Prosthodontic treatment needs in Sudan Military Hospital

By

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Dedication

To my parents, wife and children

My ever-guiding light
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Abstract

The location of our study is Omdurman Military Hospital it is the major hospital to which the patients can be referred to from all other military hospitals. The services of this hospital are not only confined to the employees and their families but also to the public Sudanese residents.

The aim of this study is to document the number of missing teeth, to examine the prosthetic rehabilitation and to evaluate further prosthetic treatment needs among a representative sample of patients attending Omdurman Military Hospital.

Interviews and clinical examinations were conducted to determine the dental concern among 200 subjects regardless of their age.

The need for prosthodontic treatment and the evaluation of the partial and complete denture restorations were assessed. The results showed that 56% of the subjects were in need for either fixed, removable or combined prosthodontic treatment. 3.5% wore fixed prostheses, 58.3% of which were in
need of reconstruction, 2% wore removable partial dentures 25% of which were in need of reconstruction, 1.5% wore complete dentures all of them were satisfactory.

Proper patient educations, a higher quality of prosthetic dentistry, a decrease in cost availability of facilities are just some of the factors which might help reduce the need for prosthetic treatment in future.

This study has brought to attention the fact that there is a need for prosthodontic treatment, and that although some of the patient had missing teeth replaced, several prosthetic lacked the required standard.
ملخص الأطروحة

إن موقع دراستنا مستشفى أم درمان العسكري وهي المستشفى الرئيسي التي بحول اليها المرضى من كل المستشفيات العسكرية الأخرى. وخدمات هذه المستشفى لم تختصر في العسكريين وأسرهم فقط و لكن أيضاً إلى جميع المواطنين.

الغرض من الدراسة هو حصر عدد الأسنان المفقودة وحالات تعويض الأسنان الصناعية التي تتم حالياً بالإضافة إلى تقييم الحاجة إلى العلاج بواسطة الإستعاضة الصناعية في مجموعة من المرضى الذين يتلقون العلاج بالمستشفى.

تمت المقابلات والكشف السريري لعدد 200 حالة. وقد تم تقييم الاجهزة الجزئية والكاملة.

أظهرت النتائج أن 56% من الأفراد في حوجة الى تركيب ثابت أو متحرك أو الاثنين معاً, 3.5% تم لهم تركيب ثابت, 58.3% منهم في حوجة إلى إعادة تأهيل فموي, 2% تم لهم تركيب أطقم جزئية, 25% منها في حوجة إلى إعادة تأهيل فموي, 1.5% تم لهم تركيب أطقم كامل كلها بحالة جيدة أو مقبولة.

هناك عوامل عدة تساعد على خفض معدلات الحوجة الى الاستعاضة الصناعية للأسنان منها ثقافة المرضى والتطور في مجال طب الأسنان والتسهيلات المقدمة من السلطات الصحية لتقليل الكلفة.

هذه الدراسة تستعرض الحوجة للإستعاضة السنية والقصور في التركيبات الاصطناعية لدى بعض المرضى.
List of content

Dedication.................................................... I
Acknowledgement......................................... II
Abstract (English).......................................... III
Abstract (Arabic)........................................... V
List of content............................................. VI
List of tables............................................... VIII
List of Figures.............................................. IX

Chapter One

Introduction............................................. 1
Purpose of study ......................................... 8
Literature review........................................... 9
Causes of tooth loss...................................... 9
Dental caries............................................. 9
Periodontal disease..................................... 13
Dental trauma............................................ 17
Tooth impaction.......................................... 21
Supernumerary teeth................................. 22
Attrition, Abrasion, Erosion......................... 23
Dental hypoplasia........................................ 25
Neoplastic and cystic lesion......................... 29
Tooth over eruption..................................... 29
Systemic disease contributed to tooth loss... 32
None disease factor..................................... 39
Socio-demographic factors............................ 41
Effect of tooth loss..................................... 42
Objective.................................................. 44

Chapter two
List of Tables

1- TABLE (1) distribution of age groups in relation gender................. .56
1- TABLE (2) distribution of missing teeth in upper jaw...................... .57
2- TABLE (3) distribution of missing teeth in lower jaw...................... .57
3- TABLE (4) gender and missing teeth........................................58
4- TABLE (5) age and missing teeth...........................................59
5- TABLE (6) gender and complete extraction................................60
6- TABLE (7) occupation and missing teeth....................................61
7- TABLE (8) age and complete extraction ....................................62
8- TABLE (9) geographic region and missing teeth........................................63
9- TABLE (10) geographic region and complete extraction................. .64
10- TABLE (11) education level and missing teeth.......................... .65
11- TABLE (12) age and prostheses present....................................66
12- TABLE (13) occupation and prostheses present............................67
13- TABLE (14) education level and prostheses present.................. .68
14- TABLE (15) geographic region and prosthesis present............... .69
15- TABLE (16) occupation and reason for not replacing missing teeth....70
16- TABLE (17) Prosthodontics treatment need by the age group........71
17- TABLE (18) Prosthodontics treatment need by the level of education.72
18- TABLE (19) Prosthodontics treatment need by the gender...........73
List of Figures

1- FIGURE (1) Distribution of missing teeth in upper and lower jaws……74
2- FIGURE (2) Age groups and missing teeth .............................75
3- FIGURE (3) Gender and missing teeth......................... 76
4- FIGURE (4) Occupation and missing teeth............... 77
5- FIGURE (5) Geographic regions and missing teeth............78
6- FIGURE (6) Education level and missing teeth..........79
7- FIGURE (7) Age group and prosthesis present........ 80
8- FIGURE (8) Occupation and prosthesis present ........81
9- FIGURE (9) Education level and prosthesis present..... 82
10- FIGURE (10) Geographic region and prosthesis present... 83
11- FIGURE (11) Reasons for not replacing teeth................. 84
12- FIGURE (12) Prosthodontics treatment need by age group... 85
13- FIGURE (13) General need for prosthodontics treatment: male &
female.................................................................86
14- FIGURE (14) Prosthodontics treatment needed by gender:
:Male…………………………………………………………87
15- FIGURE (15) Prosthodontics treatment needed by gender;
Female.................................................................88
Introduction

While the rate of total edentulism is decreasing in developed countries, the reverse is the case with developing countries as a result of tooth loss\(^{(1, 2)}\) which has been attributed to caries, periodontal diseases, trauma, tooth impaction, hypoplasia, over eruption, supernumerary teeth, attrition, abrasion, erosion, neoplastic and cystic lesions.

High and/or frequent consumption of sugars and bad oral hygiene can lead to caries and periodontal diseases. Therefore, the patient must be willing to share with the dentist the responsibility for maintaining the health of the mouth after restorative and prosthodontic treatment\(^{(3)}\).

Nutritional deficiencies (e.g. anorexia) could ultimately result in an increase in the incidence of various health disorders including tooth loss\(^{(4)}\). Poor education and socioeconomic status of the patient which are not disease factors affect the mortality of teeth arising from disease factors\(^{(5)}\).
Social interaction may be severely influenced by missing some or all teeth. Clarity of speech is dependent on particular position of the tongue, lips, cheeks and either the alveoli or incisal edges of existing or restored teeth. Appearance is another aspect of social interaction and self–image is affected by tooth loss. The stereotypic image of the older person usually includes the empty mouth, sunken, cheeks and exaggerated nose and chin due to edentulism (6).

The objectives of prosthodontic treatment are to preserve adequate speech, mastication; appearance and preservation of the surrounding structures. These factors have a positive psychological effect on the patients (7).

The need for dental service is generally considered as the treatment needs detected during oral examination by dental professionals, regardless of the patient demand. If the patient with prosthodontic treatment needs, seeks, and receives care, this effective demand can be viewed as a met need and provides an estimate of the quantity of prosthodontic treatment required by a
population beyond the quantity already provided by the dental profession. (8)

A great number of studies concerning prosthetic treatment needs have been performed on elderly populations (9 10, 11, 12, 13), while tooth loss and denture in young age groups have been conducted by Hansen and Johansen 1976, and Mohlin et al 1979. Common findings of these studies are the poor condition of the existing dentures and a notable increase in the need for oral rehabilitation after 40-50 years of age (14). Heloe 1973 reported that 83% of his subjects age 50 -60 years are in need of prosthetic treatment compared with 53% of those aged 20 -39 years (15).

Another study carried by by Nyyssonen et al in 1987 aimed to analyze the clinical dental health, use of dental services and socio-economic factors correlating with subjective need for removable denture in Finish adults aged 30 years and more. The results revealed that subjects who had subjective need for prosthetic treatment had statistically significantly fewer teeth, fewer fillings and more decayed teeth than others. Irregular users of dental services felt the need for a prosthesis more often than did
regular users of those services. Irregular brushing of teeth was also associated with a greater need for prosthetic treatment. Men, older individuals and persons with a less education and smaller family income felt the need for prosthetic treatment more often than women, younger individuals, and better educated persons (16).

Owall (17) said that if prosthodontics is analyzed in term of replacement of missing teeth, factors such as frequency, the location and the relevance of the edentulous spaces are of paramount importance. Some authors assumed that the oral function can be affected by the number of teeth (18, 19, 20, 21, 22) while others believed that the number of occluding pairs of teeth are the main determinants for oral function (23, 24, 25, 26). The number of teeth present in the mouth may not give a correct estimation of masticatory potential for any given person, because such value does not take into account the functional arrangement of the teeth. Some authors commented that a few poorly distributed teeth can be more of a hindrance than a help (27, 28). The level of oral health among the elderly has also been considered in relation to the number and type of natural and artificial opposing tooth pairs (29, 30).
Tooth loss was listed as the second most frequent cause of disability amongst the elderly after cataract in a study conducted on 300 elderly by Tamil Nado, India. (31)

Edentulous spaces can be treated by prosthetic rehabilitation with complete dentures (CD), acrylic removable partial dentures (ARPD), metallic removable partial dentures (MRPD), fixed bridges (B), implants (I) and crowns (CR).

Several studies have been conducted to observe existing types of prosthetic appliances, for example a study in 1983, by Lain & Murtomea, surveyed the frequency of removable dentures among the finish population. The samples included 957 people aged 15 years and over. The results revealed that there were 34.3% denture wearers, and the rate of removable partial denture of some kind was 10.3%. (32)

In a cohort study in Sweden a group of 483 men, all of whom were 68 or 69 years old and had lived for a long time in the city of Malmo were examined with regard to the number of teeth present, removable dentures, fixed bridges, and tooth spaces. 76.4% had one or more natural teeth remaining, 59.2% had
removable dentures, and 0.2% were edentulous and without denture. The mean number of teeth present in a fixed dentition calculated on dentate subject was 16.21±8.02, including teeth replaced by pontics and 15.0±7.44 when only natural teeth were recorded. The number of bridges was high, 28.8% of natural dentate persons having bridgework. (33)

Even though prosthetic appliances can be used to replace missing tissues, they may not meet their exact purposes, and can be influenced with several factors that make them poor after a period of time.

Hoad-Reddick has shown that after only 5 years of use roughly 50% of complete dentures may need replacement. Less than optimal oral hygiene combined with physiological changes related to a gain and use of medication, have a significant negative effect on supporting soft tissues and periodontium, and may impair proper function and construction integrity of fixed and removable prostheses.(34)

Catovic et al. assessed the number of missing teeth, the state of existing prosthodontic appliances and the need for their
replacement among 120 elderly home residents. The most persistent teeth in both jaws were canines. The analysis of variance for obtained values of Karlsson's indices showed better condition of the bridges than the crowns \((P >0.05)\). On average, the crowns were older and in poorer condition than the bridges. Lower complete dentures had better stability but were also less retentive in comparison with the upper complete dentures. More than 82% of the subjects were in need of fixed, removable or combined prosthodontic treatment. \(^{(35)}\)

A cohort study in Finland found that approximately half of all removable dentures were objectively non-acceptable and one third subjectively, confirming earlier reports of a great discrepancy between objective and subjective treatment needs \((Smith & Sheiham, Nordenarm & Bohlin,\). The percentage of objectively acceptable complete dentures varies in the range 10-45% in European and North America population \((Kandelman et al).\) \(^{(16)}\)
Literature Review

Causes of tooth loss:

Teeth may need to be removed for a variety of reasons: the tooth itself is diseased, the tooth is involved in disease affecting surrounding tissues, or the tooth is in the wrong place. Below are the most important examples:

Dental Caries:-

Dental caries is a disease of calcified tissue of the teeth, characterized by demineralization of the inorganic portion and destruction of the organic substance of the tooth. It is the most prevalent chronic disease affecting the human race. It may properly be considered a disease of modern civilization (36).

Miller, an early investigator of dental caries, put the acidogenic theory, also known as Miller's Chemo-Parasitic Theory. He stated that dental decay is a chemo-parasitic process consisting of two stages, the decalcification of enamel, which results in its total destruction and the decalcification of dentin, as a
preliminary stage, followed by dissolution of the softened residue
(36).

Gottlieb, Diamond and Applebaum (1944-1946) postulated that caries is essentially a proteolytic process: the microorganisms invade the organic pathways and destroy them in their advance. They did admit that acid formation accompanied the proteolysis – lesser amount in lamellar involvement, greater amount in the case of rod sheath involvement (2).

The proteolysis – chelation theory of dental caries proposed by Z. Schatz and his co workers states that the bacterial attack on the enamel, initiated by keratinolytic microorganisms, consist in a break down of the protein and other organic components of enamel, chiefly keratin. This results in the formation of substances which may form soluble chelates with the mineralized component of the tooth and thereby decalcify the enamel at a neutral or even alkaline pH (36).

Dental caries has a multifactorial etiology in which there is interplay of four principal factors: the host (saliva and teeth), the micro-flora (plaque), time and the substrate (diet). There is no
single test that takes into consideration all these factors and can accurately predict an individual's susceptibility to caries.\textsuperscript{(36)}

Dietary factors, especially sugar, have an influence on the prevalence of dental caries. Plaque bacteria use carbohydrates to produce the sticky gel-like matrix of the plaque. On the other hand, fats and protein have no cariogenic effects. Fats may in fact, decrease caries activity by altering surface properties of enamel. Fats also reduce sugar solubilization, are toxic to oral bacteria – all of which may result in decreased caries incidence. Fats, if they replace carbohydrates in diet, may have the indirect benefit derived from reduced consumption of carbohydrates. Proteins may reduce caries posteruptively by a direct effect on plaque metabolism, by replacement of dietary carbohydrates, or by increasing salivary urea levels. Fluoride is an essential nutrient which affects decalcification and remineralization process\textsuperscript{(37)}.

Previously reported studies have shown that dental caries was foremost reason of extraction in African countries and the rest of the world \textsuperscript{(38, 2, 39, 40)}. This high prevalence may be due to
transition from the customary fibrous African diet to western refined diet \(^{(41)}\).

It was observed that tooth loss due to dental caries tends to increase anteroposteriorly. The lower molar teeth more affected than the upper molar and the reverse in the premolar and anterior teeth. And this is due to morphology, time of eruption and position of each tooth which type confers an inherent advantage/disadvantage to the various methods employed in plaque control and naturally occurring defense factors \(^{(42)}\).

A 15 years follow up study in Scotland showed that the main reasons of tooth extraction was caries and its sequelae 54.7%, periodontal disease accounted for 9.9% of extraction, and 8.4% were preprosthetic, patient request was the reason for 5.1% of extraction, and 2.5% were for other unspecified reasons. Pericoronitis and trauma account for 1.8% and 1.0% of extractions respectively \(^{(43)}\). The tendency for tooth extraction to occur in the dental clinics due to caries appears to be less than that reported in previous studies. For example; the pattern of tooth mortality in suburban Nigeria appears to be changing with decreasing tooth
mortality arising from periodontal diseases and caries and increasing indication for tooth extraction arising from orthodontic treatment needs \(^{(44)}\).

**Periodontal Disease:-**

The term periodontal disease has different meanings and is used rather ambiguously. It is used in general sense to encompass all diseases of the periodontium; gingival, alveolar bone, cementum and periodontal ligament \(^{(45)}\).

Periodontal diseases are caused by certain types of bacteria in plaque, the sticky colorless film of bacteria that constantly forms on teeth. These bacteria create toxins ie poisons, which irritate the gums and result in a break down of the attachment of gum tissues to teeth. Over time, these toxins can destroy gum tissues, allowing the infection to progress to bone loss \(^{(46)}\).

In addition, plaque that is not removed can combine with other materials and harden into a rough, porous deposit called calculus (tartar). Calculus on the tooth surface, above the gum line, may not contribute to periodontal diseases; but calculus on
the root surface, below the gums, makes removal of new plaque and bacteria more difficult. Unlike plaque, which you can remove, only a dentist or dental hygienist can remove calculus. (47)

The following classification includes all forms of chronic destructive periodontal diseases which can lead to tooth loss (45): -

i. Periodontitis

(A) Marginal periodontitis.

1. Slowly progressing.

2. Rapidly progressing.

3. refractory

(B) Juvenile periodontitis

1. Generalized

2. Localized

(C) Necrotizing ulcerative periodontitis

ii. Trauma from occlusion

iii. Periodontal atrophy
(A) Presenile atrophy

(B) Disuse atrophy

Research proves that up to 30% of the population may be genetically susceptible to gum disease. Despite aggressive oral care habits, these people may be six times more likely to develop periodontal disease. Identifying these people with a genetic test before they even show signs of the disease and getting them into early interventive treatment may help them to keep their teeth for a lifetime\(^{(48)}\).

Clinical attachment loss was strongly related to tooth loss. There was a dose-response curve. When the clinical attachment loss at the worst site around a tooth was 3 mm, the risk for tooth loss was 56% greater (odds ratio [OR], 1.56; 95% confidence interval [CI], 1.21-2.01) than the risk for a tooth with a maximum attachment loss of less than 3 mm. Similarly, with 6 mm of clinical attachment loss, the risk for tooth loss was increased by approximately 200% (OR, 3.01; 95% CI, 2.05-4.43). With 9 mm, 10 mm, or 11 mm of clinical attachment loss, the risk for tooth loss
was increased by roughly 9000% (OR, 10.90; 95% CI, 3.29-35.9) (47).

A study among Quebec adults showed that persons aged 35 to 44 years were not aware of their periodontal problems. In response to the question: “Do you consider yourself in need of dental treatment for gum problems?” Only 26.4% of examined persons with at least one tooth with a periodontal pocket ≥ 6 mm answered “yes.” What’s more, there was little difference in the perception of periodontal treatment needs between those affected by severe periodontal problems and those with calculus only (49).

A retrospective chart study conducted at Dalhousie University, revealed that patients who received surgical periodontal treatment lost more teeth than patients who received non-surgical periodontal treatment. Mean tooth loss per patient was 1.31 ± 2.36 for surgical treatment compared with 0.68 ± 1.87 for non surgical treatment (p = 0.001, independent t-test). Patients who had surgical therapy were more likely to have advanced disease compared with those who had non surgical therapy only (p < 0.01 ;). However, no difference in tooth loss was seen in
surgical patients versus non surgical patients with advanced attachment loss. Nor was there a difference in those with early attachment loss (p > 0.1). Patients with moderate attachment loss who had surgery were more likely to lose teeth than those who did not; mean tooth loss per patient with surgery was 1.96 ± 2.78, without surgery it was 0.97 ± 2.14 (p = 0.03)\(^{(50)}\).

A cohort study at the University of Iowa College of dentistry between 1973-1994 found that twenty percent of abutments were lost in the course of the study. Periodontal disease was responsible for loss of 39% of teeth lost, 25% were lost due to periapical lesions, 22% due to caries, and 22% due to root fractures. Patients with medical conditions that could cause soft tissue lesions were more likely to loose teeth (odds ratio [OR] = 2.13), as were those who did not use fluoride regularly (OR = 1.92), and those who were poor attendees (OR = 1.93)\(^{(51)}\).

**Dental trauma:-**

Dental trauma is injury to the mouth, including teeth, lips, gums, tongue, and jawbones. The most common dental trauma is a broken or lost tooth which may be inflicted in a number of ways:
contact sports, motor vehicle accidents, fights, falls, eating hard foods, drinking hot liquids, and other such mishaps.

**Classification of dental injuries:**

I- *Tooth trauma;*

(A) Fractures of the crown

1. Involving only enamel.

2. Involving dentin.

3. Exposing the pulp.

(B) Fracture of the root

1. Horizontal fracture

2. Vertical fracture

ii. *Trauma to periodontal attachment* (Displaced or loosened teeth).

(A) Concussion

(B) Luxation

(C) Avulsion
"Once you break an anterior tooth, you carry that with you for life" says Locker. "Although it can be treated, there's a likelihood you will need to repeat that treatment every ten years."

The most common injury to the permanent teeth is fracture of the crown of a maxillary central incisor. Statistically the maxillary lateral incisors are the next most commonly injured teeth, followed by the mandibular central and lateral incisors. A single tooth is most often involved. More severe accidents may involve multiple teeth and bony fractures.

Researchers found that 75% of tooth injuries occur in children less than 15 years of age. It is not surprising that boys consistently showed a higher prevalence of tooth trauma than girls. Boys suffered tooth trauma 2.7 times as frequently as girls. Most accidents occurred in boys' ages 7-10 years-old. The rougher nature of boys' activities and active participation in sports may explain this fact. Falls (34%), bicycle-riding (30%), sports (14%), and assaults (13%) were the most common causes of oral injury. Violent assaults and falls were the most common causes of
tooth injury among patients between the ages of 16 and 20 years (52, 53, 54, 55).

A retrospective study on dental trauma concluded that preventive measures, education and research could help avoid tooth trauma. (56) Specific approaches to prevent tooth trauma could be developed because the type of injury varies by age and activity. The diligent use of: mouth guards during sporting activities, and seat belts while driving, can significantly reduce soft and hard tissue oral injury.

Looker and his research teams examined a random sample of fourteen year olds in schools served by six Ontario public health departments. Overall, 18.5 % of the teens-almost; one in five, showed evidence of tooth damage; 6% exhibited severe damage with teeth broken or knocked out. (57)

**Tooth Impaction:**

Impacted teeth are those prevented from erupting by some physical barrier in the eruption path. Lack of space due to crowding of the dental arches or to the premature loss of
deciduous teeth with subsequent partial closure of the area they occupied is a common factor in the etiology of partially or completely impacted teeth\(^{(58)}\).

Any tooth may be impacted, but certain ones are more commonly affected than others. Thus the maxillary and mandibular third molars and the maxillary premolars are most frequently impacted, followed by the premolars and supernumerary teeth. Of the third molars, the mandibular teeth are more apt to exhibit severe impaction than the maxillary teeth\(^{(58)}\).

A completely impacted tooth is one which lies completely within the bone and has no communication with the oral cavity. A partially impacted tooth is not completely encased in bone, but lies partially in soft tissue. A dentigerous cyst may develop around the coronal portion of an impacted tooth and may cause displacement of the tooth and destruction of bone. Some professionals believe an impacted tooth pushes on the next tooth, which pushes the next tooth, eventually causing a misalignment of the bite. Occasionally impacted Teeth allowed to remain in situ may undergo resorption\(^{(59)}\).
Supernumerary teeth:

These are teeth additional to those of the normal series, they may develop in any tooth bearing area but occur most frequently in the anterior and molar regions of the maxilla followed by the premolar region of the mandible \(^{(60)}\).

They may prevent the eruption, or cause malposition or resorption of adjacent teeth, and may develop dentigerous cysts if unerupted. Supernumerary teeth are more common in females, are usually single and occur in about one to three per cent of the population in the permanent dentition \(^{(60)}\).

Supernumerary teeth occurring at certain sites may be referred to by special terms. A mesiodens is Supernumerary tooth developing between the maxillary central incisors and is the most common of all supernumerary teeth. A paramolar arises alongside the maxillary molars and is usually buccally placed, and distomolar develops distal to a third molar \(^{(61)}\).
Attrition. Erosion, Abrasion:

**Attrition:**

It is defined as the physiologic wearing away of a tooth as a result of tooth-to-tooth contact as in mastication. The amount of attrition in a person is depending upon:

1- Age: The older the person the more attrition is expected.

2- Sex: Men usually exhibit more attrition than women of comparable age probably as a result of greater masticatory force of men.

3- Consistency of diet, person eating coarser diets suffer more attrition.

4- Habits such as chewing tobacco or bruxism may predispose to more rapid attrition (62).
Erosion:-

It is defined as loss of tooth substance by non-bacterial chemical processes. It occurs most frequently on labial and buccal surfaces of teeth. Acids, from either an external or an internal source, may be found in the work environment (e.g. battery manufacturing) or in the diet (e.g. excessive use of citrus fruits). The internal source of acid is most probably from gastric contents following regurgitation or increase citric acid content in saliva\(^{(62)}\).

Khan F. on his study of tooth wear analysis in south east Queens Land revealed that extrinsic and intrinsic acid erosion were strongly associated with occlusal tooth wear found in bruxers. Conversely, tooth wear patterns were unreliable indicators of abruxing habits, for attrition alone was often found on acid exposed teeth. Thus, even if a patient is suspected of having bruxism, dental erosion is more likely the cause of tooth –tissue loss than attrition, especially in dehydrating environment at South East\(^{(63)}\).
**Abrasions:-**

It is the pathologic wearing away of tooth substance through some abnormal mechanical process other than tooth-to-tooth contact like:

a. Use of abrasive dentifrice.

b. Certain habits or occupation: The habitual opening of bobby pins, holding nails or pins between the teeth in carpenters or tailors.

c. Ritual abrasion of teeth which is confined mainly to Africa (64).

**Dental Hypoplasia:**

1- Acquired enamel hypoplasia. (64, 65)

Acquired enamel hypoplasia of the permanent teeth may be due to either local (trauma or infection) or systemic factors:

**A- Trauma:**

Traumatic injuries to upper deciduous incisors may push them deeply into their sockets resulting in their roots impinging
upon the developing tooth germs of their permanent successors. The trauma may lead to horizontally oriented hypoplasia defects.

**B- Infection**

Periapical infection of a deciduous tooth, may give rise to thin, irregular enamel or entirely missing over an area of the crown.

**C – Systemic factors:**

The direct cause may either be a deficiency in mineral supply, or toxic damage to the ameloblast actively engaged in enamel formation at the time. The hypoplasia will usually present itself clinically as horizontally oriented row or rows of pits, grooves or depressions on the enamel surface. The enamel may be nearly normal in colour and translucency or it may be opaque or stained.

**D – Fluorosis or mottled enamel: - (64, 65)**

People who grow up in areas where the water supply contains a large amount of fluorides, usually 1.5 ppm (parts per million) or more, frequently exhibit signs of mottling of the enamel of their permanent teeth. The incidence and severity of mottling
increase in line with the increase in the fluoride content of the drinking water; and in areas where the fluoride content reaches or exceeds 4.5ppm, nearly all the inhabitants will be found to suffer from some degree of enamel mottling which is often severe. Mottled teeth, however, show an increased resistance to dental caries.

There is considerable individual variation in the effects of fluorosis upon different people. A few patients may suffer from mild mottling after exposure to relatively low concentrations of fluorides; while other exposed to relatively high concentrations may escape their effects altogether or only suffer from a mild degree of mottling.

2- **Amelogenesis imperfecta:** - (64)

An uncommon genetically determined defect of enamel formation. Usually all the teeth of an affected individual are involved, though not always to the same extent. Two forms of amelogenesis imperfecta are recognized:-
(A) **Hereditary enamel hypoplasia;** in which the defect is mainly quantitative reflected in a decrease in the amount of organic matrix formed. In males, this usually takes the form of a very thin but hard and smooth enamel layer, amounting in extreme cases to almost complete denudation of the tooth of its enamel. In females, the enamel is usually thicker but vertically grooved, pitted or wrinkled.

(B) **Hereditary enamel hypocalcification:** - Here the amount or thickness of enamel matrix formed is normal and the defect is one of failure in its normal maturation and mineralisation. Enamel will be soft to the probe and will lack its surface luster or gloss, having instead an opaque matt surface.

**3-Dentinogenesis imperfecta:** - (64)

In typical cases the enamel is structurally normal, though it may split away from the dentine very easily. It has been proposed that the loss of scalloping of the amelodentinal junction may be responsible for the lack of a strong bond between enamel and dentine in such cases. The teeth may appear to be normal when they first erupt, but they soon assume a brownish coloration which
has led to the condition being referred to as brown opalescent dentine. The enamel is soon lost, and thereafter the teeth become rapidly worn down to the gum margin.

4- Shell teeth: - \(^{(64)}\)

This is a rare variant of dentinogenesis imperfecta in which after an initial formation of a thin layer of normal dentine, further dentine formation completely ceases leaving a very large pulp chamber surrounded by a thin shell of dentine, and a normal layer of enamel.

Neoplastic and Cystic Lesion:-

A cyst is a pathological epithelium- lined cavity usually containing fluid or semisolid material. Intrabony jaw cyst has the potential expanding bone and displacing adjacent teeth by pressure. The odontogenic keratocyst sometimes causes root resorption to the adjacent teeth. \(^{(66)}\)

Benign tumors of the jaw usually behave like cyst since it is encapsulated and enlarge by expansion and displace the adjacent teeth. But there is exception for example some sorts of
ameloplastoma can make root resorption and destruction of adjacent tissue. (67)

Malignant tumor usually makes severe bone destruction in the jaw and root resorption. Pain and loosening of the maxillary teeth are the first symptoms of maxillary sinus carcinoma which invades the alveolar bone and causes severe bone resorption from the canine area to the upper eight. (68)

**Tooth Over Eruption:**

Every tooth tends to erupt till it meets the opposing tooth. When this tooth is missing, the opposing tooth will over-erupt and create gaps between itself and the adjoining teeth, leading to a food-trap there. The tooth will also lose its support, resulting in it becoming more mobile. (69, 70)

The incidence and extent of over eruption is of clinical significance, not only in terms of treatment planning to prevent undesirable vertical movement, but also in the restoration of the edentulous space. Fifty-one point six per cent of unopposed teeth are likely to be involved in retruded contact position (RCP) or
excursive interferences. Only a weak statistical association was demonstrated between the degree of over eruption and the presence of occlusal interferences. These findings are of clinical significance when planning the restoration of unopposed teeth as the removal of such contacts during tooth preparation may affect the maxillo-mandibular relationship and result in an undesirable occlusal relationship. This paper therefore has established that over-eruption of teeth is a clinical a retrospective study in over eruption in Combined Care Clinic of Leeds Dental Institute revealed that Eighty-three per cent of unopposed teeth are likely to over erupt, findings that should be considered when the restoration of a missing tooth is planned. (71)

Systemic Diseases Contributed to Tooth Loss.

There are several rare systemic diseases which affect the investing tissue of the periodontium making tooth mobility and subsequent tooth loss. The following are examples:-
LEUKEMIA:-

Oral lesions in leukemia are characterized by hyperplastic gingivitis with a cyanotic bluish-red discoloration. The lesions vary in degree and severity. In some patients there is diffuse enlargement of the gingiva. The oral tissues are friable and bleed easily. Frequently, hyperplastic gingiva may completely cover the teeth. In severe cases purpuric lesions and necrotic ulcers of the oral mucous membrane are also seen. Alveolar bone destruction and necrosis of the periodontal ligament may occasionally lead to loosening and exfoliation of teeth. Acute necrotizing ulcerative gingivitis may also be present. The oral manifestations of leukemia result from the basic systemic defect and local irritant. When the oral cavity is kept free of local irritant such as plaque, food debris, ill-fitting dentures, and the like, oral involvement may be minimal. (72)

ANOREXIA NERVOSA:-

People with anorexia are those who are obsessed with being thin, they eat food but throw up soon after eating or take laxative or diuretics to keep from gaining weight. Anorexics lack
buffer in their saliva that protect teeth from acid produced by
mouth bacteria, some sufferers grind their teeth in their sleep thus
lose their teeth early. \(^{73}\)

**RICKETS:-**

It is inherited as an X-linked and is characterized by
hypophosphatemia. The teeth have abnormal large pulp champers
and pulp horns with microtracts that cause communication of the
pulp with oral cavity. This communication eventually produces
pulpitis and consequent pulp necrosis with periapical pathology.
Single or multiple gingival sinuses and abscesses are associated
to the periapical pathology and many teeth are lost on this account
due to extractions. \(^{74}\)

**LESCH-NYHAN SYNDROME:-**

It is inherited as X-linked and is characterized by a
deficiency of the purine salvage enzyme xanthine-guanine
phosphoribosyltransferase (HPRTase deficiency). Affected
patients have spastic cerebral palsy, mental retardation, severe
motor disability, cognition, ocular motility, and behavioral control. Patients have a self-mutilating aggressive behavior including mutilation of lips by constant chewing on them; as a rule the tongue is spared. Chewing of finger with resultant amputation as well as chewing of hands is also common finding in these patients. Teeth are lost due to prophylactic extraction in order to avoid mutilation of lips and other body by chewing on them.\(^{(75)}\)

**PAPILON-LEFEVRE SYNDROME:**

It is inherited as autosomal recessive and is characterized by marked destruction of the periodontium of both dentitions with premature loss of teeth and palmar plantar hyperkeratosis. Teeth erupt in normal sequence, position and time. At around one and half to two years of age marked gingivo-periodontal inflammatory process develops with edema, bleeding, alveolar bone resorption and teeth mobility with consequence exfoliation. The permanent dentition starts to erupt also at the proper time, but around eight to
nine of age, the gingivo-periodontal destruction in the same manner as the primary dentition. All permanent teeth are lost before age fourteen in the same sequence in which they erupted. After all the permanent teeth are lost (except for the third molars which are not affected) the gingiva resumes its normal appearance. (76)

**ACRODYNAIA:-**

This disease rarely seen today is caused by mercurial poisoning. In the past it was generally due to mercury used in teething powders or other medications. Chardon in 1830 first described this disease and coined the name acrodynia. Clinically it is characterized by skin changes, central nervous system involvement and marked gingivostomatitis with consequent teeth exfoliation. (77)

**Hand-Schuler Christian disease:-**

This type usually starts after 5 or 6 years of age and it is characterized by exfoliation of teeth and bone radiolucencies due to intrabony lesions. One of the typical findings is the so-called
(geographic skull) due to the presence of lesions throughout the cranium. Retro-orbital lesions produce exophthalmos and lesions cause diabetes insipidus. This type generally has a long and benign course. \(^{(78)}\)

**DIABETES:-**

The destructive inflammatory processes that define periodontal disease are closely intertwined with diabetes. Persons with noninsulin-dependent diabetes mellitus (NIDDM) are three times more likely to develop periodontal disease than nondiabetic individuals. Add smoking to the mix, and the chances of developing periodontitis with loss of tooth-supporting bone are 20 times higher. An increased risk for destructive periodontal disease also holds for persons with insulin-dependent diabetes mellitus (IDDM) \(^{(79)}\).

National Institute of Dental and Cranio-facial Research (NIDCR)-supported research in the Pima Indian of Arizona community has shown that periodontal infection is more prevalent, more severe, and develops at an earlier age in this population than in nondiabetic persons. As diabetes increases in severity, the
rate at which vital tooth-anchoring bone is lost accelerates. Pima Indians with NIDDM are 15 times more likely to be edentulous than those without diabetes. \(^{(79)}\)

**Vitamin C Deficiency (Scurvy):**

Scurvy is the result of insufficient intake of vitamin C. Intraoral lesions are observed in dentulous patients and are characterized by gingival hemorrhages and hypotrophy as well as mucosal parlor. Destruction of the periodontal attachment will lead to teeth mobility and alveolar bone resorption with consequence teeth exfoliation. These oral changes are seen in late stage of prolonged vitamin C deficiency. \(^{(80)}\)

**Vitamin D Deficiency:**

Vitamin D status may impact periodontal disease both through an effect on bone mineral density (BMD) and through immunomodulatory effects. The active metabolite of 25-hydorxyvitamin D, 1,25-dihydroxyvitamin D, has been found to inhibit cytokine production and cell proliferation. Whether vitamin
D, calcium, or both are beneficial in the prevention of periodontal disease is unclear. (81)

Vitamin D resistant rickets is inherited disease characterized by hypophosphatemia with decreased renal tubular resorption of inorganic phosphates. The teeth have abnormally large pulp chambers and pulp horns with microtracts that cause communication of the pulp with the oral cavity. This communication eventually produces pulpitis and consequent pulp necrosis with periapical pathology. Single or multiple gingival sinuses and abscesses are associated to the periapical pathology and many teeth are lost on this account due to extractions. The dentin is globular and hypocalcified presenting clefts and tubular defects. The cementum is also abnormal. There is no gingivitis and/or periodontitis. (69)

None disease factors

Oral hygiene:

Oral hygiene is the practice of keeping the mouth clean and healthy by brushing and flossing to prevent tooth decay and gum disease. The purpose of oral hygiene is to prevent the build-up of
plaque. Tooth brushing and flossing remove plaque from teeth, and antiseptic mouthwashes kill some of the bacteria that help form plaque. Fluoride-in toothpaste, drinking water, or dental treatments also helps to protect teeth by binding with enamel to make it stronger. In addition to such daily oral care, regular visits to the dentist promote oral health. Preventative services that he or she can perform include fluoride treatments, sealant application, and scaling. The dentist can also perform such diagnostic services as x-ray imaging and oral cancer screening as well as such treatment services as fillings, crowns, and bridges.

**Smoking:**

There are many irritants found in cigarette smoke, and many of them have been found to dry out the mouth and decrease blood flow to the jaws, both of which can have a harmful impact on dental health. Saliva is vital for fighting cavities and gum disease because it helps wash away food debris and plaque and helping to neutralize acid. Therefore, a decrease in saliva can encourage both cavities formation and gum disease. Diminished blood flow to the jaws restricts nutrients and protective white blood cells, and
can therefore be a factor in possible tooth loss from gum disease. (82)

Across-sectional study in Sweden showed a significantly larger number of decayed and filled tooth surfaces among smokers than non-smokers (83). A nationally representative cross sectional survey of US civilians found that a history of smoking was significantly positively associated with periodontal loss of attachment (84).

**Socio-demographic factors:-**

Previous studies have shown that several non-disease factors such as attitude, behavior, dental attendance, characteristics of health care system and socio-demographic factors play important roles in the aetiopathogenesis of edentulism. (85)

Some studies reported that the incidence of edentulism correlated with educational levels and income status, with those in the lower levels exhibiting higher risks of becoming totally edentulous. In addition, a study done in a rural area of Eastern Guatemala showed that social and environmental influence such as poverty, lack of proper education and inadequate diet
contributed to widespread premature and heavy losses of permanent teeth. (85)

Although, Hoover and Mc Dermount reported a higher prevalence of edentulism in males than females (86), Marcus et al observed that the prevalence of edentulism had no relationship with gender (87). They also observed that there was an inverse relationship between the level of education, income and edentulism.

Palmqvist S at el in his questionnaire study show that married men had better dental conditions than other men. There was no significant between the groups unmarried, divorced, and widowed men. Widowed women showed the poorest dental conditions compared with both the married and the unmarried women. The unmarried women tended to have better dental conditions than even the married women. (88)

N. Shah et al in their study in India found that tooth loss increase with advancing age and was higher amongst elderly with low literacy level and those who had lost their spouse. (89)
Effect of Tooth Loss:

As number of teeth reduces, so does masticatory deficiency. The patient shift from a well-balanced diet to softer and high carbohydrate diet, resulting in not only increased dental diseases but also deficiencies of various micronutrients. \(^{(90,91)}\)

Ability to consume the food of one's liking is vital to the psychological health of an individual it provides a recurrent pleasant and satisfying experience that older individuals can anticipate daily. Denial of this simple source of satisfaction and deprivation can lead to depression \(^{(90)}\). Loss of anterior teeth with adverse effect on aesthetic brings down self-esteem and the person may tend to isolate himself-herself socially. In addition, improper mastication has also been reported to cause choking on a large bolus of food in the elderly, some times even leading to death. \(^{(92)}\)

D.M Davis et al in their research in the emotional effects of tooth loss they found that 76% of the study population restricted their choice of food; 76% did not enjoy their food as much; 67% avoided eating in public; 62% avoided laughing in public; 34% avoided going out in public; and 52% avoided forming close relationships as a consequence of loosing their teeth. \(^{(92)}\)
Purpose of the study

It has been shown that the results of surveys performed in one country cannot be used for service planning in another. Dental treatment lies under this concept.

Studies on prosthodontic needs in Sudanese hospitals have been scanty, and none have been conducted to assess the situation in the Military Hospital. This study aims to address the issue of prosthodontic need and services in the Military hospital in Sudan.
OBJECTIVES

The objectives of this study were

1- To evaluate the number of missing teeth, and the prevalence of edentulous spaces ranging from partial to completely edentulous status.

2- To examine and assess existing prosthetic restorations

3- To evaluate further needs for prosthetic treatment as related to different types of prosthetic rehabilitation such as fixed, removable or complete denture prostheses in a representative sample of 200 subjects visiting Omdurman Military Hospital for different types of treatment.
MATERIALS AND METHODS

The present study was based on material obtained from interviews, clinical examination and questionnaires for all patients attending Omdurman Military Hospital out-patients clinic.

**Sample collection:**

The sample was collected randomly amongst all subjects visiting the out-patient dental clinic of the Military Hospital. Two hundred subjects were selected.

**Interviews:**

The participants were interviewed in a familiar environment to obtain information. The questionnaire contained questions related to previous dental experience pertaining to oral health, name, age, gender, education, tribe and occupation. The participants were classified according to the following age groups: ≤15; 16-30; 31-45; 6-60; >60 years.

**Clinical Examination:**

The participants were examined in an upright dental chair using artificial dental light and a combination of dental explorer and a mouth mirror.
Each participant was examined for the missing teeth and prosthodontics status and the state of the standing dentition.

**Natural Teeth:**

The number and location of the natural teeth were recorded. Roots without clinical crowns were not recorded as existing teeth, since they were functionally and esthetically considered as non-existing teeth.

**Crowns and Fixed Bridges:**

For fixed bridges, the margins of crown-retainer and interproximal spaces were examined. Crowns soldered together though without replacement of missing teeth were not recorded as bridge.

**Removable dentures:**

The participants were classified as a complete denture condition when the denture-bearing jaw was edentulous, or in case of the partial dentures where the remaining teeth were lost but partial dentures are still in use. Removable partial dentures were recorded as such when one or more teeth were lost.
The actual use of the denture was the basis for recording an existing denture. A denture not used by the participant on the day of examination was not recorded.

**Tooth Spaces:**

In this investigation; the principles for recording teeth spaces and prosthetic treatment are in accordance with the method described by Owell as follows:

1- Tooth spaces were recorded only if edentulous areas had a width in excess of half a premolar, i.e 3.5mm, where as a closed space was recorded when a missing tooth did not give rise to a tooth space wider than 3.5mm.

2- The spaces were termed "tooth-bound spaces" if at least one tooth was present on each side of the space.

3- A tooth space with out a posterior demarcating tooth was recorded as a free-end space. A space created by a missing third molar was not recorded as a free-end space if the second molar remained.

4- Spaces not treated prosthetically for all tooth bound spaces wider than 3.5mm and for free-end spaces were classified as open tooth space.
Need for prosthetic rehabilitation:

To estimate the adequacy of prosthetic rehabilitation, the subjects were classified as edentulous if no natural teeth or roots were present, or partially edentulous if one or more natural teeth stood. The need for prosthetic rehabilitation followed the criteria described by Todd et al (1982) (93) and Ettinger et al (1984) (94) as follows: rehabilitation was required if:

a- If one arch or both arches were edentulous and no complete dentures had been used during the previous six months.

b- One tooth between the canines or two adjacent teeth in premolar and molar areas were missing and not replaced.

c- One jaw had less than ten teeth.

d- A jaw with a partial denture already present, and any additional natural tooth was missing and there was a space that had not been replaced by the denture.

No denture required:
This classification was used when a subject had (1) an intact dentition; (2) a satisfactory denture was being worn, (3) or it was believed that the subject would be unable to wear a denture because of a physical disability or mental condition.

**New Denture Required:**

This classification was used if a subject was edentulous and without a denture or there were insufficient teeth. Some criteria for insufficient teeth were fewer than 10 teeth in each arch or a distal extension edentulous arch with several natural teeth in the opposing arch. If a subject was wearing or possessed a denture that was unsatisfactory in terms of function, design, fit or occlusion damaging to the tissues and could not be easily repaired, adjusted, relined or rebased, a new denture was needed.

**Data analysis:**
Prior to the descriptive and inferential statistical analysis, the data was checked for logical errors. The categorized variables were analyzed by Cross-Tabulation, Chi-Square and Fisher’s Test in order to identify significant difference between subgroups using SPSS program.

The Results
The mean age of the patient was (32.69) with standard deviation (13.94). The highest age group was 16-30 (104) with percentage of a (52%), followed by the age group 31-45 (62) with percentage of 31%. The least age group was ≤15 (3) with percentage of 1.5%. The male patient account for 109 from 200 patients with percentage of 54.5% and the females were 91 with percentage of 45.5% (Table, 1).

There were considerable differences in the distribution of missing teeth between the upper and lower jaw. The most persistent teeth in the upper jaw were the canines, followed by the first premolar and then the lateral incisors. The most present teeth in the lower jaw were first premolars, followed by the canines, and then the lateral incisors. And the most commonly missing teeth in the upper jaw were the first molars followed by second molars and then the second premolars. Commonly missing teeth in the lower jaw were the first molars followed by the second molars and then the second premolars (Table 2 & 3 Figure 1).
From the study population 129 patients with percentage of (64.5%) had some form of missing teeth ranging from one tooth up to completely edentulous status, while the remaining sample consisting of 71 (35.5%) subject did not have any missing teeth (Table, 4).

As the age of the individual increased the frequency of missing teeth also increased. All of the age group >60 had missing teeth with percentage of 100%. On the other hand, only (25%) of the age group <15 had missing teeth (Table, 5 & Figure , 2).

The differences between gender in relation to tooth loss was statistically of no significance, there were 68 male with missing teeth with percentage of (62.4%), compared with 61 females with percentage of (67%) (Figure, 3). There were two men completely edentulous in upper and lower jaws and one man presented with edentulous lower jaw. There were four women completely edentulous in upper and lower jaw (Table, 6).
The highest numbers of missing teeth in relation to occupation were found among farmers with percentage of 100%, then the free workers with percentage of 83.3%, then house wives with percentage of (76%), then the employees with percentage of 64.2% and last group were students with percentage of 30.7% (Table, 7, 8 & Figure, 4).

The highest number of missing teeth among the tribes was found in people coming from the south with percentage of (75%), people coming from the north with percentage of (71.4%), those from the central region (66.7%), those from the west regions (57%) and those from the east with percentage of (50%) (Table, 9 & Figure, 5). There were three patients from the north and three patients from the west with completely edentulous upper and lower jaws and one patient from the central region with edentulous lower jaw (Table, 10).

There was inverse relation between level of education and tooth loss except in patients with higher education in whom the percentage was 100% (2 of 2). The illiterate had 81.2% missing
teeth, those with primary education 72%, those with secondary education 52.6%, and those with university education 48% missing teeth (Table, 11 & Figure, 6).

Eleven patients (8.5%) only replaced their missing teeth. The difference between male and female in replacing missing teeth is statistically of no significance.

The higher age group category who replaced their teeth was the age group >60 with percentage of 20%, the age group 46-60 (6.7%), the age group 31-45 (6.4%), and the age group 16-30 (2.9%). No one of the age group <15 had replaced any missing teeth (Table, 12 & Figure, 7).

In the relation between prostheses present and occupation we found that free workers had the highest rate of replacing missing teeth with percentage of 16.7% followed by house wives 10.9%, and employees 3.6%. None of the farmers nor students had any missing teeth replaced (Table, 13 & Figure, 8).
In the relation between prostheses present and the level of education we found that the illiterate had a higher rate of replacing missing teeth with percentage of 12.5%, followed by those with primary education 7%, and then those with secondary education 3.5%. No one with higher education had replaced any missing teeth (Table, 14 & Figure, 9).

In the relation between prostheses present and tribes we found that patients from the central regions with the highest percentage 26.7%, followed by those from the north 6.3%, followed by those from the south 5%, and then those from the west 2%. No one from the east had replaced any missing teeth (Table, 15 & Figure, 10).

As expected the most frequent reason for not acquiring prosthetic rehabilitation were economic reasons, on part of the subject, nearly one out of every two patients. Approximately a quarter of the subjects had not been fully informed about prostheses (Table, 16 & Figure, 11).
Materials mainly used for rehabilitation in the study population were of acrylic design, two woman patients had porcelain restoration and one man had gold.

From the study population (15) patients were in need of removable dentures 7.5%, (68) were patients in need of fixed prostheses 34% and (29) were patients in need of combination (fixed & partial) 14.5%. The need for removable prostheses was proportional to age of the patients. The need for fixed prostheses was concentrated in the younger age groups and the reverse was the case with the removable prostheses (Table, 17 & Figure, 12). And there was inverse relationship between treatment need and level of education except for the illiterate (Table, 18). The male patients who were in need of fixed prostheses were more than females and the reverse was the case with the removable prostheses (Table, 19 & Figure, 13, 14, 15).

From the study population seven patients only wore fixed partial dentures, four of which 58.3% were poor and in need of reconstruction. Four patients wore removable partial dentures, only 25% were in need of repair. Three patients only wore complete dentures all of which were either good or satisfactory.
Discussion

This study included a direct interview and clinical examination of 200 subjects, of whom 129 (64.5%) had missing teeth, ranging from one missing tooth to completely edentulous state, while the rest were all dentate. The percentage of missing teeth in this sample (64.5%) is considerably lower than the number presented in the study by Liedberg\(^{33}\) in Sweden, who found 76.4% in his sample had missing teeth. That is in spite of a high standard of measures followed in the field of prevention in those countries, in contrast to the underestimated health care system that the professionals and the public follow in our country.

There are a number of studies concerning tooth loss in the elderly population, but very few distinguish the type of teeth which are most commonly missing (Čaović et al 2000; Fure & Zickert, 1997)\(^{35,96}\).

Our study showed that the molars and premolars were the most commonly missing teeth in both jaws. This finding is in agreement with Fure & Zicket (1997)\(^{96}\) and Da’ameh (2005)\(^{42}\),
who found that molars and premolars were the most frequently extracted teeth in both jaws in 60-70 years old Swedish individuals and Afghanistan patients respectively. However, our finding suggests that the lower molars were the most commonly missing teeth, while the lower canines were the most persistent teeth in both jaws. This finding was not surprising due to the psychological impact of the loss of the upper central incisors on a person (Locker, 2005) (57).

Self-perceived oral health in older adults is correlated with the aesthetics and the sociological impairness in case of such loss (Schuurs & Eadie, 1990) (97). The lower dentition is usually less visible and the loss of the lower central incisors does not have such an impact on a person as is the case with the upper central incisors. One of the traditional customs of some tribes of the south of the Sudan is the extraction of the lower incisors. While the upper incisors are a measure of prettiness in females. The larger and whiter the upper incisors the more cows will be paid by the husbands.
The position of missing teeth is important in an individual's subjective need for replacing them (Liedberg et al, 1991, Schuurs et al, 1990). Most studies concerning subjective need for replacement of teeth report a higher perceived subjective need to replace anterior than posterior teeth (Owall, 1986; Schuurs et al., 1990). Owall (1986) found that spaces in the premolar-molar areas do not always constitute the main indication for replacement. As a consequence of this, open tooth spaces were highly accepted in the lateral regions of the mouth (Fure & Ziekert, 1997). Our finding supports this, since the majority of missing teeth of the study population were posterior, and the indifferent reason for not replacing missing teeth account for 26.5% of the patients missing posterior teeth.

The approach chosen to assess prosthetic treatment needs by clinical assessment in combination with planning guidelines and self-complete questionnaire proved to be feasible in a representative survey. The scientific basis for the definition of guidelines in medicine are formed by prospective clinical trials and high level retrospective studies (Schuurs et al, 1990).
In the literature many factors have been touched upon as determinants for the relatively low perceived need and utilization rate (Ettinger, 1984)\(^{(95)}\) Among these factors are dental status, fear and anxiety, general health, costs, dental symptoms, satisfaction with teeth and dentures, waiting time and a lack of knowledge about the dental care system. For most subjects subjective treatment need differs from demand. Trouble does not automatically result in dental visits (Elias & Sheiham, 1998).\(^{(98)}\)

The perception that the objective need for prosthetic treatment is higher in older age groups (Grabowski & Bertram, 1975)\(^{(9,)}\) was confirmed in our study population. Also the number of remaining teeth was higher for our age cohorts. The number of missing teeth without replacement was relatively very high (92.2%). Missing teeth were more frequent in the posterior regions but there were also some missing anterior teeth. No significance different was found in this respect between men and women or among the age groups studied.

Our findings were in agreement with Nyyssonen and Lappalainen\(^{(16)}\) whose study provided an exceptional chance for
studying perception about treatment needs in a sample representing the Finish adult population. They reported that elderly men and persons with less education and smaller family income felt the need for prosthetic treatment more often than women, younger individuals and those of better educated persons.

There is a conceived idea as some patients believed that replacement of missing teeth were only done for completely edentulous individuals and if any one wanted to replace some missing teeth, he/she would need to extract his healthy remaining teeth so as to wear a complete denture.

Since the Sudan is an underdeveloped country and 90% of its resident are under the poverty line, the economic reason was found to be the main factor for not replacing missing teeth and account for 54.5%.

In this study, as was mentioned before, 129 subjects out of the number of 200 subjects, had missing teeth ranging from one tooth to complete edentulism and the need for prosthodontic restoration was exhibited in 56% of the subjects, while the remaining were not in need of this rehabilitation. This is lower than
the percentage obtained in a study performed in Croatia by Catovic \(^{(35)}\), who found that more than 82% of the subjects were in need of fixed, removable or combined prosthetic treatment. However, compared to the study of Mojon \(^{(99)}\), in British Columbia, it was observed that the percentage he obtained was less than the percentage of this study, 36.4% with respect to 56%.
Conclusion

The final results of this study which consisted of 200 subjects indicated that 56% were in need of fixed, removable or combined prosthodontic treatment. The patients with missing teeth constituted about 64.5% of which 52.7% were male and 47.3% were female. Complete denture wearers presented 1.5% of the total sample, while removable partial dentures were worn by 2%, 3.5% had fixed bridges and the remaining did not have any prostheses (93%).

In the light of the found high normative need rates prosthetic dentistry seems to remain a dental discipline of major importance in the future. However, whereas the effectiveness of prosthetic restoration is doubtless (missing teeth are replaced) the health gain may have to be critically discussed in several cases. Evidence-based guidelines are considered to be valuable tools to promote a cost-effective and need based dental care. Aspect of health gain and patient preferences will achieve increasing significance.
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edentulous population. Community Dent Oral Epidemiol
Questionnaire regarding edentulous spaces and prosthesis provided

1. Name: ……………………………………………………………
2. Serial Number: …………………………………………………
3. gender 1/ male  2/ Female
4. Age: …………………………………………………………………
5. Tel. No.: …………………………………………………………
6. Address: ……………………………………………………………
7. Occupation: ………………………………………………………
8. Tribe: ……………………………………………………………
9. Educational Status: ……………………………………………
10. Intra-oral examination: …………………………………………

Missing teeth 1/ Yes  2/ No
Formula for missing teeth 1 | 2
                      4 | 3  how

Date of first extraction: …………………………………………
Date of last extraction: …………………………………………
Prosthesis present 1/ Yes  2/ No

Partial:

  Upper
  Complete
      Lower
      Both

Kennedy's class   modification

  Upper
  Lower

Fixed:

  Left   Right

  Upper
  Lower
Examination of the denture:

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Examination of bridge:

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<tr>
<td>Interproximal space</td>
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</tbody>
</table>

Type of fixed prosthesis:

Gold
Veneer
Porcelain bonded
Others

Why that specific prosthesis?

1. Economic reasons.
2. Not been informed.
3. No other alternative.
4. Doctor's choice.
5. Patient's choice.
6. Others.
Age of prosthesis: .................................................................

Reasons for not replacing missing teeth.

1. Indifferent: .................................................................

2. Uninformed: .................................................................

3. Economic reasons: ........................................................

4. Bad previous experience: ............................................... 

5. Mal informed by friend: ............................................... 

6. Doubting the efficacy of prosthesis: ................................. 

7. Following doctors instructions: ....................................... 

8. no dental clinic in vicinity: ............................................ 

9. Others: ........................................................................