ORIGINAL ARTICLE

Pattern and indications for adult permanent teeth extractions in Zamfara state, Northwest Nigeria

Schemat i wskazania do ekstrakcji zębów stałych u dorosłych w prowincji Zamfara w północno-zachodniej Nigerii

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Abstract

Aim of the study. *To determine the indications and pattern of tooth extraction in adult patients seeking care at the Dental Clinic of Federal Medical Centre, Gusau, Zamfara State between January 2011 and December 2012.* ***Material and methods.*** *The case records of patients seen at the Dental Clinic of the Federal Medical Centre, Gusau, Zamfara state between January 2011 and December 2012 were retrieved from the Medical Records Department and analyzed for gender, age, indication for extraction and tooth/teeth extracted.* ***Result.*** *A total of 1470 teeth were extracted over a two-year study period. There were 739 (50.3%) males and 731 (49.7%) females (M:F = 1.03:1). The age of the patients ranged from 14 to 90 years (mean*

Streszczenie

Cel pracy. *Ustalenie wskazań i schematu ekstrakcji zębów u dorosłych pacjentów zgłaszających się do kliniki stomatologicznej w Federalnym Centrum Medycznym w Gusau w prowincji Zamfara między styczniem 2011 a grudniem 2012.* ***Materiał i metody.*** *Dokumentacja pacjentów przyjętych w w/w klinice w podanym okresie została wyjęta z archiwum i poddana analizie pod kątem płci, wieku, wskazań do ekstrakcji oraz usuniętego zęba/zębów.* ***Wynik.*** *W analizowanym okresie dwóch lat usunięto łącznie 1470 zębów, z czego 739 (50,3%) u mężczyzn i 731 (49,7%) u kobiet (M:K = 1.03:1). Wiek pacjentów w przedziale od 14 do 90 lat (średni wiek = 34,4 lat ± 13,4 SD). 1347 (91,7%) zębów usunięto z powodu*

*= 34.4 years ± 13.4 SD). Among the teeth extracted, 1347 (91.7%) were due to caries and its sequelae, 84 (5.7%) and 34 (2.3%) were for periodontal disease and trauma respectively. Caries and its sequelae was the principal indication for extraction across all age group. The modal age group was 20-29 years. Higher proportion of extracted teeth was from the lower arch and the lower left quadrant. Molars made up 80.2% of all extractions with first molars predominating (50.1%). The ratio of mandibular to maxillary molars was approximately 2:1. **Conclusion.** Dental caries and its sequelae was the primary indication for tooth extraction in the study followed by periodontal disease and trauma. Hence, it is our opinion to urgently adopt preventive oral health policies to bring about reversal in the current trend.*

*próchnicy i jej następstw, 84 (5,7%) i 34 (2,3%) zęby usunięto w wyniku chorób przyzębia i urazów. Próchnica i jej następstwa były zatem głównym wskazaniem do ekstrakcji we wszystkich grupach wiekowych. Modelowa grupa wiekowa to 20-29 lat. Wśród zębów usuniętych zaobserwowano przewagę zębów dolnych zwłaszcza z dolnej lewej ćwiartki. Trzonowce stanowiły 80,2% wszystkich usuniętych zębów z dominacją pierwszych trzonowców (50,1%). Proporcja trzonowców w żuchwie do ich odpowiedników w szczęce wynosiła w przybliżeniu 2:1. **Wniosek**. W tym badaniu, próchnica i jej następstwa stanowiły główne wskazanie do ekstrakcji. Kolejnymi wskazaniami były choroby przyzębia i urazy. Zdaniem autorów, należy niezwłocznie wdrożyć działania profilaktyczne w obrębie jamy ustnej w celu odwrócenia obecnej tendencji.*

Introduction

Tooth extraction occupies a significant chunk of procedures carried out daily across many dental and oral surgery clinics on the African continent.[1] The deterioration in oral health owing to large scale loss of teeth as a result of extraction remains a big public health burden.[2] The attendant consequence on the quality of life of its vulnerable population/economy threatens the fragile health system already bedeviled with low funding and severe manpower shortage.[3]

Reported aetiology factors of tooth exodontia include dental caries, periodontal disease, trauma and orthodontics.[4-6] Others implicated included impaction, iatrogenic, tumours, failed root canal treatment, prosthetic, prophylaxis and patients' requests.[7-9] Studies suggest that dental caries and periodontal disease are the primary causes of tooth extraction in many populations worldwide.[10-12] Several reports from developing nations of Western Europe, Japan, Canada, Singapore and Jordan showed a steep decline in dental caries.[6,13-17] In contrast, many studies from Nigeria and other parts of Africa do not exhibit any significant changes in the proportion of dental caries as the predominant cause of tooth extraction.[18-21]

Little information is available on the indications and pattern of tooth extraction in Zamfara state, Northwest Nigeria. This will help in equitable distribution of scarce dental services, oral health economy/financing, manpower upgrading and implementable local oral health policies.

The aim of this study is to fill this void by examining the indications and pattern of tooth extraction in patients treated at the dental clinic of Federal Medical Centre, Gusau, Zamfara state, Nigeria. To the best of our knowledge this is a pioneer report of such from this state.

Materials and method

The case records of patients for tooth extractions at the dental clinic of the Federal Medical centre between 1st January 2011 and 31st December 2012 were retrieved from the Medical Records Department and analyzed for gender, age, indications for extraction and tooth extracted.

This hospital is the only tertiary and referral centre in the state and it is strategically located in the state capital, Gusau, Zamfara state. Zamfara state is one of the 7 states that form northwest geopolitical zone of Nigeria with coordinates 12o10'N latitude and 6o15'E longitude.

Until 1996, it was part of Sokoto state.[22] It shares an international border with republic of Niger to the north and interstates border with Katsina state to the east, Sokoto state to the west, Kaduna, Kebbi and Niger states to the south.[23] The state has a land mass of approximately 38,418 square kilometers and about 3.3 million largely rural inhabitants with agriculture being the predominant occupation.[22,23]

Included in the study are those whose age were 14 years or above at the time of presentation. The indications for tooth extraction were categorized into the following: (1) Caries and its sequelae, (2) periodontal disease, (3) Orthodontics, (4) Trauma, and (5) supraeruption.

Data analyses were performed using Analyse-it version 2.25 Excel 12+ (2013). Simple frequencies were computed and cross tabulations of some variables were made to determine any pattern of association. Statistical significance was drawn when the P value was less than 0.05.

Results

A total of 1470 teeth were extracted over a 2 years study period. There were 739 (50.3%) males and 731 (49.7%) females (M:F = 1.03:1) (Table 1). The age of the patients ranged from 14 to 90 years (mean = 34.4 years ± 13.4 SD).

Among the teeth extracted, 1347 (91.7%) were due to caries and its sequelae, 84 (5.7%) and 34 (2.3%) were for periodontal disease and trauma (Table 1). Caries and its sequelae was the principal indication for extraction across all age group (Tables 1, 4). The patients in the

Table 1. Pattern of dental extraction according to indication and sex

Reason for extraction	Sex of subjects		
	Male (%)	Female (%)	Total
Caries and its sequelae	670 (45.6)	677 (46.1)	1347 (91.7)
Periodontal disease	46 (3.1)	38 (2.6)	84 (5.7)
Supraeruption	1 (0.1)	2 (0.1)	3 (0.2)
Orthodontics	0 (0.0)	2 (0.1)	2 (0.1)
Trauma	22 (1.5)	12 (0.8)	34 (2.3)
Total	739 (50.3)	731 (49.7)	1470 (100.0)

Pearson's X^2 statistic = 6.03, df = 4, p = 0.1970.

Table 2. Pattern of dental extraction according to age group and gender

Age groups	Sex of patients (%)		
	Female	Male	Total (%)
10-19	57 (3.9)	49 (3.3)	106 (7.2)
20-29	231 (15.7)	257 (17.5)	488 (33.2)
30-39	213 (14.5)	198 (13.5)	411 (27.9)
40-49	134 (9.1)	111 (7.6)	245 (16.7)
50-59	55 (3.7)	69 (4.7)	124 (8.4)
60-69	17 (1.2)	33 (2.2)	50 (3.4)
70-79	17 (1.2)	17 (1.2)	34 (2.3)
≥80-89	7 (0.5)	5 (0.3)	12 (0.8)
Total	731 (49.7)	739 (50.3)	1470 (100)

Pearson's X^2 statistic = 11.75, df = 8, p = 0.16.

Table 3. Pattern of teeth extractions

1.	Side of Extraction	
	Right = 695 (47.3%)	Upper = 550 (37.4%)
	Left = 775 (52.7%)	Lower = 920 (62.6%)
2.	Total Teeth Extracted = 1470 (100%)	
3.	Permanent Molars = 1179 (80.2%)	
	(a) Upper (%)	(b) Lower (%)
	First = 180 (12.2)	411 (28.0)
	Second = 73 (5.0)	208 (14.4)
	Third = 104 (7.1)	203 (13.8)
	Total = 357 (24.3)	822 (55.9)
4.	Permanent Premolars = 127 (8.6%)	
	(a) Upper (%)	(b) Lower (%)
	First = 26 (1.8)	15 (1.0%)
	Second = 53 (3.6)	33 (2.2%)
	Total = 79 (5.4%)	48 (3.3%)
5.	Permanent Anteriors = 164 (11.2%)	
	(a) Upper (%)	(b) Lower (%)
	Central incisor = 78 (5.3)	32 (2.2)
	Lateral incisor = 22 (1.5)	11 (0.7)
	Canine = 14 (1.0)	7 (0.5)
	Total = 114 (7.8)	50 (3.4)

age group 20-29 years had the most extractions (Tables 2, 4).

Higher proportion of extracted teeth was from the lower arch and lower left quadrant (Table 3). A slightly greater proportion of anterior teeth were lost than the posteriors for periodontal disease (Table 5). Molars made up 80.2% of all extractions with first molars predominating (50.1%) (Table 3, 5). Mandibular molars were approximately twice as affected as maxillary molars (Table 3).

Discussion

Tooth loss is considered as a crucial indicator of oral health status of the individual and the community at large.[24] Studies have shown that tooth loss strongly impact quality of life and nutrition intake of those affected and signal the onset of serious morbidity and disability.[3,24] Tooth extraction has been demonstrated to be the major form of dental treatment in developing countries of Africa despite recent progress in preventive dentistry.[1,25,26]

Similar to previous authors, there was a slight male preponderance in the current study.[10,25,27] A statistical significance was however not established between gender and tooth extraction. At variance are recent studies by *Alesia* and *Khalil*; and *Danielson* et al who identified a female predominance.[28,29] Report from north Afghanistan suggests that men prefer tooth extraction due to their unwillingness to commit time and financial resource to restoration.[30] *Olaleye*, *Sulaiman* and *Solomon*[25] from Maiduguri northeast Nigeria found that more females seek restorative care while males prefer extraction.

In industrialized countries, the incidence and prevalence of dental caries have declined drastically owing to aggressive adoption of preventive oral health policies, extensive public awareness, regular brushing with fluoride toothpaste, mandatory dental checkup and availability of dental health insurance to a large majority of the population.[8,13-15] However, reports from many developing countries demonstrated a reversal of the scenario in developed nations.[27,29-32] Our present study is higher and contrasts with earlier studies from other regions of Nigeria and the rest of the world.[5,10,14,18,19,27,28] However, it is in concordance with figure obtained from Jigawa state, Nigeria.[32] We speculate that this could be related to low public awareness of preventive oral health, economic restraint and accessibility to dental facilities by many rural communities in the state. Future study might reveal if there is any association with the local diet and socioeconomic status.

Many studies have given the incidence of periodontal disease as ranging from 9.2% to

Table 4. Pattern of dental extraction according to indication and age groups

Age groups	Indication for extractions among patients					
	Caries and Sequelae	Orthodontics	Periodontal Disease	Supra eruption	Trauma	Total
10-19	96 (6.5)	2 (0.1)	2 (0.1)	2 (0.1)	4 (0.3)	106 (7.2)
20-29	464 (31.6)	0 (0.0)	19 (1.3)	0 (0.0)	5 (0.3)	488 (33.2)
30-39	388 (26.4)	0 (0.0)	14 (0.9)	0 (0.0)	9 (0.6)	411 (28.0)
40-49	227 (15.4)	0 (0.0)	13 (0.9)	1 (0.1)	4 (0.3)	245 (16.7)
50-59	102 (6.9)	0 (0.0)	18 (1.2)	0 (0.0)	4 (0.3)	124 (8.4)
60-69	33 (2.3)	0 (0.0)	12 (0.8)	0 (0.0)	5 (0.3)	50 (3.4)
≥70	37 (2.5)	0 (0.0)	6 (0.4)	0 (0.0)	3 (0.2)	46 (3.1)
Total	1347 (91.7)	2 (0.1)	84 (5.7)	3 (0.2)	34 (2.3)	1470 (100)

Pearson's X^2 statistic = 151.24, df = 32, p < 0.0001.

Table 5. Pattern of dental extraction according to indication and type of tooth extracted

Type of tooth extracted	Indications for tooth extraction					
	Caries and Sequelae	Orthodontics	Periodontal Disease	Supra eruption	Trauma	Total
Canine	14 (1.0)	0 (0.0)	3 (0.2)	2 (0.1)	2 (0.1)	21 (1.4)
First Incisor	50 (3.4)	2 (0.1)	37 (2.5)	1 (0.1)	20 (1.4)	11 (0.7)
First Molar	572 (38.9)	0 (0.0)	18 (1.2)	0 (0.0)	1 (0.1)	591 (40.2)
First Premolar	37 (2.5)	0 (0.0)	3 (0.2)	0 (0.0)	1 (0.1)	41 (2.8)
Second Incisor	24 (1.6)	0 (0.0)	5 (0.3)	0 (0.0)	4 (0.8)	33 (2.2)
Second Molar	271 (18.4)	0 (0.0)	9 (0.6)	0 (0.0)	1 (0.1)	281 (19.1)
Second Premolar	79 (5.4)	0 (0.0)	5 (0.3)	0 (0.0)	2 (0.1)	86 (5.8)
Third Molar	300 (20.4)	0 (0.0)	4 (0.3)	0 (0.0)	3 (0.2)	307 (20.9)
Total	1347 (91.7)	2 (0.1)	84 (5.7)	3 (0.2)	34 (2.3)	1470 (100)

Pearson's X^2 statistic = 487.51, df = 28, p < 0.0001.

41.8%.[5,6,9,14,18,21] However, 5.7% recorded in the present series is lower than those reported in the literature. Worldwide, most studies have implicated periodontal disease as one of the leading cause of tooth extraction second to dental caries,[5,9,27] *Danielson* et al[28] reported differently showing periodontal disease as the most frequent indication for tooth extraction in their series. Our result confirmed these earlier observations from the literature. This could be attributed to underreporting owing to the painless course of most periodontal diseases resulting in loss of these teeth or removal by the patient without recourse to dental treatment.

Unlike earlier reports,[21,24] our result established trauma as the third reason for tooth extraction with anterior teeth being significantly affected. *Noori* and *Al-Obaidi*[34] in an Iraqi study found fall and playing as common reason for dental injuries in group of children with class II division I malocclusion as a predisposing factor. Our figure suggests the need to determine the predisposing factors to trauma in this cohort and adopt ways to prevent it.

Recent Saudi study[28] demonstrated orthodontics to be the second indication for tooth extraction. Contrary to the above, only 0.1% of teeth extracted were for orthodontics reason in this cohort. It is unlike studies from southwest Nigeria[35,36] and developed countries[13-15] reflecting the increasing demand for orthodontic treatment. In our centre, owing to lack of technical expertise, we can only offer interceptive orthodontics or refer patients to more established tertiary hospital in the capital or south of the country.

Across both gender, peak age of extraction was in 20-29 years group with a frequency of 29.5% which was not statistically significant (p=0-27) from the about 25% recorded by the 30-39 years group. This results coincides with many previous findings[5,10,27,29] but in the contrary, a recent Saudi report[28] found the 10-20 years as the second most frequently affected group. They attributed this to the aggressive preventive program earlier embarked upon and the increasing demand for orthodontic treatment among their population. Our findings goes against the trend[8,9,28] that periodontal disease is the predominant reason for tooth extraction among people above 40 years. However, it highlights the need to take cognizance of increasing percentage of elderly patients presenting for tooth extraction complicated by debilitating general health status.

This study revealed the left side to be more commonly involved in tooth extractions which is in agreement with several investigators[5,19] while *Saheeb* and *Sede;*[27] and *Danielson* et al reported the right to be more affected. There were a higher proportion of extractions in the lower arch than upper arch resonating with others[5,20,28] but different from a UAE report.[37] Posterior teeth were mostly extracted in this study comprising 85.9% in contrast to 14.1% of anterior teeth. This is similar to that of *Da'ameh*[30] and *Taiwo* et al[33] that found 84.1% and 96.8% respectively of teeth extracted in their studies to be posteriors.

A slightly greater proportion of anterior teeth were lost than the posteriors for periodontal disease. This trend is more marked in the maxilla than mandible which is not in concordance with result from Singapore,[16] In tandem with global reports,[5,9-12,27-30] molars have shown to be the most vulnerable teeth to dental caries in this current study. Plausible explanations for this pattern have been deduced by earlier workers to be the presence of deep fissures, early eruption time, inaccessibility of the fissures to brushing and masticatory function making them susceptible to dental caries,[5,10,27-30]

We observed that the first molars were the major teeth extracted. In particular, first mandibular molars constitute approximately a third of our cohort (p<0.0001). This corresponds with earlier studies,[5,27] in contrast however, *Alesia* and *Khalil*[28] found the mandibular third molar to be more implicated. The study interestingly observed that third molars were commonly extracted in the 4th decade. This counter findings from western countries[13,15] where third molar extraction is preferred at a much earlier age and in lots of cases prophylactic extraction adopted. Studies from Nigeria[5,18,33] have shown that prophylactic extraction of third molars is rare in our population.

In conclusion, dental caries and its sequelae was the most important challenge in the study followed by periodontal disease and trauma. Hence, it is our opinion to adopt both preventive and curative measures to achieve reversal in the current trend.

In addition, we also reiterate the following submissions;

Incorporation of preventive oral health care into the existing primary health centres and the millennium development goals of the nation.

Expansion of the existing oral health services and manpower in the rural and urban communities.

Establishing mobile dental clinics thus bringing oral care to the doorsteps of our largely rural population.

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