Esthetic Perception of Missing Teeth Among a Group of Tanzanian Adults

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Purpose: To assess esthetic perceptions among Tanzanian adults regarding missing teeth using a cross-sectional clinical study of a convenience sample of 5,532 subjects in the Northern coastal zone of Tanzania. ***Materials and Methods:*** The dental status of urban and rural Tanzanian adults (5,532 subjects, ages between 20 and 80 years) was recorded. A structured interview was used to assess esthetic perception (yes/no complaint) considering the location and number of missing teeth. Logistic regression analysis was applied to determine the effects of the variables age (2 groups: ≤ 45 years vs > 45 years), gender, socioeconomic status (high/middle vs low), and residence (urban vs rural) on the number of complaints. ***Results:*** Of the subjects with 1 or more missing maxillary anterior teeth, 54% reported a complaint. Dissatisfaction was reported by significantly more subjects ≤ 45 years of age and subjects with high/middle socioeconomic status. Gender and residence had no significant influence. Of the subjects with missing maxillary premolar(s) (no missing anterior teeth), 25% reported esthetic complaints (missing first premolar: 24%; missing second premolar: 11%; missing first and second premolar on the same side: 44%). Dissatisfaction was significantly greater in women, subjects ≤ 45 years of age, and subjects with high/middle socioeconomic status. Residence had no significant influence. Fewer than 1% of the subjects were dissatisfied with missing maxillary molars. ***Conclusion:*** Among this group of Tanzanian adults, absence of teeth played a considerable role in the esthetic appreciation of their dentition. Complaints were associated with both number and location of missing teeth. *Int J Prosthodont 2008;21:169–173.*

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In prosthodontic research addressing oral function, chewing capacity is usually the main topic of interest. Other oral functions, such as speech, taste, and esthetics, have been given less attention. Research on esthetics—traditionally the area of orthodontics and restorative dentistry—mainly focused on discoloration, malformation, and irregular arrangement of teeth, rather than on the role of number and location of missing teeth. Although it is obvious that missing teeth compromise dental appearance, the extent of the esthetic consequences is rarely described in the literature. One of the few studies on this topic described dentofacial appearance using portrait photographs judged by young adults. Individuals displaying normal dental arrangements of anterior teeth were judged friendlier and kinder compared to edited portraits of the same persons appearing to have a missing anterior tooth.[1] Another study claimed that missing anterior teeth caused a "pretty bad sight," and opinions

about missing teeth affecting dental appearance differed little between dental clinicians and laypersons.[2] Furthermore, a review of the relationship between overall satisfaction with dentition and number and position of teeth underlined the significance of anterior teeth with respect to esthetics.[3]

The role of missing posterior teeth in dental attractiveness and its perception has seldom been investigated. It is probable that the impact of missing teeth in the posterior region depends on their visibility during speaking and smiling. Maxillary first and second premolars were found to be partially visible in over 80% of smiles; maxillary second premolars displayed their entire clinical crown length during smiling in almost 70% of the examined (Caucasian) subjects.[4]

Knowledge about the perception and significance of missing posterior teeth is necessary for a better understanding of the consequences of particular treatment concepts, such as the shortened dental arch.[5] In a study of the impact of the shortened dental arch concept in Tanzania, aspects of oral function have been described.[6,7] Esthetic perception was part of this study.

However, the perception of missing teeth in people living in a developing country such as Tanzania may be different from that of people living in industrialized high-income countries. This difference may be the result of several factors. First, the majority of the African population is still subject to life-threatening diseases and severe socioeconomic problems. Consequently, esthetic imperfections may have limited impact on their well-being. Further, because access to oral health care is limited in Tanzania, it is quite common to have missing teeth without replacement, and thus this condition is probably more accepted. In spite of these considerations, the authors hypothesized that absence of teeth plays a considerable role among Tanzanians in the esthetic perception of their dentition. For this purpose, this study aimed to investigate to what extent esthetic perception is based on the number and location of missing teeth.

Materials and Methods

The data for the present study were originally collected as part of a comprehensive epidemiologic study investigating shortened dental arches in a Tanzanian adult population. Previous reports[6–9] described the study design, subjects involved, and examination criteria in detail; thus, the main conditions will be mentioned only briefly here.

Cluster samples were obtained from urban and rural adult populations of the coastal zone in Tanzania. A total of 5,532 subjects between 20 and 80 years of age were involved (2,654 urban residents of 2 cities working at 5 factories and 2 governmental institutions, and 2,878 rural residents from 6 villages). After obtaining verbal consent, a single calibrated examiner performed a dental examination using a dental mirror and a dental probe in natural light while the subject was seated on an ordinary chair.

The examiner recorded the dental status of each subject. Each tooth was recorded as present, missing, or replaced by a partial denture. Teeth replaced by a partial denture used by the subject were considered as present. Further, if the width of the open space was reduced by tooth migration for at least half the width of the missing tooth, then that tooth was also recorded as present.

For the assessment of esthetic perception, subjects with 1 or more missing maxillary teeth were considered, irrespective of the absence or presence of mandibular teeth. Five groups were constructed. Subjects with 1 or more missing maxillary anterior teeth irrespective of the absence of posterior teeth were allocated to Group A (n = 473; 230 men and 243 women). Group A was subdivided into a group of subjects with 1 or more missing maxillary anterior teeth and complete mandibular anterior regions (Group A_{max}; n = 345; 164 men and 181 women) and a group of subjects with 1 or more missing anterior teeth in both the maxilla and mandible (Group A_{maxman}; n = 128; 66 men and 62 women).

Subjects with complete anterior regions but with at least 1 missing maxillary premolar were allocated to Group P (n = 635; 325 men and 310 women). This group was also subdivided into a group of subjects with missing maxillary premolars only (Group P_{max}; n = 142; 75 men and 67 women) and a group of subjects showing both missing maxillary premolars and missing mandibular premolars on the same side of the dentition (Group P_{maxman}; n = 493; 250 men and 243 women).

Finally, subjects with missing maxillary first molars but with complete anterior and premolar regions were allocated to Group M (n = 539; 315 men and 224 women). Subjects not fitting in either of these groups (ie, complete dental arches, missing maxillary second molars only, missing mandibular teeth only) were excluded from the analysis.

The examiner interviewed the subjects and scored dissatisfaction with esthetics because of missing maxillary anterior teeth as "complaint because: 1 or more maxillary anterior teeth / maxillary first premolar / maxillary second premolar / maxillary first molar missing." Esthetic satisfaction in spite of missing teeth was recorded as "no complaint although 1 or more maxillary anterior teeth / maxillary first premolar / maxillary second premolar / maxillary first molar missing."

Logistic regression analysis was applied to determine effects of the variables *(1)* age (≤ 45 years vs > 45 years), *(2)* sex, *(3)* socioeconomic status (SES) (high

Table 1 Distribution of Complaints and the Effects of the Variables Included in the Regression Model

	Complaints (%)	No complaints (%)	Total	*P*	OR	95% CI
Group A	254 (54)	219 (46)	473			
Sex				.94	-	-
Male	130 (57)	100 (43)	230			
Female	124 (51)	119 (49)	243			
Age group				< .0001	8.9	5.3–14.2
≤ 45 y	139 (86)	23 (14)	162			
> 45 y	115 (37)	196 (63)	311			
Residence				.90	-	-
Urban	114 (60)	75 (40)	189			
Rural	140 (49)	144 (51)	284			
SES				< .0001	3.5	2.3–5.5
High/middle	141 (74)	49 (26)	190			
Low	113 (40)	170 (60)	283			
Group P	157 (25)	478 (75)	635			
Sex				< .0001	0.3	0.2–0.5
Male	46 (14)	279 (86)	325			
Female	111 (36)	199 (64)	310			
Age group				.0002	2.2	1.5–3.3
≤ 45 y	109 (35)	199 (65)	308			
> 45 y	48 (15)	279 (85)	327			
Residence				0.55	-	-
Urban	82 (26)	230 (74)	312			
Rural	75 (23)	248 (77)	323			
SES				.0009	2.1	1.4–3.4
High/middle	122 (30)	290 (70)	412			
Low	35 (16)	188 (84)	223			
Group M*	3 (0.6)	536 (99.4)	539			

*No statistical analyses performed because of the small number of complaints.
OR = odds ratio; CI = confidence intervals; SES = socioeconomic status.

Table 2 Distribution of Complaints According to Subgroup

	n	Complaints (%)	*P*
Group A	473	254 (54)	
A_{max}	345	154 (45)	.23
A_{maxman}	128	65 (51)	
Group P	635	157 (25)	
P_{max}	142	20 (14)	.009
P_{maxman}	493	137 (28)	
Group M*	539	3 (0.6)	

*No statistical analyses performed because of the small number of complaints.

and middle SES vs low SES; SES composed of formal level of education, occupation, and housing condition), and *(4)* residence (urban vs rural) on esthetic complaints. Differences between anterior subgroups and between posterior subgroups were tested using the chi-square test.

Results

Anterior Region

Fifty-four percent of the subjects with missing anterior teeth (Group A) reported dissatisfaction with their dental appearance (Table 1). More complaints were recorded for subjects missing 2 or more maxillary anterior teeth (62%) than for subjects missing only 1 maxillary anterior tooth (49%) ($P = .02$). The more maxillary anterior teeth that were missing, the higher the prevalence of reported complaints. Of the subjects missing all maxillary anterior teeth, 71% had esthetic complaints. There was no statistically significant difference in the prevalence of complaints between the group of subjects with missing maxillary anterior teeth and complete mandibular anterior regions (Group A_{max}, 45% complaints) and the group with missing maxillary and mandibular anterior teeth (Group A_{maxman}, 51% complaints) (Table 2). Subjects with missing maxillary anterior teeth only reported complaints (57%) more often than subjects with missing mandibular anterior teeth only (26%) (chi-square; $P = .01$).

Subjects 45 years of age or younger and subjects with a high or middle SES reported esthetic complaints significantly more often with respect to missing anterior teeth than older subjects or subjects with low SES (Table 1; $P < .0001$). The variables sex and residence showed no significant effects in the regression model. Subjects over 45 years of age had a higher average number of missing anterior teeth than subjects 45 years and younger (Table 3). Removable partial dentures replacing missing anterior teeth were seen in only 8 subjects (1.7%).

Table 3 Mean No. of Missing Anterior Teeth Per Age Group

	≤ 45 years (SE) (n = 162)	> 45 years (SE) (n = 311)
Missing maxillary anterior teeth	1.6 (1.0)	2.3 (1.4)
Missing mandibular anterior teeth	0.3 (0.9)	0.9 (1.5)

Table 4 Distribution of Complaints of Subjects with Missing Maxillary Premolars and the Effect of Missing Mandibular Premolars on this Distribution (n = 635)

Missing maxillary premolar	n	Complaints (%)	Missing mandibular premolar(s) on same side	n	Complaints (%)*
First	165	39 (24)	No	43	8 (19)[a]
			Yes	122	31 (25)[a]
Second	263	28 (11)	No	77	2 (3)[b]
			Yes	186	26 (14)[c]
First and second	207	90 (44)	No	22	10 (45)[d]
			Yes	185	80 (43)[d]

*Same superscript letters indicate nonsignificant differences (chi-square, $P < .05$).

Posterior Region

Of the subjects missing 1 or more premolars, 25% reported esthetic complaints (Table 1). Subjects with a combination of missing maxillary and mandibular premolars on the same side of the dentition complained more often than those missing maxillary premolars only (Table 2). This effect was seen most clearly for subjects missing a maxillary second premolar (Table 4). Complaints about a missing maxillary first premolar were independent from the absence of mandibular premolar(s) on the same side of the dentition. More subjects missing both maxillary premolars in the same quadrant reported complaints than subjects missing only 1 maxillary premolar per quadrant ($P < .0001$).

Female subjects, subjects 45 years of age or younger, and subjects with high and middle SES had significantly more esthetic complaints with respect to missing premolar teeth than their counter groups (Table 1). Only 3 subjects reported esthetic complaints because of missing maxillary molar teeth. Because of this small number, statistical analysis could not be performed. Removable partial dentures replacing missing posterior teeth were seen in 13 subjects (2%). In three of these cases, the dentures were not regularly worn.

Discussion

The sample population in this study was originally recruited to find subjects with shortened dental arches.[6–9] These individuals have missing molars and/or premolars but no missing anterior teeth. Thus, subjects with missing anterior teeth were underrepresented and subjects with missing posterior teeth were overrepresented. Nevertheless, the selection of subjects was randomized. The sample size was large and its composition was considered to provide a realistic profile of the population of the Northern coastal area of Tanzania.

In the complete sample (n = 5,532), about 9% of the subjects had 1 or more missing maxillary anterior teeth and about 21% had 1 or more missing maxillary posterior teeth. Missing teeth did influence perceptions of dental appearance among Tanzanian adults. As expected, missing maxillary anterior teeth resulted in more complaints than missing maxillary posterior teeth. With regard to the posterior region, the absence of both premolars on 1 side resulted in more esthetic complaints. Complaints about missing maxillary second premolars increased significantly only when mandibular premolar(s) were also missing on the same side. In contrast, missing mandibular anterior teeth did not add to the frequency of complaints about maxillary anterior teeth. Missing molars were not important in esthetic satisfaction.

The older age group was less dissatisfied about missing teeth than the younger age group. These findings are in line with previous findings regarding the esthetic perception of tooth color. The presence of dark teeth is seemingly perceived as less important with increasing age.[10,11] Alkhatib et al[11] mentioned several factors that may contribute to the fact that older people are less dissatisfied with darker teeth than younger people. They suggested that, in general, older people favor function over appearance compared to younger people. Another factor is that older people may be happy to look similar to their peers, who may also have darker teeth. Finally, self-esteem is generally less dependent on appearance in older people than in younger people. These factors may also apply to older people with missing teeth. Thompson et al[12] stated that older people perceive more secondary control (acceptance) over aging-related appearance than younger people. In younger people, primary control of appearance (ie, the belief that one can have control over attractiveness) is predominant.

The number of subjects with complaints about missing maxillary anterior teeth was not associated with sex, but more women than men complained about missing maxillary premolars (Table 1). It can be speculated that women are more critical of their esthetics than men for less visible sites, but this does not explain why the number of complaints regarding missing anterior teeth was the same for men and women.

Missing teeth were replaced by a dental appliance in only 2% of the subjects. A considerable number of subjects were dissatisfied with their appearance but had no replacement. This suggests a lack of financial resources for or accessibility to dental care. One report stated that 5% of Tanzanian adults seeking dental treatment came for esthetic reasons, compared with 86% who came for pain relief.[13] However, the origin of esthetic treatment demand was not specified.

Conclusion

The results of the present study add to previous findings regarding shortened dental arches. Not only were chewing function and stability sufficient in subjects with a shortened dental arch comprising all premolars, but subjects also appear to be satisfied with their dental esthetics when none of these teeth were missing. The findings of this study justify the acceptance of the hypothesis that the absence of teeth affects esthetic perceptions in this group.

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Literature Abstract

Effect of metal type and surface treatment on in vitro tensile strength of copings cemented to minimally retentive preparations

This study evaluated the effect of alloy type and surface pretreatments on tensile strength to minimally retentive preparations on metal copings made of base alloy and noble alloy. Standardized crown preparations were made on recently extracted human third molars with a height of 3 mm and 26-degree taper (n = 68). All noble and base alloy copings fabricated received heat treatment for oxide formation. Three experimental groups (oxide only, airborne-particle abraded, or metal-primed) were created for each metal type. Copings were luted using a self-adhesive universal resin cement (RelyX Unicem) and thermal cycled (500 cycles between 5°C and 55°C) and stored (24 hours, 37°C) before debonding using a universal testing machine. Two-way analysis of variance was used to verify the interaction between the metal type and surface treatment (α = .05). A multinomial logit statistical model was used to describe the effect of metal type and surface treatment on failure site location (α = .05). The results indicated no significant influence of any factor on debond load. The multinomial logit statistical model showed that noble metals and metal primers significantly shifted failures to occur more frequently at the resin/tooth interface or within the tooth itself.irborne-particle abrasion was found to shift debonding more toward root failure than did the oxide layer only. The authors concluded that neither metal type nor surface pretreatment affected bond strength. Alloy type and surface treatment affected debond location.

Abreu A, Loza MA, Elias A, Mukhopadhyay S, Rueggeberg FA. *J Prosthet Dent* 2007;98:199–207. **References:** 43. **Reprints:** Dr Amara Abreu Oral Rehabilitation Department, School of Dentistry, Department of Oral Rehabilitation, Medical College of Georgia, 1120 15th St AD3239A, Augusta, GA 30912. Fax: 706 721 8349—*Ansgar C. Cheng, Singapore*