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Tooth Loss Status and the Prevalence of Dental Restorations Among the Palestinian Population in Gaza Strip

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حالة فقدان الأسنان ونسبة انتشار عمليات تعويضات سنيه بين السكان الفلسطينيين في قطاع غزة

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** المؤلف المراسل: وسيم مشتهى، كلية طب الأسنان، جامعة الأزهر-غزة ، فلسطين

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Abstract

Objective: to investigate the prevalence of tooth loss and dental restorations among Palestinian adults in Gaza, and to provide data about dental awareness level.

Methods: Descriptive statistics were used to explore and summarize dentition status. Stratified random cluster-sampling method was used to enrol adult subjects aged 30 to 44, 45 to 59, 60 to >80 years in 5 provinces of Gaza. The status of tooth loss and dental restorations were investigated. SPSS-22 software was used for statistical analysis

Results: The current results exhibited a description for sample size of 388 patients. Concerning the dentition status, 29.9% of the patients had complete dentition, 68.3% had partially edentulous and 1.8% had complete edentulous. In the same line, statistical higher proportion reported with males compared to females. Regarding the demographic variable, the patients from Mid-zone showed a significantly higher proportion of complete dentition than other provinces. Females tend to replace their missing teeth more than males (37.0% vs 26.2%). Moreover, the patients with prosthetic restoration exhibited significant higher proportion in the Mid-zone (44.9%) compared to the other provinces. In parallel, the patients with fixed prosthesis have the highest percentage (15.5%) than any other type of replacement. Regarding the educational status, the educated participants showed a higher percentage of replacement than non-educated subjects (41.0%).

Conclusion: Status of tooth loss and prosthetic restoration among adults in Gaza were recorded in this survey, the results showed that dental caries is the first cause behind the extraction of teeth. Income, age, education, social status, functional status and occupation are important factors which play a vital role in replacement of missing teeth. More efforts are needed to improve oral health promotion and dental awareness level.

Key words: Tooth loss, restorations, dental awareness

الملخص:

الهدف من الدراسة: الدراسة الحالية تهدف الى تحديد مدى انتشار فقدان الأسنان وترميمها بين البالغين الفلسطينيين في غزة، وتوفير بيانات حول مستوى الوعي عند المرضى بأسنانهم.

طريقة انجاز الدراسة: تم استخدام الإحصاء الوصفي لاستكشاف وتلخيص حالة الأسنان. حيث تم استخدام طريقة جمع العينات العنقودية الطبقية العشوائية لإدراج الأشخاص البالغين والتي تتراوح أعمارهم بين 30 أكثر من 80 عامًا في 5 محافظات في قطاع غزة. تم فحص حالة فقدان الأسنان وترميمها وذلك باستخدام برنامج SPSS-22 للتحليل الإحصائي.

النتائج: أظهرت النتائج الحالية وصفًا لحجم عينة متكونه من 388 مريضًا. فيما يتعلق بحالة الأسنان التي تم فحصها، أظهرت الدراسة أن 29.9٪ من المرضى لديهم أسنان كاملة (بدون فقد)، 68.3٪ لديهم فقد جزئي في الأسنان و1.8٪ لديهم فقد كامل للأسنان. وبهذا الخصوص اوضحت النتائج أن نسبة الفقد كانت أعلى إحصائيًا عند الذكور مقارنة بالإناث. فيما يتعلق بالمتغير الديموغرافي، أظهرت الدراسة ان نسبه المرضى بأسنان كامله كانت أعلى بكثير في المنطقة الوسطى مقارنة بباقي المحافظات. بالإضافة الى ذلك فقد تبين ان الإناث تميل إلى استبدال أسنانهن المفقودة أكثر من الذكور (37.0٪ مقابل 26.2٪). علاوة على ذلك، أظهرت الدراسة أن المرضى الذين خضعوا لعمليه تعويضات سنيه بنسبة أعلى وبشكل ملحوظ في المنطقة الوسطى (44.9٪) مقارنة بباقي المحافظات. بالتوازي مع ذلك، فإن المرضى ذوي التركيبات السنية الثابتة لديهم أعلى نسبة (15.5٪) من أي نوع آخر من عمليات الاستبدال. فيما يتعلق بالمستوى التعليمي، أظهر المشاركون ذو المستوى التعليمي العالي نسبة استبدال أعلى من غير المتعلمين (41.0٪).

الخلاصة: أوضحت الدراسة الحالة العامة لفقدان الأسنان والتعويضات السنية للبالغين في غزة في هذه الدراسة، وقد أظهرت النتائج أن تسوس الأسنان هو السبب الأول لفقد الأسنان. مما سبق تبين أن هناك مجموعه من العوامل (الدخل، العمر، التعليم، الوضع الاجتماعي، والوظيفة) هي من العوامل المهمة التي تلعب دورًا حيويًا في استبدال الأسنان المفقودة. ختاما أوضحت الدراسة أن هناك حاجة إلى مزيد من الجهود لتحسين تعزيز صحة الفم ومستوى الوعي بالأسنان.

الكلمات المفتاحية: فقدان الأسنان ، التعويضات السنيه، توعية الأسنان

Introduction

Oral health is a very important component of health throughout human life. Poor oral health and untreated oral diseases have a negative impact on the quality of life and can be risk factors for general health. Oral diseases affect the most basic daily activities, including eating, drinking, smiling and communication (Hescot, 2017, Piovesan et al., 2010). Oral diseases such as dental caries and tooth loss have been considered to the most important global health burdens (Lui et al., 2014). When teeth shift, they can create further cosmetic problems and become more susceptible to cavities, bite problems and gum (malocclusion lead to decrease masticatory performance) (Lui et al., 2014).

Tooth loss is a multifactorial problem which can result from dental caries, periodontal diseases, social and psychological effects (Gavriilidou and Belibasakis, 2019). Some patients can't have dental care due to financial problems, dental fear or lack of awareness. Therefore, it is assumed that infection will progress until the tooth needs to be extracted or even broken down with exfoliation of infected residual roots (Lin et al., 2001).

A recent study conducted in Egypt showed that lack of oral hygiene measures specifically tooth brushing is the most significant behavioral risk factor for the poor oral health status and tooth loss. Sociodemographic and socio-economic factors are influential risk factors for tooth loss (Moussa et al., 2020). In general, increased prevalence of periodontal disease and poor oral hygiene are special healthcare concerns in Arab countries (Ghaith et al., 2019; Hashemi et al., 2012). It is well-known that tooth loss can cause various problems associated with functional and psychosocial issues (Anastassiadou and Robin, 2006; Simunkovic et al., 2005).

Oral rehabilitation including utilization of fixed, removable prosthesis has long been advocated as an effective measure in reducing the burden associated with tooth loss (Anastassiadou and Robin, 2006; Koshino et al., 2006; Simunkovic et al., 2005 and Kuo et al., 2009). Within the last years, population in Gaza has been increasing rapidly, the aim of this study is to investigate the status of tooth loss and the percentage of dental restorations among multiple age group.

Material and methods

Descriptive statistics were used to explore and summarize dentition status. A sample of 388 subjects was representative for the population of Gaza. A stratified random sample was used in the five governorates of the Gaza strip. We randomly selected the subjects of our study among different age groups. The status of tooth loss and prosthetic status was investigated. SPSS version 22 software was used for statistics analysis.

Data collection

Data of tooth loss status and restoration were collected through orally answering a questionnaire**.** The oral-answered questionnaire was done by dentists and data collectors in the main five governmental clinics at the Gaza Strip governorates (once in each governorate). The questionnaire was self-developed based on previous theoretical and empirical studies. Questionnaires were distributed through face to face structured-interviews have been performed by researcher and trained data collectors. The questionnaire was arbitrated by a group of experts and professionals (academics and clinicians) and a pilot study was performed on 8%

of the total sample (32 participants) to examine the content validity. The participants of the pilot study were included in the main study because no major modifications have been done on the content of the questionnaire.

At first, subjects were being classified according to tooth loss into: - edentulous subjects (no remaining teeth), subjects with complete dentition (no missing teeth) and subjects with dentition defects (some of remaining teeth). Secondly, subjects were classified according to restoration of tooth loss into: -Subjects with implants, fixed partial dentures, removable partial denture, complete denture and subjects with no restoration for their missing teeth.

The researcher performed a consecutive sample that is also known as total enumerative sample, while consecutive sampling is the process of conducting research on all the clients who met the inclusion criteria and were conveniently available, as part of the sample. So, data collectors continued in collecting data till achieved the planned number of participants.

Data analysis was performed with the Statistical Package for the Social Sciences (IBM – SPSS Statistics v26.0). Descriptive statistics of frequencies, percentage, and cross tabulation were used to describe the main features of the data and to study the bivariate relationships among the variables. Bivariate Chi-square tests were used to identify the significance (p-value = .05) of the associations between each of the covariates of interest and the dichotomous dependent variable of replacement of missing tooth or keeping it unreplaced. Spearman correlation was calculated to detect the direction of relationship between age and replacement of missing teeth.

The associations between categories of the predictor variables and the outcome are expressed as odds ratios with 95% confidence intervals (CI).

Results

In total of 388 adults was investigated. The age, region and gender distribution characteristics of subjects are shown in table 1. The present study covered 10 investigation sites. Subjects were sampled from 5 governorates.

Table 1: Age, region and gender distribution characteristics of Gazan adult subject

Age	Region										Gender					
	Rafah		Khan Younis		Mid Zone		North		Gaza		Female		Male		Total	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
30-44y	27	49.1	41	57.7	34	557	40	55.6	74	57.4	111	56.3	105	55	216	55.7
45-59y	19	34.5	19	26.8	19	31.1	22	30.6	37	28.7	58	29.4	58	30.4	116	29.9
60-80<y	9	16.4	11	15.5	8	13.1	10	13.9	13	14	28	14.2	28	14.7	56	14.4
total	55	100	71	100	61	100	72	100	129	100	197	100	191	100	388	100

The status of tooth loss

The percentage of extraction for each tooth among adults in Gaza of different age groups are shown in table 2. According to the table, the tooth with a highest extraction percentage in 30-44 y group is lower right first molar (18.1%) followed by upper left second premolar (16.7%) while upper left lateral incisor and upper right central incisor have the lowest extraction percentage (0.9%).

For 45-59y group, the tooth with highest extraction is also lower right first molar (38.8%) followed by upper left first molar (33.6%) while lower right lateral incisor has the lowest extraction percentage (5.2%).

For 60-80y group, the tooth with highest extraction is also lower right first molar (64.3%) followed by upper right first molar (58.9%) while lower right canine has the lowest extraction percentage (23.2%). Among all tooth positions, lower right first molar showed the highest percentage of extraction.

Table2 : The percentage of extraction for each tooth related to age groups

Tooth	30-44y	45-59y	60-80<y
UR7	7.9%	25.9%	53.6%
UR6	13%	22.4%	58.9%
UR5	13.9%	30.2%	53.6%
UR4	6%	19.8%	44.6%
UR3	3.2%	9.5%	35.7%
UR2	1.9%	11.2%	28.6%
UR1	0.9%	7.8%	30.4%
UL1	1.9%	9.5%	28.6%
UL2	0.9%	11.2%	35.7%
UL3	2.3%	10.3%	37.5%
UL4	6%	19.8%	42.9%
UL 5	16.7%	29.3%	50%
UL 6	14.4%	33.6%	57.1%
UL 7	13.9%	25%	51.8%
LL 7	9.7%	25%	55.4%
LL 6	10.6%	26.7%	48.2%
LL 5	9.7%	15.5%	37.5%
LL 4	2.8%	11.2%	33.9%
LL 3	1.9%	6.9%	26.8%
LL 2	1.9%	7.8%	32.1%
LL 1	1.4%	7.8%	33.9%
LR 1	2.3%	6%	32.1%
LR 2	1.9%	5.2%	26.8%
LR 3	1.4%	6%	23.2%
LR 4	4.2%	12.9%	32.1%
LR 5	8.8%	19.8%	37.5%
LR 6	18.1%	38.8%	64.3%
LR 7	11.6%	31.9%	50%

(UR: upper right; UL: upper left; LL: lower left; LR: lower right)

Prosthetic status

The relation between gender and percentage of replacement is shown below in chart 1. Generally, among the 388 subjects in this survey 1 male to 1.6 females who replaced their missing teeth while the ration of the participants who didn't replace their missing teeth was 1:1. The relation among the governorate and the percentage of replacement is shown below in chart 2. The researcher sought to identify the public awareness of the dental restoration among the Gaza Strip governorates in terms of culture and financial status. Moreover, the researcher intends to explore the impact of either partial or complete edentulous on the health status of patients in a future study. Meantime, out of 39 participants, 16 (41%) of them in Rafah replaced their missing teeth. In Khanyonnis, 15 out of 51 participants (29.5 %) replaced their missing teeth. In Mid-zone, 22 out 49 participants (44.9%) replaced their missing teeth, while. in North province, 13 out of 48 participants (27%) replaced their missing teeth and out of 85 participants in Gaza City, 21 of them replaced their missing teeth.

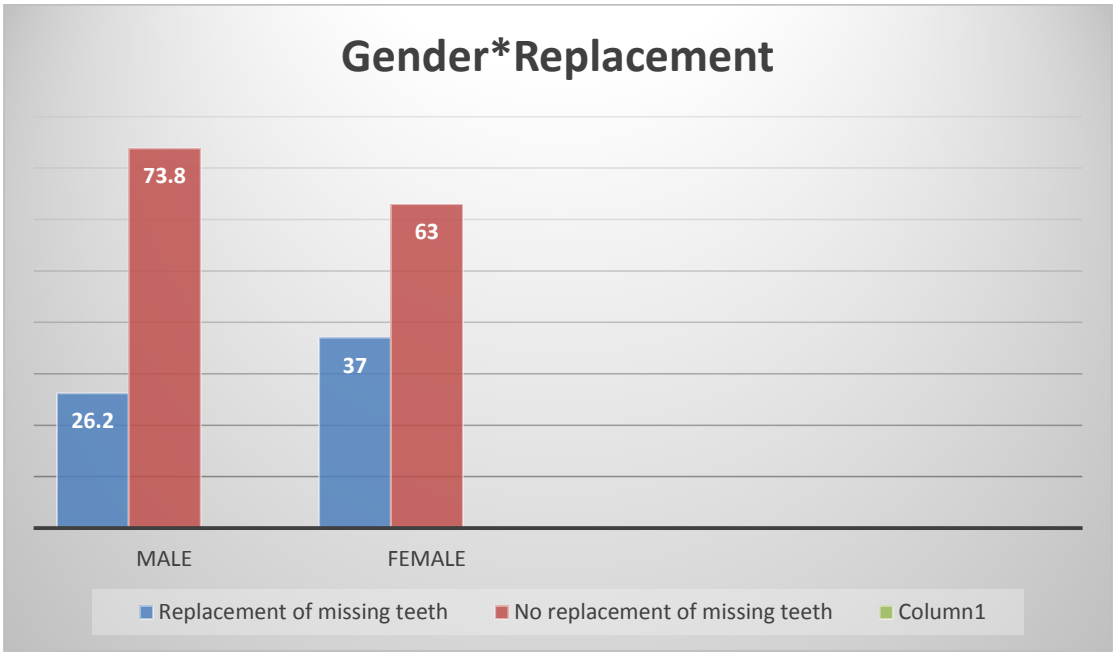

Chart 1: The relation between gender and percentage of replacement

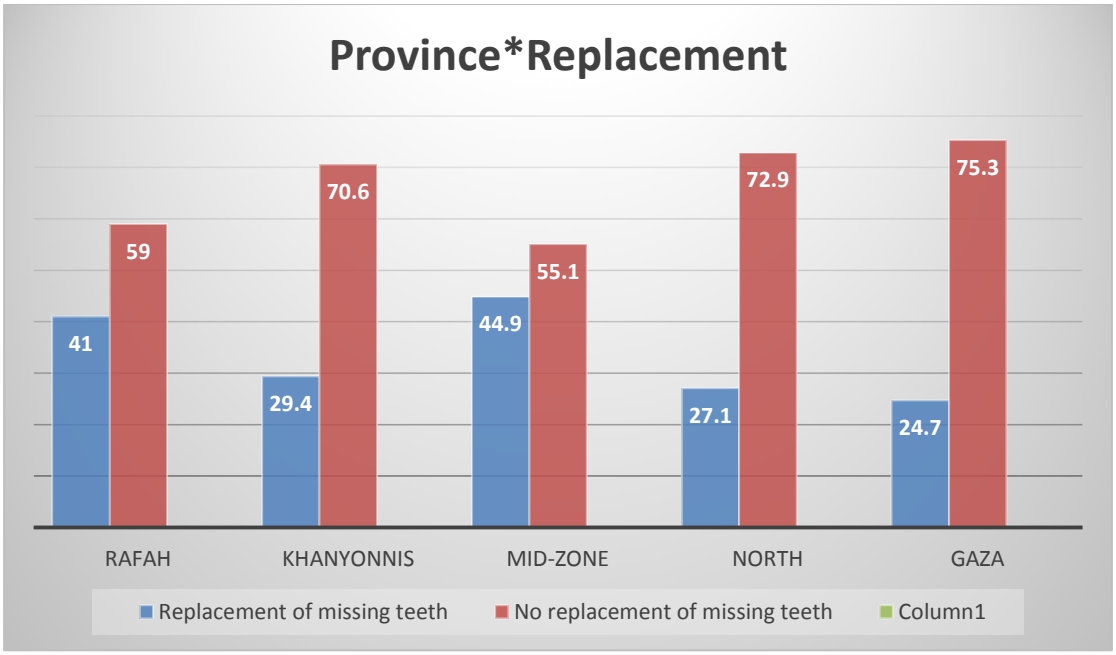

Chart 2: The relation between place of living and percentage of replacement

The relation between place of living and percentage of replacement

The relation between level of education and percentage of replacement is shown below in chart 3. Out of 388 subjects, 90 subjects were educated, 37 of 90 replaced their missing teeth, while 53 didn't. Furthermore, 182 subjects weren't educated, 50 replaced their missing teeth while 132 didn't.

The relation between different age groups and percentage of replacement of missing teeth is shown below in table 3. The percentage of extraction is shown below in chart 4. 116 out of 388 subjects have sound teeth, while 87 subjects replaced the missing teeth and 185 subjects didn't replace any missing teeth.

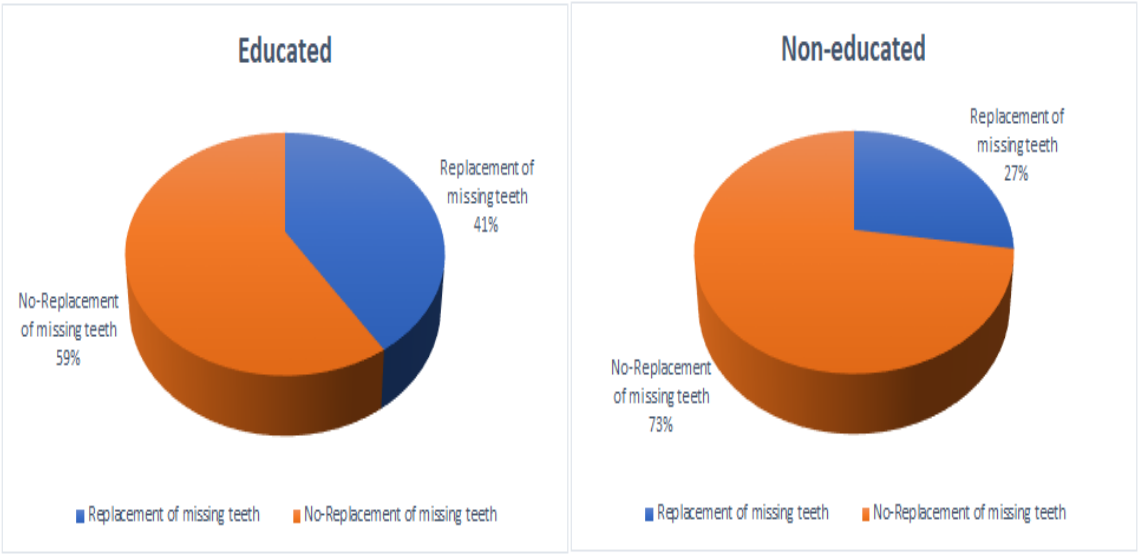

Chart 3 The relation between level of education and percentage of replacement

Table 3: Correlation between Age and replacement of missing teeth

Variable			Replacement	
			Replacement of missing teeth	No replacement of missing teeth
Age	30-44	No.	27	100
		Correlation	21.3%	78.7%
		p-value	< .01	< .001*
	45-59	No.	39	52
		Correlation	42.9%	57.1%
		p-value	< .001*	< .001*
	>60	No.	21	33
		Correlation	38.9%	61.1%
		p-value	< .001*	< .001*
Total		No.	87	185
		Correlation	32.0%	68.0%
		p-value	< .01	< .001*

P-value * < .001 (highly significant relationship)

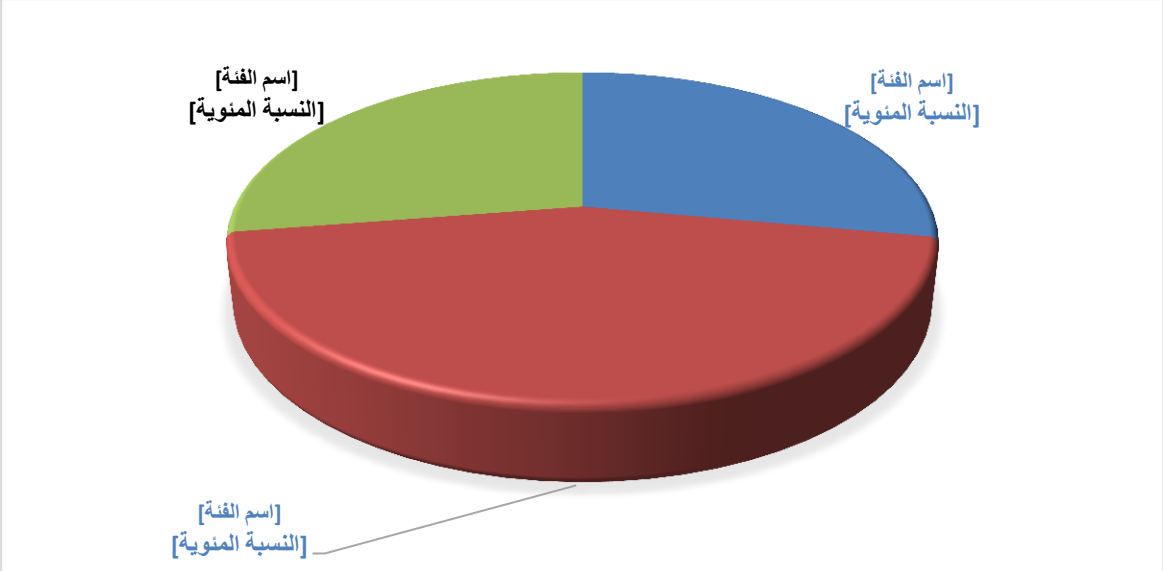

Chart 4 the percentage of replacements for extraction

The percentage of different types of prosthetic restoration is shown below in chart 5. Among all the restorations detected in this survey, fixed prosthetics accounted for the highest proportion with 15.5%, removable complete denture ranked second with 2.8%, implants ranked third with 2.3%, the percentage of removable partial denture was 1.3% and the last one was removable complete with partial denture 0.5%. Reasons for restoration of missing teeth are shown in chart 6. As shown in the chart below people tend to restore missing teeth mostly for mastication. Reasons for not restoring missing teeth are shown in chart 7.

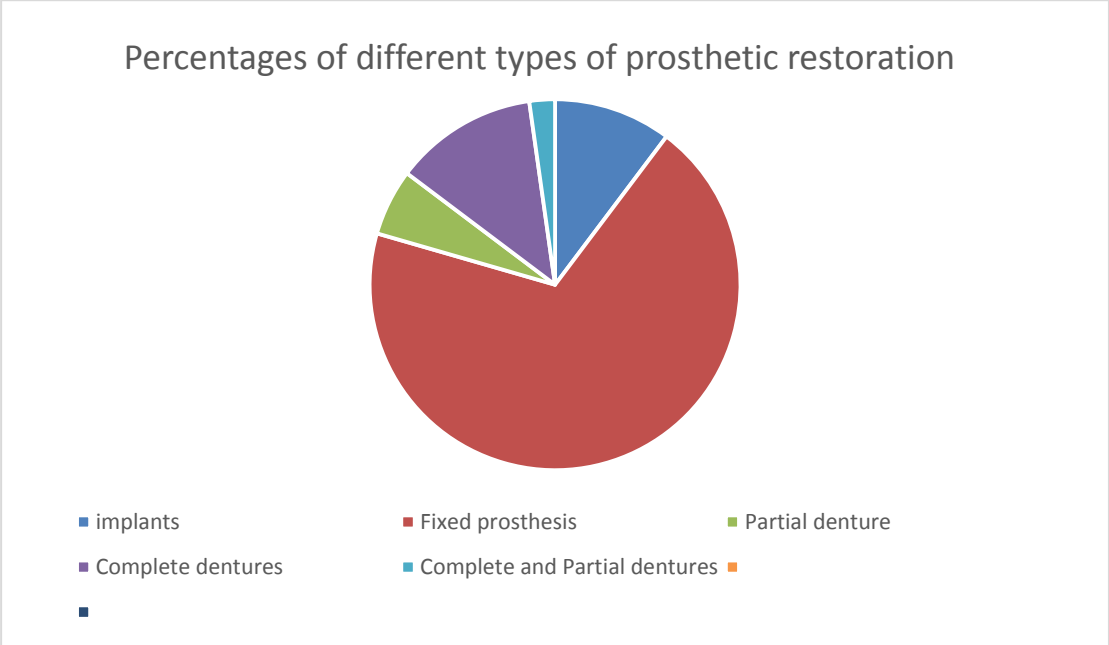

Chart 5 Percentage of different types of prosthetic restoration
Note: complete and removable partial dentures

Table 4: The possible reasons of replacement for missing teeth.

Reasons of replacement for missing teeth	Frequency	Percentage (%)
Esthetic	62	16
Mastication and Function	233	60
Esthetic and Function	93	24

Table 5: The challenges reasons for replacement of missing teeth.

Reasons of replacement for missing teeth	Frequency	Percentage (%)
Financial Problems	308	79.4
Lack of Awareness	19	4.9
Busy Lifestyle	19	4.9
Mental Issues	12	3.1
Others	30	7.7

Table 6: Association between the sociodemographic status and replacement status

Variables	% of replacement	Chi	P-value
Gender		3.623	0.057
Male	26.2		
Female	37.0		
Governorate		7.977	0.092
North			
Gaza	41.0		
Middle	44.9		
Khan Younis	29.4		
Rafah	27.1		
	24.7		
Age		12.843	0.002
30-44	22		
45-59	44		
60-80	35		

Table 4 reveals the association between the sociodemographic status and replacement status of participant in the current study. The Chi square test for association between gender and replacement status is 3.623 with p-value = 0.057, which is insignificant at 0.05, but it is significant at 0.1. Therefore, we can conclude that there is a significant statistical correlation between gender and teeth replacement at 0.1, where females tend to replace the missing teeth (37.0%) more than males (26.2%), this is because females care more about their appearance.

The Chi square test for association between place of living and replacement status is 7.977 with p-value = 0.092 which is insignificant at 0.05, but it is significant at 0.1. Therefore, we can conclude that there is a significant statistical association between place of living and teeth replacement at 0.1, where patients from Rafah and middle zone (41.0%) and (44.9%) respectively tend to replace the missing teeth more than patients from other governorates (Khanyonnis =29.4%, North =27.1% and Gaza 24.7%).

The Chi square test for association between education and replacement status is 5.149 with p-value = 0.023 which is significant, but it is significant at 0.05 and 0.1. Therefore, the researcher can conclude that there is a significant statistical association between education and teeth replacement at 0.05, where educated patients tend to replace the missing teeth (41.1%) more than non-educated (27.5%) due to higher level of dental awareness.

The Chi square test for association between age and replacement status is 12.843 with p-value = 0.002 which is significant, but it is significant at 0.05 and 0.1. Therefore, we can conclude that there is a significant statistical association between age and teeth replacement at 0.05 level of significance where patient in the middle age (45-59 years) tend to replace the missing teeth more than other considered age groups and the reason for this, a greater number of teeth are missed so, there is a need for replacement for a better mastication

As shown in the chart, fixed prosthesis has the highest percentage (15.5%) while the lowest is complete with partial dentures (0.5%). As shown in the chart below, people tend to restore missing teeth mostly for mastication for a better function and comfort.

Discussion

The population in Gaza has been increasing rapidly for the last 10 years. Tooth loss is one of the most important symptoms that reflects the oral health condition, and the cumulative effect of long life on disease and various social factors (Hao et al., 2018; Copeland et al., 2004; Tiwari et al., 2016). In this study the researcher investigated the status of tooth loss and restoration of missing teeth. To our knowledge, no previous studies have investigated the prevalence of tooth loss and prosthetic restorations among Palestinian population in the Gaza strip.

The edentulous rate is often regarded as the most important indicator of quality of life for the elderly. Moreover, according to the oral global database from the WHO, the edentulous rate for 65-74 years old is 46% in the UK, 27% in Denmark, 29% in Sweden (Hao et al., 2018; Fure and Zickert 1997) and between 14% and 27% in most European countries5. The same rate of edentulous for those aged 60 to 69 years old was 26% in the USA. In this study the edentulous rate of the 60-80-year-old was only 1.8 % showing a relatively low edentulous rate which may be attributed to food style that is healthier, less junk food consumed, and our water contains more fluorides.

The principal cause of tooth loss in this series was caries, a finding that is accordance with that of another study (Petersen et al., 2005; Khalifa et al., 2012; Corbet and Davies, 1991). It is difficult to establish the validity of reasons for tooth extraction because this relies on the accuracy of subjective information provided by everyone. Moreover, in accordance with other studies (Khalifa et al., 2012; Manji et al., 1988; Kida et al., 2006), molars accounted for being the most missing teeth and overall tooth loss were mainly due to caries (Khalifa et al., 2012).

As for people age, patients were at an increased risk of systemic diseases as well as having poor oral health, which led to a significantly increased risk of tooth loss (Jing et al., 2018; Kida et al., 2006; Hirotomi et al., 2012; Hamasha et al., 1998).

Based on our data analysis, women suffered more from tooth decay, with multiple visits and more extracted teeth were found like a Tanzanian study (Khalifa et al., 2012; Kida et al., 2006). Also, 146 females had extracted teeth while 126 males had their extracted. Furthermore, females tend to restore the missing teeth (37.0 %) more than males (26.2%), that's because women always show more care and concern to aesthetics. Socioeconomic status in this study seemed to play a relevant role in that people with a greater income and higher education are more likely to retain teeth. This finding is like the multivariate results of 1998 UK adult Dental Health Survey (Khalifa et al., 2012; Treasure et al., 2001).

Dental awareness plays an important role in restoration of missing teeth, educated people tend to restore their missing teeth (41.1%) more than non-educated people (27.5%) like other studies, that's why programs for increasing dental awareness should be considered.

As the results show, people in Rafah and mid-zone have a higher percentage of restoring missing teeth, (41.0%) and (44.9%) respectively while the percentages in other governorates were: - Khanyonnis (24.9%), North (27.1%) and Gaza (24.7%). Based on our data analysis, middle age group (45-59) year old tends

to replace the missing teeth more than other considered age groups for functional purposes because more teeth are extracted.

People who had missing teeth and didn't restore their missing teeth were about (47.7%) while people who had missing teeth and replaced their missing teeth were (22.4%) and people who had sound teeth (no extraction) were about (29.9%). People restore their missing teeth either for a better mastication (function) or esthetic or both of them. (60%) of people restored for mastication only, for esthetic only (16%) while for both esthetic and mastication (24%).

Reasons for not restoring the extracted teeth were numerous. The majority of people (79.5%) said it is the financial situation that hold them from getting any type of replacement while (4.9%) said they have a busy lifestyle and they don't have the time for multiple visits, (3.2%) have dental fear and prefer neglect over going to a dentist, (4.9%) of people lack dental awareness and have no idea that there is restoration after extraction and (7.6%) of people said it's none of these reasons, some of them mentioned reasons like having a restricted mouth-opening, broken jaw, some can't handle multiple visits.

Conclusion:

Status of tooth loss and prosthetic restorations among adults in Gaza were recorded in this survey. The findings revealed that dental caries was reason number one, a primary reason for tooth loss. Patients' income, age, education, social, functional and occupational status were also important factors, a thing that played a role in replacement of missing teeth. More efforts are required to strengthen oral health promotion and raise dental societal awareness among the Palestinian.

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