar is 52 million and almost 70% are rural dwellers. The National Health Committee has defined the policy of improved health care in the areas as one of its top priorities for equity in health care provision for the people.[5] At present, the dental surgeon to population ratio in Myanmar stands at (1:38,800), (WHO Norm for a good dentist to population ratio is 1:20,000).[5]

Moreover, the dental surgeons were not posted in rural area. Therefore any alternative staff or health workers have to be employed to serve the rural people to take care of their oral health. With the purpose to give comprehensive health care to the communities, basic health staffs act like primary cadre for the community people's health welfare. They are justifiably presumed to perform preventive measures, curative measures, health promotion and rehabilitation services in the communities and very much appreciated by the people in rural places.

The next logical step is to make people more and more aware of oral health, give advises on preservation or maintenance of oral health, to practice the lifestyle which promote the better Oral Health. In practice, "community participation" should start with organizing the basic health staffs (BHS) : Health Assistants, Lady Health Visitor, midwife, public health supervisor (1) and (2) etc. to be involved in the activities of oral health promotion program.[4] Since BHS were most likely to be busy with their basic health duties and special tasks of other projects, they might have less knowledge or awareness regarding oral health.

In Shan State, apart from POHC projected townships there are no properly trained personnel to perform oral health care where dental surgeons are not available and inaccessible ; BHS are the ones who have to take care of rural people. They are also appreciated by the community people.

Owing to these facts, the present study was carried out to explore the level of knowlwdge, attitude practice (KAP) and performance relating to the oral health among basic health staffs before and after the introduction of the oral health educational programme at five health centres in Taunggyi Township.

Aim

To assess the effectiveness of oral health educational programme among BHS in Taunggyi Township.

Specific Objectives

1. To determine the level of oral health knowledge, attitude, practice and performance of BHS before the introduction of oral health deucational programme.
2. To assess the relationship between the socio-demographic characteristics of BHS and the level of oral health KAP before the educational programme.
3. To determine the level of oral health KAP and performance of BHS after the educational programme.
4. To compare the level of oral health KAP and performance among BHS before and after the oral health educational programme.

Materials and Methods
Study Design

A community based intervention study.

Study Population

Basic Health Staffs (34 BHS) from 3 Maternal and Child Health Centers (Urban, Taunggyi) and 2 Rural Health Centers (Taunggyi and Naungkar) in Taunggyi township.

Study Period

September, 2006 to November, 2006

Sampling Procedure and Sample Size

There are 3 Station Hospitals, 4 Rural Health Centers, 2 Urban Health Centers, 1 School Health Team and 3 Maternal and Child Health Centers in Taunggyi Township. Station Hospitals with Medical Officers in-charge were excluded from the sampling frame. Since, the present study was based on the BHS, 3 MCH centers and 2 RHC were selected. All BHS from those centers except who with previous oral health training were included in this study (N = 34).

Inclusion Criteria

1. BHS who was working in her jurisdiction.
2. BHS who had no previous oral health educational training.

Exclusion Criteria

1. BHS who had previous oral health educational training
2. BHS who was not working at her jurisdiction.
3. BHS who resided at other townships.
4. BHS who did not give consent to involve in the study

Study Method

The study was a small scale study and all BHS participated in this study were enrolled and interviewed individually by

investigator for two times (one month interval) before and after the oral health educational programme.

Type of the Intervention

In the study, the intervention (oral health educational programme) composed of :

1. Providing lecture on dental caries, periodontal diseases 3rd molar impaction, mixed dentition, oral mucosal lesions and oral cancer, replacement of extracted tooth (denture) and preventive measures.

2. Case demonstration relating to the above conditions

Data Collection Method

After pre-testing of questionnaire (KAP and performance) at Urban Health Center, Taunggyi Township Health Department, a structured questionnaire was used to interview on each subject. The questionnaire included socio-demographic characterisics such as age, educational status, years of service, jurisdiction and the designation were also assessed.

Data Management and Data Analysis

Questionnaries were checked for the completeness and accuracy. Data entry was done manually and the scores for each oral health knowledge, attitude, practice and performance before and after the intervention were calculated. The Chi square test (X^2-test) and Non-Parametric Sign test were used in analyses. Statistical significant level was set at two-tailed $\rho < 0.05$.

Ethical Approval

The ethial approval was applied to the Ethical Committee, Myanmar Dental Association, Yangon, Myanmar. The objective of the study was explained to each BHS and those who give consent to participate in the study was interviewed. All the information was kept as con-fidential.

Results

General Characteristics of the Sample

Total number of sampled BHS was 34 and among them, 19 (55.9%) were working in the rural area and 15 (44.1%) were working in the urban. The characteristics of the study participants were shown in (Table 1). The half of sample (17 BHS) was under 40 years. All the participants were women. Regarding the educational level of participants, 52.9% were undergraduate and the remaining 47.1% were graduates. According to the years of services, 50% of health staff had more than 14 years of service. Among those, 11(32%) were supervisors and the remaining were providers.

Table 1

Socio-demographic characteristics of 34 Basic Health Staffs

Variable	n	(%)
Age (years)	17	50
40 and below over 40	17	50
Education		
Undergraduate	18	52.9
Graduate	16	47.1
Jurisdiction		
Urban	15	44
Rural	19	56
Years of service		
Below 14 years	17	50
14 years and above	17	50
Designation		
Supervisor	11	32
Provider	23	68

Table 2

Scores of oral health KAP and performance among BHS before and after the oral health educational programme

Score	Before		After		P value
	Median	Range	Median	Range	
Knowledge score	7	45 to 10	9	4.5 to 10	<0.05
Attitude score	9	7 to 10	10	8 to 10	<0.05
Practice score	7.25	3.5 to 9.5	9	6.5 to 10	<0.05
Performance score	5.6	2.7 to 8.7	8.25	4.7 to 10	<0.05
Total score	30.15	23.16 to 34.66	35.98	26.66 to 39.5	<0.05

Non-parametric sign test

Table (2) showed that median scores for oral health KAP and performance among BHS before and after the oral health educational programme. The follow up scores for each sector was significantly higher than the baseline scores.

Table 3

Association between socio-demographic characteristics and
scores of oral health KAP and performance among BHS before the study

Socio-demographic Characteristic	Knowledge	Attitude	Practice	Performance	P value
	Chi Square Value	Chi Square Value	Chi Square Value	Chi Square Value	
Age (years)	0.23	0.65	0.98	0.01	>0.05
Education	0.06	0.06	0.36	0.13	>0.05
Jurisdiction	0.05	0.01	0.65	0.23	>0.05
Years of service	0.23	0.01	0.42	0.12	>0.05
Designation	0.00	0.87	0.2	0.49	>0.05

Table (3) depicted that association between socio-demographic characteristics and scores of oral health KAP and performance among basic health staff. It reflected that their oral health knowledge, attitude, practice and performance scores before the oral health educational programme were not dependent on their age, educational status, jurisdiction, years of service and designation. It was found that the follow up scores were also not related to those factors.

Discussion

The basic health staffs (BHS) are the base or foundation on which the entire health care services of Myanmar is working. They reach to the grass root level of people particularly to those residing in the rural area where more than two third of Myanmar population lived. The present study was conducted to assess the BHS' oral health knowledge, attitude, practice and performance before and after the introduction of oral health educational programme.

There are 18 dental surgeons in Taunggyi township, 5 are Government servants & the others are non-Government. Total population in Taunggyi township is 331079; 142698 live in Urban and 188381 live in rural area. All the dental surgeons practice in urban only. So that, more than half of people in Taunggyi township were served by BHS who had not been trained with dental health educational programme.

The present study found that the baseline level of oral health KAP and performance among BHS were more or less satisfactory but still had a room for improvement. However, according to their response, they might have misunderstanding about oral health e.g, blindness can be a result of tooth extraction, do not know

about the correct time to start tooth brushing for children, and eruption time. Moreover, even though they brush their teeth regularly, they do not know correct tooth brushing method. Due to the absence of oral health education, they cannot manage the dental patient properly and they do not refer the patient to the dental surgeon.

The baseline scores for oral health KAP and performance among participants were not related to their socio-demographic characteristics of such as age, educational status, jurisdiction, years of service and designation were not dependent was shown in the study. This finding showed that all BHS irrespective of their status should have educational programme to improve their oral health KAP and performance.

The follow up assessment was carried out one month after the baseline measurement and then revealed that the significant improvement between scores of before and after the programme and the higher scores were detected in all components. It may indicate the effectiveness of the oral health educational programme.

There might be a recall bias because study subjects were interviewed two times. This bias was probably minimal because the participants were interviewed at a interval of one month duration. In addition, the questionnaire was set to assess the KAP of general people; this

might be easy to get high scores in baseline assessment. Further research may be needed using the questionnaire formulated only for the health personnel.

The oral health knowledge, attitude, practice and performance among BHS after conducting the oral health educational programme may give rise increase their awareness, perception and skills in the treatment and prevention of oral diseases. The role of BHS in oral health care of community would be the frontline providers for minor cases and for referring special cases to township Dental Surgeon. On the other hand, one time introduction of oral health education may not be enough. That kind of programme should be held annually in the township, and monthly meeting to ensure the improvement of oral health status of the community.

Conclusion

1. BHS have more or less satisfactory level of oral health knowledge, attitude, practice and performance but still had a room for improvement.

2. There was no associationship between the socio-demographic characteristics of BHS and their base line scores of oral health KAP and performance.

3. The oral health educational programme was effective since their follow up scores were got better in each component of the questionnaire.

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A Study on the Chewing Ability and
The Stability of the Complete Dentures with Lingualized Occlusion

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Abstract

In the dental profession, oral rehabilitation with complete denture for the edentulous patient, the selection of the occlusal concept and the position and design of artificial posterior teeth are important factors that effect denture stability and chewing ability. Twelve complete denture with lingualized occlusal concept were constructed on the mean value articulator by one operator only. After six weeks of post insertion period, the stability of complete dentures was assessed by Kapur's method. At the same time, chewing ability of the denture wearers were assessed by using modified Carlsson's subjective questionnaire. The stability, chewing ability and their correlation were analyzed. It was found that 83.33% of complete dentures were stable and 16.67% of complete dentures were fairly stable. And then 75% of mandibular dentures had good stable as compared to 66.67% of fairly stable maxillary denture. Most of the patients 91.67% had good chewing ability according to rating the answer. The remaining percent 8.33% had fairly chewing ability. There was statistically no correlation can be seen between denture stability and chewing ability of complete dentures with lingualized occlusion in this study.

Introduction

In the complete dentures treatment, the search for ideal artificial teeth arrangement that maximizes the denture stability, chewing ability, comfort, appearance and long-term maintenance of supporting tissues is important (Backer et al. 1977). The most logical and the least complicated approach of occlusal concept for artificial teeth arrangement that fulfills the requirement of the patient should be chosen. The most common concepts are monoplane occlusion, balanced occlusion and lingualized occlusion. (International Prosthodontics Workshop, USA 1972)

Monoplane Occlusion

Monoplane Occlusion is the arrangement of teeth in which they are positioned in a single plane and the denture

can be constructed on a plane line articulator. (Jone, 1972)

The articulation is often unsatisfactory for the following reasons:-

- deflective occlusal contacts are quite common and it will be changed in occlusion and residual ridge resorption.
- cusps are removed - can only crush foods because they do not penetrate and cut the foods and the efficiency of the occlusion is relatively poor.
- lack of aesthetic quality due to non-anatomic teeth.
(Fenn, 1989)

Balanced Occlusion

Balanced occlusion is bilateral, simultaneous anterior and posterior occlusal contact of teeth in both centric and eccentric positions. When changing the jaws from one position to another, they move with a smooth, sliding motion, free from the cuspal interference and maintaining even contact. (Glossary of prosthodontic terms, 6th edition 1994)

During masticatory movement,

- the maximum number of teeth is in contact
- occlusal load is evenly distributed over the supporting tissues
- tilting of denture is less likely to occur and cuspal interference is eliminated
- the denture will be more stabilized

- grinding and cutting of foodstuffs are also possible

Clinically, it is difficult to achieve the bilateral balanced occlusion because to get detail record of mandibular movement is sophisticated and highly adjustable articulator is essential for successful complete dentures treatment. If mandibular movements are accurately recorded and an articulator with high capability for adjustment is used, balanced occlusion may remain the norm.

Lingualized Occlusion

Lingualized occlusion articulates the maxillary lingual cusps with the mandibular occlusal surfaces in centric, working and non-working mandibular positions (Pound, 1970). Another explanation for lingualized occlusion is the occlusal contacts of the maxillary lingual cusps of posterior teeth initially with the occlusal surfaces and marginal ridges of mandibular teeth in maximum intercuspation and the continuous contact of maxillary lingual cusps with the mandibular teeth during various movement of mandible. (Glossary of Prosthodontic terms, 6th Edition, 1994)

Lingualized occlusion provides a useful combination of several occlusal concepts. Many advantages of anatomic and non-anatomic occlusions are retained.

Balanced occlusion can be accomplished. (Becker , Swoope , Guckes, 1977).

Vertical forces are directed more centrally on the mandibular alveolar ridge, which gives more stability to the lower denture and uses the special posterior teeth design with sharp maxillary lingual cusps and widened central fossae to improve chewing ability. (Good penetration of food bolus is possible) .Becker, Swoop, Guck, 1997

In this study, stability, chewing ability and their correlation of complete denture with lingualized occlusion by using mean value articulator (Gysi Simplex OU-Type-30 Degree) are investigated.

Aim and Objectives
Aim :
- To study the relationship of chewing ability and stability of complete denture with lingualized occlusion.

Objectives :
- To assess the denture stability in subjects with complete denture with Lingulized occlusion
- To assess the chewing ability of those subjects
- To correlate the chewing ability and stability of denture

Methodology

This was descriptive study. Place of study was at Department of Prosthodontics, University of Dental Medicine, Yangon. This study was done in one year during the period of 2004 May to 2005 October.

The consecutive collection of the subjects who met the inclusion criteria seeks care for denture within the study period of one year.

Inclusion Criteria are :
- Patients who are willing to participate in the study and giving inform consent.
- Age – elderly patients above 60 years old.
- Gender – Both sex.
- Patients with generally favorable denture supporting tissues.
- Patients with good general health (functionally healthy & mentally alert elderly).
- Patient with class I, II, III skeletal jaw relationship.

Exclusion Criteria are :
- Those patients with who are not willing to participate in the study and not giving inform consent.

Study Procedure (Study Method)
- Twelve fully edentulous patients are selected according to selection criteria.
- The technique was the same for all patients.
- Impression taking, Record block construction and JRR procedures were done according to accepted Prosthodontic principles.

Evaluating the trial denture at the final try-in include :

◆ Cusp to fossa relationship. (correct centric occlusion)

◆ Position of the teeth in the dental arch.

◆ Balanced lingualized and vertical overlap.

◆ Vertical dimension.

◆ Adequate tongue space.

After denture has been processed, they were remounted on the articulator by split-cast method. The occlusion was adjusted in the laboratory prior to delivery. The occlusion of denture in the mouth were also adjusted. Proper patient instruction were given. After the patients have worn their complete dentures for six weeks post adjustment period, they were evaluated. The patients were asked to answer the questionnaires on patient's chewing ability with denture by Modified Carlson's Method. Then, the stability of the denture were evaluated clinically by Modified Kapur's method.

The subjects were informed about the procedure and requested to sign the informed consent to participate in the study.

Ethical Consideration - This study method is an involvement of complete denture construction with lingualized occlusal concept. Aseptic technique is strictly adopted to prevent chance of infection. Every case was conducted under informed consent.

Data Analysis

Data was entered and analyzed by using computer software SPSS (Statistical Package for Social Science) version 11.5 after manual checking. For descriptive analysis, age was categorized as 10 years age groups. Then age and sex were shown in percentage of total. The scores were evaluated in 3 groups: good, fair and poor. The relationship of stability (good and fair) & complete denture with lingualized occlusion were analyzed Chi-square test and significant level of the statistical tests set at (0.05). Chewing ability was described by (good and fair) score.

Results

Table 1

Distribution of Sample Subject according to Age and Gender

Gender	Age (Years)			Total
	60 - 70	*71 - 80*	*>80*	
Male	4 (50%)	4 (50%)	0	8 (66.7%)
Female	3 (75%)	0	1 (25%)	4 (33.3%)
Total	7 (68.3%)	4 (33.3%)	1 (8.3%)	12 (100%)

Table 2

Relation of Stability with Complete Dentures

Stability score	Dentures	Number	Percent
Good	Maxillary Denture only	1 subject	8.33
	Mandibular Denture only	6 subjects	50
	Both Maxillary & Mandibular	3 subjects	25
Fair	Both Maxillary & Mandibular	2 subjects	16.67
	Total	**12 subjects**	**100**
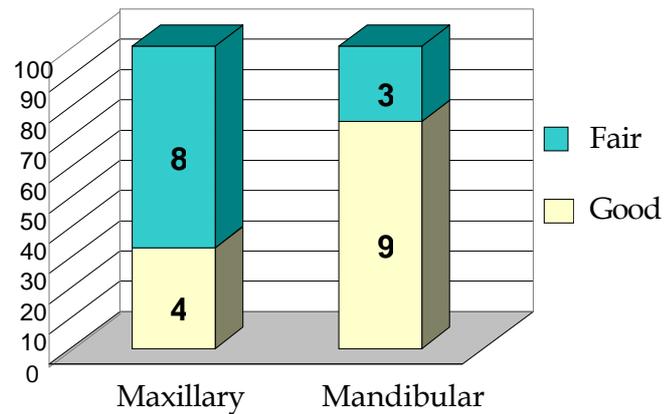
Stability Relation of Maxillary to Mandibular Denture

Table 3

Relation of Chewing Ability with Complete Denture

Chewing ability	Number	Percentage
Good	11 subjects	91.67 %
Fair	1 subject	8.33 %

Discussion

Gunne, Wall 1985 shown that to improve chewing ability, the stability and balanced occlusion were one of the influencing factors. Kyaw Naing 2005 also stated that the clinically stable and fairly stable denture get good or fair chewing ability.

In the present study, There may not be statistically correlated, although the result showed good and fairly stable denture and chewing ability. Chewing ability is also effected by other factors; type of occlusal form and arrangement, type of ridge, size of arch, amount of force of patient is able to exert, adaptation of the base, coordination of the patient and mental attitude of the patient. The results indicate that overall finding do not confirm the common finding of previous researchers. Clinically, lingualized occlusion improves the stability especially at lower denture and chewing ability.

Conclusion

In the present study, although study design with small sample size, conclusion can be made as follow : -

1. Lingualized occlusion is a special type of balanced occlusion and it is easy to teach and learn by using mean value articulator without extensive grinding procedures.

2. Lingualized occlusion can easily give satisfactory balanced occlusion, good stability result especially in lower denture and distinctly improvement of chewing ability.

3. These result did not totally support the fact that stability of complete denture is one of the influencing factors for better chewing ability because of limitation of study design.

4. No conclusion should be found correlation between stability and chewing ability but presumption can be drawn, improvement of chewing ability is due to the advantages of special teeth design using with balanced lingualized occlusion constructing on mean value articulator.

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Correlation of Computed Tomographic Feature, Panoramic Radiographic Feature and Histological Feature in Early Detection of Bone Invasion in Oral Squamous Cell Carcinoma

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Abstract

12 patients with confirmed cases of oral squamous cell carcinoma were radiographically examined with computed tomography, panoramic radiography prospectively for mandibular or maxillary bone invasion and pattern of bone invasion. The pattern of bone invasion is classified as erosive, invasive and mixed. The histological examinations of bone involvement of oral squamous cell carcinoma were also performed by using H & E staining method. **Results** – both computed tomography and panoramic radiography revealed 8 cases with jawbone involvement and excluded 4 cases without bone invasion. **The sensitivity, specificity, positive predictive value, and negative predictive value** were all 100% for both computed tomography and panoramic radiography in detection of bone invasion by oral squamous cell carcinoma. The pattern of invasion seen on computed tomography and panoramic radiography were nearly the same for both imaging modalities (Spearman Correlation Test r = 0.135, P = 0.632). There was no conclusive result for histological findings due to lack of adequate excised bone specimens. Thin-section 3 mm Computed Tomography in bone window is an accurate technique to detect bone involvement by oral squamous cell carcinoma but panoramic radiography is still the first choice for bone invasion due to accuracy, accessibility and affordability.

Introduction

Squamous cell carcinoma is a malignant neoplasm derived from or exhibiting the morphologic features of squamous epithelium (Sapp JP *et al.* 1997). It is the most common oral cancer – 94% (Neville BW, 2002).

Oral squamous cell carcinoma has a varied clinical presentation, including exophytic, endophytic, leukoplakia (white patch), erythroplasia (red patch), erythroleukoplasia. Microscopic appearance will invariably reveal invasion of the underlying tissues, a change that is responsible for the clinical feature of induration (Neville BW, 2002).

The important role of imaging in evaluating patients with squamous cell carcinoma of the oral cavity is to evaluate for the presence of mandibular or maxillary invasion (Mukherji *et al.* 2001).

Computed Tomography (CT) is the imaging technique that is most commonly used to determine mandibular involvement in USA (Abraham JJ, 2000).

Panoramic radiography (PR) and intraoral radiography (IR) also play an important role in the detection of the bone invasion (Nakayama *et al.* 1999).

An accurate evaluation of the extent of bone invasion of oral squamous cell carcinoma is not only important for diagnosis, but also crucial in the treatment for these patients (Nakayama *et al.* 2000).

The purpose of this study is to correlate the association between panoramic radiographic (PR) and computed tomographic (CT) findings with histologic finding in early detection of bone invasion and pattern of bone destruction by oral squamous cell carcinoma.

Materials and Methods

12 Patients with oral squamous cell carcinoma that were presented at the Oral Maxillofacial Surgical Ward (Thingangyun Sanpya Hospital), Plastico-Maxillofacial Surgical Ward (Yangon General Hospital), were studied from April to October 2005.

The provisional diagnosis in all cases were confirmed as oral squamous cell carcinoma through history taking, clinical examination and the use of an initial incisional biopsy specimen of the tumour.

CT images, panoramic radiographs, and decalcified, hematoxylin-eosin–stained preparations of the excised mandibular or maxillary bone of patients with oral squamous cell carcinoma were prospectively evaluated by an experienced radiologist and an oral pathologist respectively.

CT scans were performed with Siemens Somatom Emotion Duo 2005 yielding 3-mm thick contiguous axial images parallel to the mandibular plane. (window width/window level: 3500/500 Hounsfield units). Panoramic radiographs were obtained by using Panoramic X-Ray Machine from UDM (Ygn).

The criteria for the classification of bone destruction on the basis of the CT and PR, and histologic findings are as follows (Nakayama *et al.* 2003).

1. Erosive pattern – loss of continuity in cortex, smooth, well defined U-shaped or scalloped margin to medullary bone with no isolated bony spicules.
2. Invasive pattern – irregular, ill defined margin with either bony spicules or isolated fragments.
3. Mixed pattern – irregular but relatively well defined margins without bony spicules.

Histologic Examinations

Histologic results were obtained by examining several slices of decalcified, hematoxylin-eosin–stained preparations of the excision specimen in the buccolingual plane that included the deepest area of tumor invasion into the mandible or maxilla.

Data analysis

Statistical analysis includes calculation of sensitivity, specificity, and the positive and negative predictive values of the ability of computed tomography and panoramic radiography to detect bone invasion.

The relationships among the CT pattern, the PR pattern of bone destruction were analyzed with Spearman rank correlation test. P value of < 0.05 will be considered statistically significant.

Results

Table 1

Detection of Extent of Bone Invasion on Panoramic Radiography

Grade 0	Grade 1	Grade 2	Grade 3	Total
4	2	3	3	12

Table 2

Detection of Extent of Bone Invasion on Computed Tomograph

Grade 0	Grade 1	Grade 2	Grade 3	Total
4	2	3	3	12

Table 3

Pattern of Bone Destruction on Panoramic Radiography

Erosive	Invasive	Mixed	Total
3	4	1	8

Table 4

Pattern of Bone Destruction on Computed Tomography

Erosive	Invasive	Mixed	Total
3	4	1	8

Table 5

Correlation between Bone invasion in CT, PR and Histologic Findings

No	Primary Tumour Site	Site	Tumour Staging	Panoramic Finding	CT Finding	Histologic Finding
1.	Upper alveolus	Maxilla	T2 No Mo	No invasion (-)	(-)	No invasion
2.	Buccal mucosa	Mandible	T4 N2c Mx	Bone invasion (+)	(+)	
3.	Hard palate	Maxilla	T4 N2b Mx	Bone invasion	(+)	
4.	Lower alveolus	Mandible	T4 N2c Mx	Bone invasion	(+)	Bone invasion
5.	Buccal mucosa	Mandible	T4 No Mo	Bone invasion	(+)	
6.	Buccal mucosa	Maxilla	T4 No Mx	Bone invasion	(-)	
7.	Floor of the mouth	Mandible	T4 N1 Mo	Bone invasion	(+)	Bone invasion
8.	Lower alveolus	Mandible	T4 N2b Mx	Bone invasion	(+)	
9.	Upper gingiva	Maxilla	T4 N1 Mo	Bone invasion	(+)	
10.	Upper gingiva	Maxilla	T3 N1 Mo	No invasion	(-)	
11.	Lower alveolus	Mandible	T4 N1 Mo	Bone invasion	(+)	
12.	Buccal mucosa	Mandible	T2 N1 Mo	No invasion	(-)	

Table 6.   Test Result of OPG

Test Result	Bone Invasion	No Bone Invasion	Total
Positive	8	0	8
Negative	0	4	4
Total	8	4	12

Table   7.   Test Result of CT

Test Result	Bone Invasion	No Bone Invasion	Total
Positive	8	0	8
Negative	0	4	4
Total	8	4	12

Table   8

Correlation between Bone Destruction Pattern in CT, PR

No.	Primary Tumour Site	Site	Tumour Staging	Panoramic Finding	CT Finding
1.	Upper alveolus	Maxilla	T2 No Mo		
2.	Buccal mucosa	Mandible	T4 N2c Mx	Erosive	Erosive
3.	Hard palate	Maxilla	T4 N2b Mx	Invasive	Invasive
4.	Lower alveolus	Mandible	T4 N2c Mx	Erosive	Invasive
5.	Buccal mucosa	Mandible	T4 No Mo	Invasive	Erosive
6.	Buccal mucosa	Maxilla	T4 No Mx		
7.	Floor of the mouth	Mandible	T4 N1 Mo	Invasive	Invasive
8.	Lower alveolus	Mandible	T4 N2b Mx	Invasive	Invasive
9.	Upper gingiva	Maxilla	T4 N1 Mo	Mixed	Mixed
10.	Upper gingiva	Maxilla	T3 N1 Mo		
11.	Lower alveolus	Mandible	T4 N1 Mo	Erosive	Erosive
12.	Buccal mucosa	Mandible	T2 N1 Mo		

Table 9

Diagnostic Test Result of OPG and CT

	OPG	CT
Sensitivity	100%	100%
Specificity	100%	100%
Positive Predictive Value	100%	100%
Negative Predictive Value	100%	100%

Spearman Correlation Test Result of Correlation between Pattern of Bone Destruction Seen on CT & OPG

$$r = 0.135$$
$$P\ Value = 0.632$$

Discussion

Both panoramic and computed tomographic techniques are effective in determining the bone involvement of oral SCC. Computed tomography is more expensive, more sophisticated, technically sensitive and the images are more clearly seen as compared to panoramic radiography.

In this study, there are 8 cases of bone invasion and 4 cases of no bone invasion which are both detected by CT and PR. Other studies also found that there is statistically no significance between diagnostic accuracy of CT and PR imaging modalities.

The grading of bone invasion is important because it will show that early or late detection of bone invasion of the patient and also support the management and prognosis of the patient (Nakayama et al. 1999).

Nakayama et al. 2000 stated that the pattern of bone destruction of the mandible is attributable to one of the prognostic factors in the carcinoma of the mandibular gingiva.

The pattern of bone destruction seen on CT and OPG findings show that there are 6 cases where CT and OPG agreed on pattern of bone destruction. There are 2 cases where CT and OPG have discrepancy between pattern of bone destruction (Table 8).

There is statistically no significance difference between CT and OPG in evaluation of pattern of bone destruction (r = 0.135 and P value = 0.632).

Conclusion

It is to concluded that the early detection of bone invasion in Oral SCC by CT and PR has show favourable result.

There is statistically no significance between computed tomography and panoramic radiography in detection of

bone invasion and pattern of bone destruction by Oral SCC.

Further studies should be necessary in the field of correlation of the pattern of bone destruction between CT, PR and histological findings.

An accurate evaluation of the extent of bone invasion of Oral SCC is not only important for diagnosis, but also crucial in the treatment for these patients.

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Oral Mucosal Changes in Relation with Smoking and Smokeless Tobacco Usage

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Moe Phone Myint

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Abstract

Tobacco consumption habit has a major social and cultural role in communities throughout the India subcontinent, Southeast Asia, Asia and Locations in the Western Pacific. The recognition of the role of such practice in the development of a variety of oral mucosal changes, oral precancer and cancer is of great importance to the dentist. The association between tabacco usage and such lesions emphasizes the importance of early detection for prompt treatment. A total of 200 villagers practicing tobacco in smoking and smokeless (chewing tobacco) form were examined by using Toluidine Blue Vital staining in Kyon - Pyaw Township, Pathein District, Ayeyawaddy Division to study the prevalence of oral mucosal changes. The prevalence of oral mucosal changes was 4% of betel - quid lichenoid lesion, 24.5% of betal chewer's mucosa and 11.5% of smoker's melanosis. There was staistically significant association between oral mucosal changes and amount, duration and nature of consumption of tobacco. Then, the adverse effect of tobacco usual in development of oral mucosal changes was highlighted among the study population for public awareness.

Introduction

Tobacco has been variously used throughout the world as a habitual practice. Being a harmful leaf, tobacco related diseases are posing the major problem in many countries. Tobacco consumption is linked with many serious illnesses such as cancer, cardiopul- monary diseases and low birth weight as well as oral health **(Saghvi and Notani 1989).** Although the systemic effects of tobacco have been extensively explored and reported, the local oral effects of various tobacco habits have received little attention.

The oral effects of tobacco present as wide variety of oral mucosal changes which change in colour and texture of the mucosa initially **(Axell 1993, Tomar *et at* 1997, Winn 1997 and 2001 and Avon 2004)** and may progress to premalignant lesions, condition and finally oral cancer if the tobacco practice is continued. **(Winn 1997, Hoffmann 1997 Shiu *et al* 2000).**

As epithelial dysplasia may indicate an increased risk of malignant change at the particular site, thorough detection of these changes is crucial. Epithelial dysplasia and early oral squamous cell carcinoma often resemble benign lesions and it may lead to difficult in clinical identification. The application of Toluidine Blue vital staining test may provide the early recognition and facilitate the histological confirmation by indicating the most representative site of the lesion **(Silverman et al 1984).**

In Myanmar, the prevalence study of oral precancerous lesions among smokers and chewers was first reported by **Lay et al in 1982.** According to the data obtained from the UDM (Ygn.) field trip survery in Kyon - Pyaw Township in 2004, it was found the more than **95%** of the local people have been consuming tobacco in various forms. The aim of this study was to screen the oral mucosal changes and epithelial dysplasia by using Toluidine Blue staining test among the heavily tobacco consumer at that region to provide the greatest opportunity for successful prevention of malignant transformation.

Materials and Methods

Selected for the study were 200 subjects with the age ranging from 15 to 65 and lived in Kyon - Pyaw Township. Only those using tobacco in various forms were included. Each subject was asked about demographic information, personnel data and tobacco consumption in terms of amount, duration and nature. Then a thorough clinical examination was carried out and oral mucosal changes were recorded in Assessment form and photographs were taken. During the clinical examination Toluidine Blue staining was applied to facilitate the diagnostic confirmation.

Chi square test was used for statistical analysis while P vale of < 0.05 were considered as statistically significant by using EPI - INFO 2002 statistical package.

Toluidine Blue Vital Staining Procedure

The staining procedure is as follow.

- ❑ 25mg of Touidine blue powder is weighed and dissolved in 99 ml of distilled water to obtain 1% aqueous solution. (1ml = 25 mg)

- ❑ Glacial acetic acid is also diluted with distilled water for 1% concentration.

- ❑ The lesion and surrounding mucous membrane are gently cleaned with a cotton swab with 1% acetic acid. Solution and wait for 1 minute.

- ❑ The mouth is rinsed thoroughly with water for 2 spits and the area to be stained is dried.

- ❑ A second swab saturated with 1% solution of toluidine blue is applied for 3 paints to the lesion and surrounding tissue and wait for 1 minute.

❑ After that the mouth is rinsed for 2 spits and a third swab saturated with the acetic solution is applied and final rinsing is done. Then the area applied is observed for any stain uptake.

Results

Types of oral mucosal changes related with tobacco usage detected in this study were shown in table 1. The correlation between oral mucosal changes and amount, duration and nature of tobacco consumption in smoking and smokeless forms with corresponding P- values were shown in table 2, 3, 4, 5 and 6. The types of oral mucosal changes in relation with Toluidine Blue staining uptake were expressed in table 7.

Table 1

Distribution of Oral Mucosal Changes in Relation with Different forms of Tobacco Usage

Tobacco Usage	No. of Person	Oral Mucosal Changes			Total	
		BLL	BCM	SM	No.	%
Chewing	106	5	31	-	36	34
Smoking	31	-	-	18	18	58
Both Chewing & Smoking	63	3	18	5	26	41
Total	200	8 (4%)	49 (24.5%)	23 (11.5 %)	80	40

BLL   -   Betel - quid Lichenoid Lesion

BCM   -   Betel Chewer's Mucosa

SM   -   Smoker's Melanosis

Table 2

Association between Oral Mucosal Changes & Amount of Smoking Tobacco

Amount (No. Day)	No. of Cases	Oral Mucosal Changes (+)		Oral Mucosal Changes (–)	
>5	30	24	80.00	6	20.00
<5	64	20	31.25	44	68.75
Total	94	44	46.8	50	53.19

X^2 = 17.59,   p value = < 0.001 (Significant) OR = 8.80 (2.83 - 28.69)

Table 3

Association between Oral Mucosal Changes & Duration of Smoking Tobacco

Duration (Year)	No. of Cases	Oral Mucosal Changes (+)		Oral Mucosal Changes (–)	
		No.	%	No.	%
>5	60	40	66.66	20	33.33
<5	34	4	11.76	30	88.24
Total	94	44	46.8	50	53.19

X^2 = 24.11, p value = < 0.0001 (Significant)

Table 4

Association between Oral Mucosal Changes and Amount of Smokeless Tobacco Usage

Amount of Tobacco(quids/day)	No. of Cases	Oral Mucosal Changes (+)		Oral Mucosal Changes (–)	
		No.	%	No.	%
>6	107	49	45.79	58	54.20
<6	62	13	20.96	49	79.03
Total	169	62	36.69	107	63.31

X^2 = 9.38, p value = 0.002 (Significant), OR = 3.18 (1.47 - 6.99)

Table 5

Association between Oral Mucosal Changes and Duration of Smokeless Tobacco Consumption

Amount of Tobacco(quids/day)	No. of Cases	Oral Mucosal Changes (+)		Oral Mucosal Changes (–)	
		No.	%	No.	%
>5	113	53	46.90	60	53.10
<5	56	9	16.07	47	83.93
Total	169	62	36.69	107	63.31

X^2 = 14.02, p value = 0.0001 (Significant)

Table 6

**Association between Oral Mucosal Changes and
Nature of Smokeless Tobacco Consumption**

Nature of Consumption	No. of Cases	Oral Mucosal Changes (+)		Oral Mucosal Changes (–)	
		No.	%	No.	%
Holding	10	9	90.00	1	10.00
Swallowing	30	18	60.00	12	40.00
Spitting	129	35	27.13	94	72.87
Total	169	62	36.69	107	63.31

X^2 = 24.33, 2dof, p value = < 0.001 (Significant)

Table 7

Relation between Oral Mucosal Changes and Toluidine Blue Staining Uptake

Oral Mucosal changes	No. of Cases	Toluidine Blue Uptake		No Toluidine Blue Uptake	
		No.	%	No.	%
BLL	8	3	37.5	5	49
BCM	49	49	100	-	-
SM	23	-	-	23	100
Total	80	52	65.00	28	35

Discussion

Tobacco Usage and Oral Mucosal Changes

Smoking Form

Cheroot was the most popular item for smoking in that area. In the present study, smoking of cigarettes was less frequent than cheroots. It was found that here was no pipe or cigar smoke. Regarding among' those smokers, only one type of oral mucosal changes; smokers' melanosis (11.5%) was detected during this study. In the study of Lay et al (1982), 89% of leukoplakia was found in different types

of smokers (cigar, pipe, cigarette and cheroot) among 6000 villagers. In 2000, Mirbod and Ahing suggested that there's no clear relationship between leukoplakia and smoking. Thus, the chemical constituents of each and every item should be analyzed in the further study.

Smokeless Form

The principal smokeless form consumed in that region was chewing tobacco as quid. There are a lot of different in composition of quid between communities and individuals. The main constituents of quid included were tobacco, areca nut and lime which are wrapped in betel leaf. Most of the people in this study used tobacco in almost natural form while fermented or dried forms were used in other part of the country. Substances of local preference like spices; Aniseed, cardamon etc were not also added. They used to spit the pieces and fluid of quid rather than to hold. Among these habitues, 49 cases of betel chewers' mucosa (BCM) and 8 cases of betel quid lichenoid lesion (BLL) were detected. Reichart and Philipsen suggested in 1998 that BCM may be the precursor of oral submucous fibrosis. Thus long term regular follow up should be carried for such changes.

Being desquamative nature of BCM, all changes showed staining uptake. Another application of Toluidine Blue staining for confirmation of dysplasia 10 to 14 days after stopping the habits could not be carried out because of limited study period. Out of 8 cases, 3 cases of BLL had staining but all of them were faint in color. People with such lesions refused to do biopsy for histological examination. Hence it could not be judged that these changes had dysplasia or not.

Nevertheless, it can be suggested that people with tobacco practice were likelihood to develop more oral mucosal changes than those who never used. According to the statistically significant data, the higher the consumption and the longer the duration the more oral mucosal changes were encountered. Thus, the distribution of information to the public regarding tobacco related oral effects and oral screening should be promoted in other parts of the country for early diagnosis and prompt treatment.

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