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Oral Health Status and Utilization of Auxiliary Dental Hygiene Devices among Patients Attending Dental Hygiene Clinics at JUST

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Abstract

Aim: The aim of this study to determine the oral health status and factors affect utilization of auxiliary dental hygiene (DH) devices among patients attend dental hygiene (DH) clinics at Jordan University of Science and Technology (JUST); including: gender, financial issues, marital status and educational level.

Materials and Methods: Randomized sample of 99 subjects were surveyed; selected from entire population of patients attend (DH) clinics at (JUST). Participants received cover letter with questionnaire. Findings analyzed by using descriptive data techniques. Chi square test used to determine statistically significant differences across demographic variables and utilization's factors.

Results: Sample predominantly 65.7% female. It included 60.6% were single; 17.2% earned >500 JD monthly; and 57.6% having a Bachelor's degree. The majority of study sample 39.4% utilized auxiliary (DH) devices once daily; however, only 16.4% used dental floss. Minority 3.0% expressed very poor oral health. Mostly 65.7% don't have missing teeth; while only 33.3% don't have dental fillings. Almost 63.6% expressed having gingival bleeding during brushing; however, 25.9% don't know why. Minority 3.6% believed no effects of using auxiliary (DH) devices. Statistically significant association were found between gender; family income; educational level; and using of auxiliary (DH) devices (P = 0.000); (P = 0.008); (P = 0.049).

Conclusion: Patients attending (DH) clinics at (JUST) expressed fair oral hygiene status. And their using for the auxiliary (DH) devices was significantly associated with gender; family income; and educational level. Teaching and motivating patients can achieve oral health (OH) improvement and better use for auxiliary (DH) devices.

Keywords: Auxiliary Devices, Self-Care, Oral Health, Dental Hygiene, Jordan

Clinical Relevance

Scientific rational for study

Study conducted to determine the oral health status of patients who attend (DH) clinics at (JUST) and to identify factors that relate to their utilization of auxiliary (DH) devices. Documenting these factors will clarify the specific issues and benefits needed to establish and maintain educational oral and dental hygiene programs.

Principal findings

Patients who attending (DH) clinics at (JUST) are predominantly expressed fair oral hygiene status. The minority believed that using axillary (DH) devices has no effects. And mostly use them once daily.

Practical implications

Identifying factors that affect practice and utilization of auxiliary (DH) devices may assist to maintain a permanent presence of improved oral and dental hygiene educational programs in in Jordan.

Introduction

The recommendation of auxiliary (DH) devices can be challenging. Traditionally, oral self -care have limited to tooth brush and floss; but nowadays there are a lot of devices on market to help

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meet clients self- care needs and using of this devices affected by clients preference, value and needs. Using of auxiliary dental hygiene (DH) devices performed effectively on daily basis can be effective in preventing periodontal disease and bad breath (halitosis) that caused by inter-dental and sub-gingival plaque biofilm in low risk client [1].

Jordan cares about health and education of its citizens. Health sciences programs such as medicine, pharmacy, dentistry, nursing, applied medical sciences, and allied dental sciences are taught at Jordanian Universities. The Allied Dental Sciences (*ADS*) program is offered only at Jordan University of Science and Technology (*JUST*), Irbid, Jordan; and it was established in 1996. This university which located northern of Jordan grants its graduating students a bachelor's degree in dental hygiene and dental assisting and they are trained at dental hygiene clinic (*DH*) at (*JUST*).

This study will investigate specific factors that relate to patients who attending (DH) clinics at (JUST)'s oral health status and factors that affect their use of auxiliary (DH) devices including gender, financial issues, marital status and educational level.

Identifying the specific factors that contribute to oral health status and utilization of auxiliary (DH) devices will clarify specific benefits needed by Jordanian dental hygienists to use with their careers and maintain educational oral hygiene programs at the region and increase the awareness of Jordanian people toward oral health. This is the first study about oral health status and utilization of auxiliary (DH) devices among patients who attend (DH) clinics at (JUST).

Oral hygiene self - care devices: oral health and practice

The study that conducted by Vandana et al. in 2015 aimed to evaluate awareness regarding interdental aids in medical population. Researchers found that significant positive response ($P < 0.05$) in females as compared to males was observed. they concluded that low positive response towards interdental aids should be focused to conduct mass educative providing information in different interdental aids [2]. Additionally, a research established by Neamatollahi et al. in 2011, was aimed to establish efficient methods for self-prevention of oral diseases, assessment of dental health behavior and knowledge in various social classes in Iran. Researchers found that experimental science students had better oral health behavior compared to other students [3].

Additionally, in 1999 Kressin et al. [4] conducted a study to examine the persistence of oral self-care behaviors over time and whether personality traits arc related to the performance of such behaviors. They indicated that individual psychological factors may associate with the practice of good oral self-care [4]. Furthermore, previous study [5] found that there is a statistically significant difference in stages of interdental cleaning behavior change by gender by considering the application of transtheortical model among participants [5].

Usage of Miswak/Siwak can be combined with modern oral healthcare devices (floss, toothbrush and mouthwash) [6]. As indicated by Nordin et al. in 2014 that majority 91.6% pf participants believe that miswak/siwak use helps in maintaining oral health [6].

Madman et al. [7] in 2017 estimated the knowledge, attitude and practices toward dental floss among dentists in a study conducted India. Researchers found that majority of dentists cited lack of awareness, availability and cost as the major factors affecting floss usage. They concluded that health education programs regarding dental floss are necessary to increase awareness among the general population dentists should practice recommended oral self-care and act as role models [7]. More over; a study which established by Gufran et al [8] in 2015 in Saudi Arabia, they indicated that overall knowledge about the interdental aids was good and there is improvement in usage of dental floss with increasing levels of dental education [8].

Tubaishat [9] in 2004 conducted a study to describe the perceived relationship among (miswak, toothbrush, and toothbrush-plus-miswak) usage on oral health beliefs and behaviors of adult in Jordan. They found that level of knowledge about oral health was low (26% know the meaning of dental plaque), and only 3% use miswak alone. They concluded that Jordanian people need maintaining dental health educational programs [9]. On the other hand, a study in 2015 that conducted by Salzer [10] was aimed to explore the effect of mechanical inter-dental plaque removal with tooth brushing, on managing gingivitis. Evidence indicate that inter-dental cleaning with interdental brushes is the most effective method for inter-dental plaque removal. All investigated devices for inter-dental self-care seem to support the management of gingival inflammation [10]. Additionally; oral pain, bleeding gums, and dry mouth have greater odds of engaging in most of the dental self-care behaviors [11].

Effects of auxiliary dental hygiene devices on oral health

Tashiro et al. [12] in a study that conducted in 2011 pointed that plaque index and gingival index and oral malodor decreased by teeth cleaning to ($p < 0.01$). Additionally, it is not only teeth cleaning is important, as well as, the detection of the risk of oral infection should be considered too [12]. Dorfer et al [13] in 2003 did a comparison between the effectiveness of the cleaning of the teeth with modern manual toothbrush with tapered filaments. They found that both brushes removed a significant amount of plaque [13].

In 2015 Sälzer et al [14] assessed the effect of the use of interdental brushes (IDB) in patients as an adjunct to tooth brushing compared with tooth brushing alone or other interdental oral hygiene devices on plaque and the clinical parameters of periodontal inflammation. They indicated that as an adjunct to brushing, the IDB removes more dental plaque than brushing alone [14]. A study showed a positive significant difference using IDB with respect to the plaque scores, bleeding scores and probing pocket depth. The majority of the studies presented a positive significant difference in the plaque index when using the IDB compared with floss [14].

Farther more; Hujoel et al. [15] in 2006 indicated that there is a possibility that flossing may be effective in a situation where oral hygiene is poor and where exposure to fluorides is minimal, additionally; Professional flossing for children with low fluoride exposures is highly effective in decreasing interproximal caries [15]. Based on that, the primary means of plaque control is through mechanical action with focusing on interproximal areas where the periodontitis, gingivitis and interproximal dental caries are predominantly observed [14].

This Research is based on the Following Null Hypotheses

1. Males would report less in number of missing teeth and dental fillings than females.

2. Females would report less using for the auxiliary (DH) devices than males.

3. Married patients would report less using for the auxiliary (DH) devices than singles.

Section I. Demographics:

1. Gender: □ Male □ Female
2. Marital Status: □ Married □ Single
3. Monthly Income: □ <200JD □ 200-500 JD □ >500 JD
4. Educational Level: □ < High School □ High School □ Bachelor's Degree □ > Bachelor's Degree

Section II. Oral Health Status

5. Do you know about Bacterial Dental Plaque? □ Yes □ No
6. How would you rate your overall oral hygiene status?
   □ Excellent □ Good □ Fair □ Poor □ Very Poor
7. The Best description of your breath is:
   □ Always I have a bad breath (Halitosis) □ Sometimes I have a bad breath (Halitosis)
   □ Never I have a bad breath (Halitosis)
8. You're your gingival tissue bleed when you clean your teeth? □ Yes □ No
9. Why do you think that your gingival tissue bleeds? (Choose only one response):
   □ I do not know □ Bacterial plaque accumulation □ Food debrides accumulation
   □ Bad brushing technique □ It is normal to bleed □ Because of using auxiliary (DH) devices
   □ Because of not using auxiliary (DH) devices □ Not Applicable
10. Do you have missing teeth in your oral cavity? □Yes □No If yes; Specify in number……..
11. Do you have dental fillings in your oral cavity? □Yes □No If yes; Specify in number……..

Section III. Utilization of Auxiliary Dental Hygiene Devices:

12. How often you utilize adjunctive oral hygiene self(care devices?
    □ Once/day □ Twice/day □ > Twice/day □ Weekly; but not daily
13. What type of oral hygiene device do you use? (Please check all that applied):
    □ Tooth Brush □ Miswak/Siwak □ Dental Floss
    □ Interdental Toothbrush □ Dental Rubber Stimulator
14. What do you think the effects of adjunctive oral hygiene self(care device on oral health?
    □ Reduce bad breath □ Reduce gingival inflammation □ No effect

Figure 1: Oral Health Status and Utilization of Auxiliary Dental Hygiene Devices among Patients Attending Dental Hygiene Clinics at JUST's Questionnaire.

4. Patients with high income would report less using for the auxiliary (DH) devices than patients with less income.

5. Highly educated patients would report less using for the auxiliary (DH) devices than less educated patients.

Methodology

This descriptive study employed a questionnaire to determine the factors that affect oral health status of patients who attend (DH) clinics at (JUST) and their use for the auxiliary (DH) devices. The sample was selected randomly from the population of patients who attending (DH) clinics of (JUST). Therefore, the sample represents patients from JUST's employee and students.

The measurement instrument used in this study was the Oral Health Status and Utilization of Auxiliary Dental Hygiene Devices among Patients Attending Dental Hygiene Clinics at JUST's Questionnaire (Figure 1). The questionnaire was designed and reviewed by content experts for evaluation of the validity of questions. Once content validity was established the questionnaire was administered to 10 subjects on two separate occasions to establish test-retest reliability. A questionnaire with a cover letter and return self-addressed envelope was sent out to all 99 participants.

The questionnaire contained three sections: a demographic portion, a section on description of oral health status, and the last section for the respondents to predict behavior of utilization of auxiliary (DH) devices (Figure 1).

Statistical analysis

Data, which was collected via questionnaire, are nominal, ordinal and interval/ratio in nature. Results were statistically analyzed by using statistical package for the social sciences (SPSS) software (version 20.0). Parametric and nonparametric statistics such as Chi-square analysis and frequency distribution were used to determine the factors that affect Jordanian dental hygienists' career satisfaction. A P-value ≤ 0.05 was considered significant.

Results

A total number of 100 questionnaires were distributed; and 99 of the forms were completed by volunteering patients attending (DH) clinics at (JUST). This account for a return rate of 99.4%. A study had been conducted within a period of (March 1st. , 2017 – Apr.1st , 2017). According to demographics, patients attending (DH) clinics at (JUST) were predominantly female (65.7%). In terms of marital status; most of participants 60.6% were unmarried. Additionally, small proportion 17.2% of them earned > 500JD as a monthly salary, on the other hand, almost one third of the respondents 29.3% earned < 200JD monthly. In terms of educational level; over half 57.6% with

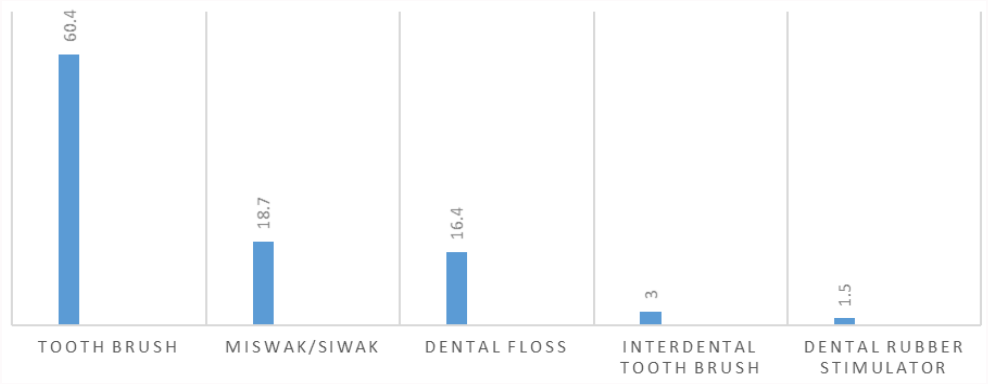

Figure 2: Reported types Auxiliary (DH) devices used by respondents.

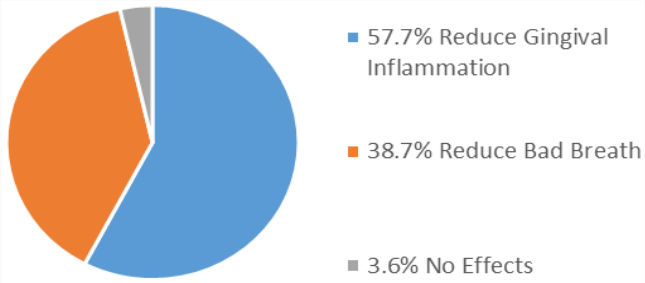

Figure 3: Reported effects of Auxiliary (DH) devices.

bachelor's degree, however, only 9.1% had < high school. In term of using auxiliary (DH) devices; analysis showed that only 8.1% of participants utilized them > twice daily, while 39.4% of respondents utilized them once daily. Figure 2 shows the main types of auxiliary (DH) devices that used by the participants.

The majority 36.4% of participants responded (Fair) according to their rating of their oral health status, on the other hand, only 3.0% of them responded (Very Poor). Additionally, most of participants 67.7% did not ever hear or know about dental plaque. As well as, findings reported that the majority 65.7% of the participants don't have missing teeth, while around one- third of them 33.3% they don't have dental fillings.

Self- reported results showed that almost 54.5% of participants sometimes they have a bad breath (Halitosis), while 42.4% they do not have, however, small proportion 3.0% always they have. In terms of the participants' gingival tissues if bleed during teeth cleaning; mostly 63.6% of participants responded "Yes", while the rest of them 36.4% responded "No". And according to reason of why their gingival tissues bleed during they clean their teeth; results indicated that 3.6%; 25.9%; and 1.8% of participants respectively expressed "It is normal to bleed"; "They don't know why", or "Because they do not use auxiliary dental hygiene devices" (Table 1). Additionally, the majority 57.7% of the participants believe that using auxiliary (DH) devices reduces gingival bleeding, while the minority 3.6% of participants reported that using auxiliary (DH) devices has no effects on oral health (Figure 3).

Hypothesis 1

Males would report less in number of missing teeth and dental fillings than females. Chi-square analysis revealed no statistically significant relationship between gender and oral health status; (Number of missing teeth & Dental fillings) (P = 0.300, 0.881) (Table 2). Thus the above null hypothesis is accepted.

Table 1: Reported Reasons of Gingival Bleeding During Teeth Cleaning.

The Reason	(%)
I don't Know	(0.259%)
Bacterial Plaque Accumulation	(0.098%)
Food Debrides Accumulation	(0.045%)
Bad Brushing Technique	(0.188%)
Bad Flossing Technique	(0.027%)
Brushing Hardly	(0.107%)
It is Normal to Bleed	(0.036%)
Using Auxilary (DH%) Devices	(0%)
Not Using Auxiliary (DH%) Devices	(0.018%)
Not Applicable	(0.223%)
Total	**(100%)**

Null Hypothesis 2

Females would report less using for the auxiliary (DH) devices than males. Null hypothesis 2 is rejected as Chi –square analysis showed a statistically significant relationship between gender and using for the auxiliary (DH) devices (p = 0.000) (Table 3).

Null Hypothesis 3

Married patients would report less using for the auxiliary (DH) devices than singles. Null Hypothesis 3 is accepted as Chi-Square analysis indicated no statistically significant between marital status and using of auxiliary (DH) devices (p = 0.687) (Table 3).

Null Hypothesis 4

Patients with high income would report less using for the auxiliary

Table 2: Association between Oral Health Status and Gender.

Gender/Oral Status	N (%)	Dental Fillings		Total	Missing Teeth		Total
		No	Yes		No	Yes	
Male	N (%)	11 (32.4%)	23 (67.6%)	34 (100.0%)	20 (58.8%)	14 (41.2%)	34 (100.0%)
Female	N (%)	22 (33.8%)	43 (66.2%)	65 (100.0%)	45 (69.2%)	20 (30.8%)	65 (100.0%)
Total	N (%)	33 (33.3%)	66 (66.7%)	99 (100.0%)	65 (65.7%)	34 (34.3%)	99 (100.0%)
P (Value)		0.881			0.3		

Table 3: Association between Utilization of Auxiliary (DH) Devices and Demographics Factors.

Demographic			Utilization				Total	P (Value)
			Once/Day	Twice/Day	>Twice/Day	Weekly; not daily		
Gender	Male	N (%)	11 (32.4%)	3 (8.8%)	2 (5.9%)	18 (52.90%)	34 (100.00%)	0
	Female	N (%)	28 (43.1%)	26 (40.0%)	6 (9.2%)	5 (7.70%)	65 (100.00%)	
	Total	N (%)	39 (39.4%)	29 (29.3%)	8 (8.1%)	23 (23.20%)	99 (100.00%)	
Marital Status	Married	N (%)	17 (43.60%)	10 (25.60%)	2 (5.1%)	10 (25.60%)	39 (100.0%)	0.687
	Single	N (%)	22 (36.70%)	19 (31.70%)	6 (10.00%)	13 (21.70%)	60 (100.00%)	
	Total	N (%)	39 (39.40%)	29 (29.30%)	8(8.10%)	23 (23.20%)	99 (100.00%)	
Family Income	≤ 200 JD	N (%)	9 (31.00%	10 (34.5%)	3 (10.30%)	7 (24.10%)	29 (100.00%)	0.008
	200–500 JD	N (%)	25 (47.20%)	8 (15.10%)	5 (9.40%)	15 (28.30%)	53 (100.00%)	
	≥ 500 JD	N (%)	5 (29.40%)	11 (64.7%)	0 (0.0%)	1 (5.90%)	17 (100.00%)	
	Total	N (%)	39 (39.40%)	29 (29.3%)	8 (8.1%)	23 (23.20%)	99 (100.00%)	
Educational Level	<High School	N (%)	2 (22.20%)	2 (22.20%)	1 (11.10%)	4 (44.40%)	9 (100.00%	0.049
	≤High School	N (%)	13 (41.90%)	5 (16.10%)	2 (6.50%)	11 (35.50%)	31 (100.0%)	
	Bachelor's Degree	N (%)	24 (42.10%)	22 (38.60%)	4 (7.00%)	7 (12.30%)	57 (100.00%)	
	>Bachelor's Degree	N (%)	0 (0%)	0 (0%)	1 (50.00%)	1 (50.00%)	2 (100.00%)	
	Total	N (%)	39 (39.40%)	29 (29.30%)	8 (8.10%)	23 (23.20%)	99 (100.00%)	

(DH) devices than patients with less income. This null hypothesis was rejected as Chi-square analysis revealed a statistically significant relationship between family income and using for the auxiliary (DH) devices (p = 0.008) (Table 3).

Null Hypothesis 5

Highly educated patients would report less using for the auxiliary (DH) devices than less educated patients. Chi-Square analysis revealed statistically significant relationship between educational level and using for the auxiliary (DH) devices (p =0.049) (Table 3). Thus the above null hypothesis was rejected.

Discussion

This is the first study investigating oral health status of patients who attend (DH) clinics at (JUST) and factors affects their utilization of auxiliary (DH) devices. A structured questionnaire were used to collect data regarding 99 patients attending (DH) clinics at (JUST) who were predominantly female and educated with a bachelor's degree. The four week time frame of the study dictated the number of subjects. Three null hypotheses of this study were rejected and two were accepted.

Patients attending (DH) clinics at (JUST) expressed mostly 36.4% fair oral hygiene and about 39.4% utilized auxiliary (DH) devices, and only 3.0% used interdental brush to remove interproximal bacterial plaque; this may suggest that might individual psychological factors associated with the practice of good oral self-care [4], while only 18.7% of respondents used Miswak/Siwak as an auxiliary (DH) devices. This finding differs from that of Nordin et al (2014) who reported that about 32.6% of respondents using Miswak/Siwak combined with modern oral healthcare devices [6].

In the present study, 67.7% of participants did not ever know the meaning of dental plaque. This reported result is mostly similar to that of Tubaishat et al (2004) who indicated that 26.0% of respondents know the meaning dental plaque [9]; this may suggest individual and community-based preventive measures and efficient evidence-based dental health education are needed.

As the present study indicated, about 66.7% had dental fillings, which may suggest that professional and personal use of auxiliary (DH) devices is highly effective in reducing interproximal dental caries [1,15].

The participants at this study expressed about 42.4% they do not have malodor (Halitosis) as well as about 36.4% expressed that had no gingival bleeding during dental cleaning, additionally; the majority 57.7% believed that using auxiliary (DH) devices decreases gingival bleeding; as it was indicated by previous studies that gingival inflammation and malodor decreased by efficient use of auxiliary (DH) devices [10-12,14].

On the other hand, the reported findings indicated that minority 3.6% of participants expressed that using auxiliary (DH) devices has no effects on oral health. This finding is similar to that of Vandana et al. (2015) who reported that low positive response toward interdental aids [2]; which may suggest to conduct a mass educative information in auxiliary (DH) devices use and effects. However, previous studies showed high positive effects of using different and variety types of

auxiliary (DH) devices [13,14].

Lalonde et al (2001) reported that female had low scores in (DMFT) than males, however, this present study revealed that there wasn't a significant association between gender and oral health status as indicated by (number of missing teeth and dental fillings); (p = 0.300, 0.881); which may suggest that both male and female in this study are in need to be educated more about the importance of practicing good oral hygiene [1,14,16]. On the other hand, the current results showed a significant association between gender and utilization of auxiliary (DH) devices (P = 0.000); and this is closely similar to that reported in another study [5]. It seems that utilization of auxiliary (DH) devices by female (43.1%) more than male (39.4%) expressed who is more caring about aesthetic and appearance issues more.

Additionally, no statistically significant relationship between marital status and utilization of auxiliary (DH) devices (P = 0.687). This finding differs from that of Jang (2012) who reported that utilization of dental hygiene auxiliary devices was significant high at marriage state [17]. It seems that the significant of utilization of auxiliary (DH) devices should be addressed as an important issue for oral health care at different segments of population according to their marital status.

The Percentage of participants with high income who reported that they use auxiliary (DH) devices was (29.4%); that may indicate their appreciation to the significance of utilization of auxiliary (DH) devices. Furthermore; the current results indicated a significant association between family income and utilization of auxiliary (DH) devices; and this is closely similar to that reported by Madman et al in 2017. It seems that cost is a factor that may play a main role in affecting auxiliary (DH) devices usage [7].

The reported findings indicated that educational level was significantly associated with the utilization of auxiliary (DH) devices (P = 0.049). About (42.1%) of respondents who have a Bachelor's degree reported that the use auxiliary (DH) devices; which might suggest that they appreciate the utilization of auxiliary (DH) devices more than respondents who have < High School (22.2%). Similarly; Neamatollahi et al (2011) who reported that there is improvement in usage of auxiliary (DH) devices with increasing level of education [3].

Conclusion

There has been no previous research investigating oral health status of patients attending (DH) clinics at (JUST). Patients attending (DH) clinics at (JUST) have fair oral hygiene status and almost of them use auxiliary (DH) devices and minority expressed that its use has no effects. They need accurate, evidence-based oral health education, individual and community-based preventive measures.

Utilizing the auxiliary (DH) devices is related to gender, family income, and educational level with p = 0.000; p = 0.008; and p = 0.049 respectively. Several factors may limit the validity of this study. The study shows important issues that need to be addressed to increase patients' dental hygiene knowledge. Findings may not be generalized to larger population. Moreover, there was no objective clinical examination of the subjects. Further studies are needed to determine the actual prevalence of oral health problems of patients attending (DH) clinics at (JUST). Educational preventive programs on oral self-care are recommended.

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