

Jordanian Teachers Knowledge, Attitude and Awareness Regarding Students Oral Health

Dr. Anas Ismaeel Abusalem¹, Dr. Mahmoud Khalil Ibrahim², Dr. Amal Tayseer Al - Khraisha³,
Dr. Abeer Isam Faraj⁴, Dr. Ahmad Nizam Al - hashlamoun⁵

¹DDS, JDB, Endodontics, Dental Department, Jordanian Royal Medical Services, Jordan
Corresponding Author: abusalem_anas@yahoo.com

²BDS, JDB, Conservative Dentistry, Dental Department, Jordanian Royal Medical Services, Jordan

³BDS, JDB, Pedodontics, Dental Department, Jordanian Royal Medical Services, Jordan

⁴DDS, JDB, Endodontics, Dental Department, Jordanian Royal Medical Services, Jordan

⁵DDS, JDB, Pedodontics, Dental Department, Jordanian Royal Medical Services, Jordan

Abstract: ***Introduction:** Oral health plays an integral part in health sciences. Oral diseases have adverse impacts on the quality of patient's life. Dental caries and periodontal disease are considered the most common non - communicable preventable disease among adolescents and children. According to the World Health Organization (WHO), dental caries affects 60% to 90% of school - aged children, Oral disease is a significant public health problem in Jordan, and therefore school teachers should have a role in dental education at the school. The purpose of this study is to assess the level of school teachers' attitudes and knowledge of oral health, their perception and experiences of receiving and implementing educational programs on students' oral health status. **Method:** This was a cross - sectional survey in which 263 teachers at government and private schools in Jordan in two areas (Amman and AL - Zarqa) were surveyed to determine their knowledge and perception toward oral health. A total of 480 students were randomly chosen for clinical examination of their oral health using the decayed, Missing, Filled Teeth (DMFT) index. Statistical analysis was conducted using SPSS version 23. **Results:** About 88% of teachers agreed that oral health plays a role in general health; 74.1% of them agreed that decay, gum disease, bad breath, and stains on teeth are caused by irregular tooth brushing; 82.5% agreed that a clean mouth can protect against tooth decay; 93.9% thought that maintaining a healthy mouth is their own responsibility; 87.8% had visited the dentist, the majority of them (28.2%) for pain - related reasons; 90.5% thought that it is necessary to visit a dentist regularly to maintain oral health; 87.8% of teachers reported using a toothbrush and toothpaste; just over half (51.0%) cleaned their mouth twice daily; 37.6% of teachers had been trained to provide education on topics related to the teeth and mouth; and 63.1% had attempted to educate their students about oral health. **Conclusion:** The majority of teachers demonstrated good knowledge; attitudes and practices regarding oral health. More teachers should be included in the educational programs and adequately trained in order to have an efficient role in the promotion of good oral health to their students. The knowledge of teachers about preventative measures must be strengthened by the establishment of a comprehensive oral health - promotion program by the government to decrease the psychosocial stress of poor oral health, and reduce the duration and the costs of these tooth problems if they are diagnosed early.*

Keywords: Teachers dental awareness in Jordan, Oral health, Preventive dentistry

1. Introduction

Oral health is considered an important and integral aspect in the general health of public. Oral disease is a significant public health problem in Jordan. (1) Dental caries prevalence is high and the level of severity was associated with lower oral health - related quality of life (OHRQoL). (2, 3, 4) Oral health has improved for the average individual over the past few decades in high income countries and declined in developing countries. (5) Improvements include a lower incidence of edentulism (loss of some or all teeth) and periodontitis in the elderly and less dental caries in adults. (5) The prevalence of cavities in children in the US has declined. (5) The reasons for this trend are the increased utilization of dental care as dental insurance coverage has expanded, improvements in the quality of dental care, higher income, improvements in dietary habits, better practicing of oral hygiene. (5)

Nevertheless, dental caries is still epidemic and one of the biggest problems in oral health, being predominant in children especially in developing countries. (6)

Jordan has an estimated 11 million inhabitants. The population is young, i. e., 59% are under 25 years of age (department of statistics 2015) In total, 83% of the population live in urban centers and 40% reside in the capital of Amman and AL - Zarqa. The dentist to population ratio is 1: 1800. (7)

There are two kinds of schools, government and private; 60% of children attend government schools, and school is compulsory for children aged 6 - 14.

Risk factors for oral diseases, such as dental caries and gingivitis include the consumption of beverages and foods that contain high levels of sucrose, limited access to dental care and oral health literacy, and habits of poor oral hygiene. (8, 9) dental caries are considered the most common non - communicable preventable disease among adolescents and children. (8)

According to the World Health Organization (WHO), dental caries affects 60% to 90% of school - aged children (9), and

this leads to the loss of about 50 million school hours every year (10). Dental diseases in childhood lead to physical pain and affect social and psychological aspects of the child. (8) For over 70 years, the Decayed, Missing and Filled Teeth (DMFT) index has been globally used as the most important index for assessing the status of oral and dental health. Moreover, this index is the most important index used in epidemiological studies of the health status of the community (11). This index determines the number of decayed teeth, the number of treated teeth, and the number of teeth missed due to decay (12). This index is used to evaluate and monitor oral health interventions in the community by developing policies and programs related to this area (13)

Epidemiological data from Jordan regarding oral hygiene status and dental caries prevalence among schoolchildren mainly described the oral hygiene status of schoolchildren in Northern Jordan, whether in Irbid (14, 15) or Jerash governorates (16) or in Southern Jordan, Tafelah (17) For example, these studies showed that dental caries experience, as measured by Decayed (D), Missing (M), and Filled (F) teeth (T) (DMFT) index. (18) was found to be between 3 and 5 for the 12 - 16 year old schoolchildren age group. (14, 15) These values are relatively high as compared with the declining DMFT values in most industrialized countries. (19, 20) A study about oral health trends in Jordanian schoolchildren (21) concluded that oral hygiene, gingival conditions and dental caries have improved since 1993. A recent study published in the Royal Medical Service (RMS) Journal for school children aged 12 and 15 year old in southern and central regions in Jordan demonstrated that Gingivitis was found in about 31.4% of the 12 year old and the prevalence of dental caries was 89.7%, compared to 52.6% for gingivitis and 94.8% for dental caries in the 15 year old group, which was a high prevalence. (22) Education about oral health for school children is very important as healthy habits develop early in life, and they spend a considerable amount of time in school. The role of school teachers during these stages is therefore critical for developing healthy habits. (23) This role is internationally recognized in the form of school - based dental education, (24).

In Jordan, the school oral health services department of the ministry of health is responsible for the organization of oral health programmers for children, all schoolchildren must have their teeth examined regularly and parents receive a report of their child's oral health status. Parents are encouraged to seek a dentist for any necessary dental care for their child, either a private dental practitioner or a dentist working in public health care sector. Many disadvantages are carried as teachers may be insufficiently trained to give this dental health education. (25) So, the teachers should have a suitable level of awareness and knowledge of oral hygiene such as the following: brushing teeth before going to bed, moving the toothbrush in gentle, circular motions to remove plaque, limiting sugary and acidic foods, brushing twice daily, going to dentist at least twice a year. (26) So, our study was conducted in Jordan to assess the school teachers' attitudes and knowledge on oral health, their perceptions and experiences of receiving and implementing education programs on students' oral health status.

2. Method

Prior to commencing the study, ethical approval by the Human Research Ethics Committee at the Royal Medical Services was obtained (21 - July - 2019) Authorization from Ministry Of Education was also obtained for the participation of teacher prior to data collection, the schools included in the study were randomly assigned by the Ministry of Education. The inclusion criteria for the students are:

- 1) The fourth, fifth, sixth, seventh, eighth and ninth grade classes (9 - 14 year old pupils)
- 2) Absence of medical problems that would have dental presentation.

A total of 263 teachers were included. All teachers who were recruited into the study provided a signed written informed consent form. The inclusion criteria for the teachers were 2 years or more of experiences in their work field in the selected schools were targeted. Questionnaires were distributed to the teachers after signing the consent form. The teachers' level of knowledge would be determined according to their answers (number and percentage) to the questionnaire and a score will be given by comparing the teachers' answers to the typical answer.

All teachers were requested to complete a comprehensive questionnaire (Appendix I) adopted from Prabhadevi C Maganur et al. (27) which was in English language and we translated it into Arabic language to make it easier for the teachers to understand. . It was composed of 19 questions and was divided into four parts as follows:

Teachers' knowledge about oral health, attitudes of teachers towards oral health, practices of teachers regarding oral health, and general information on oral health in the school curriculum.

Following the questionnaire the second part of the study consisted of clinical examinations of students.

A letter was sent to the student's parents informing them of the study and asking for their consent. Parents' approval and participant's consents were obtained for 480 students. Of those, there were 180 (37.5%) males and 300 (62.5%) females. Students were examined in the school clinic, if one was available or in the classroom by one examiner. Dental examination was carried out using disposable gloves, examination set for each student (mirror, world health organization (WHO) mouth probe and tweezer) under artificial light. Universal control precautions were followed during the examination. Examiner reliability was tested by duplicate examination for at least 10% of students using DMFT index, which revealed a 95% of same reading. Thus, as recommended by WHO survey methodology, the DMFT score of the samples were determined based on the results of clinical examination and calculation of the number of decayed (D), filled (F), and missed (M) teeth due to caries. (18)

Statistical analysis

Statistical analysis was done using the statistical package for the social sciences (SPSS PC version 23; Chicago, IL, USA). Means, standard deviation and frequency distribution were calculated. An independent sample T - test was used to compare the means of two variables. The level of statistical significance was chosen at $p < 0.05$.

3. Results

This study presents an overview of the knowledge, attitudes and practices of teachers regarding oral health in government and private schools in Jordan.

The total number of teachers participating in this survey was 263, of which 160 (60.8%) were female. The number of total students was 480; 300 (62.5%) of them were female, distributed according to age as follows: 9–11 years old ($n=175$), 12–14 years old ($n=125$); the 180 (37.5%) males were distributed as follows: 9–11 years old ($n=105$), 12–14 years old ($n=75$).

Four hundred and eighty students were chosen for clinical examination of their oral health using the DMFT index. The results of the Means and standard deviations of decayed (D), missing (M) and filled (F) teeth (DMFT) scores of all subjects and for males and females of the study population ($n=480$) are given in Table 5.

Regarding the results on teachers' knowledge of oral health, 88.6% of participants agreed that oral health plays a role in general health; 17.5% of teachers agreed that irregular tooth brushing causes decay; 4.2% said it contributes to bad breath; 1.5% said it causes gum diseases; 1.5% said it causes stains on teeth; 1.1% of them said it does not cause anything; and 74.1% agreed that all these factors are caused by irregular brushing. About 12% of teachers stated that dental problems are caused by not brushing properly, 6.5% agreed that it is caused by eating sweets and ice cream, and 4.2% due to not regularly visiting a dentist; only 1.5% said that these dental problems are caused by not rinsing the mouth, while 75.7% said that all these factors cause dental problems.

Around 9% of teachers agreed that brushing properly can prevent dental problems, 8.4% reported that regular visits to the dentist may prevent dental problems, 3.8% agreed that problems can be prevented by avoiding sweets and sticky foods, and 2.7% said that mouth rinsing after meals would help. Seventy - six percent of teachers said that all these factors are important for preventing dental problems. Around 82% of teachers knew that a clean mouth may prevent tooth decay. Table 1 presents these results in detail.

It was found that 93.9% of teachers accepted that maintaining a healthy mouth is the individual's responsibility, and about 87.8% of them had visited the dentist previously, the majority of them (28.2%) for pain - related reasons, and the minority (9.4%) for extraction.

A high proportion (90.5%) of teachers thought that it is necessary to visit a dentist regularly to maintain oral health.

Table 2 shows the results regarding attitudes of teachers towards oral health in detail. Regarding the oral health practices of teachers, 87.8% of teachers reported using a toothbrush and toothpaste, followed by 7.2% who used a toothbrush and toothpowder, 3.0% who used a finger and tooth powder, and 1.9% who used neem - sticks.

Fifty - one percent of teachers cleaned their teeth twice daily followed by 17.5% who cleaned them after every meal, 17.1% who cleaned them more than twice daily, and 14.4% who cleaned them once daily. The majority of teachers (45.2%) brushed their teeth in both the horizontal and vertical directions, and 44.1% changed their brush every 3 months. The highest proportion of teachers (46.7%) used an amount of paste equivalent to the full length of the toothbrush bristles, followed by half the length, while the minority of them (25%) used a pea - sized amount. Table 3 shows the practices of teachers regarding oral health.

The teaching of subjects related to the teeth and mouth in school was also assessed, and the majority (77.9%) of teachers supported this. About 37% of teachers had been trained to provide education on topics related to the teeth and mouth and (63.1%) had attempted to educate their students about oral health; the majority (56.0%) of oral health education was about brushing, good dietary habits, and detrimental oral habits, while the minority (5.4%) was about tooth decay, gum diseases, irregular teeth, their causes, treatment, and prevention. Fifty - three percent of teachers used talking as a method for oral health education, while (7.6%) of them used models, charts, and posters. Table 4 shows the results regarding the inclusion of general information on oral health in the school curriculum.

To determine the relationship between DMFT score and gender of each age group of students, the Independent Sample T - test was conducted. For Age (9 - 11) year, there is a statistically significant difference for DMFT between male and female, ($T = - 2.32$, $P < 0.05$), while For Age (12 - 14) year, there is no statistically significant difference for DMFT between male and female, ($T = - 1.70$, $P > 0.05$). For all ages, there is a statistically significant difference for DMFT between male and female, ($T = - 2.81$, $P < 0.05$) as shown in table 5.

To determine the relationship between knowledge teacher score and gender, also an independent Sample T - test was performed, and the result was no statistically significant difference for Knowledge teacher between male and female, ($T = 0.80$, $P > 0.05$) as shown in table 6.

4. Discussion

Most epidemiological oral health surveys conducted in schoolchildren in Jordan focused on oral hygiene status and prevalence of dental caries among schoolchildren or teacher. None of these studies were assessed the school teachers' attitudes and knowledge on oral health, their perceptions and experiences of receiving and implementing education programs on students' oral health status.

This cross - sectional examinational study presents an overview of the knowledge, attitudes, and practices of

teachers regarding oral health in public and private schools in Jordan, obtained via a self-administered questionnaire. A total of 263 teachers and 480 students were included in the analysis. The present study was undertaken to provide nationwide information about teacher's knowledge, attitude and practice regarding the oral health status of Jordanian schoolchildren aged 9 - 14 years, which are the standard age groups recommended by WHO for intra- and inter-country comparison. A disadvantage that a national sample cannot be drawn automatically as there is no census list of the population in Jordan. However, the school system provides an effective frame for sampling of students and the high response rates obtained in the survey imply that the final sample should be considered relevant for the purpose of study.

School teachers have an enormous impact on the behavior of children regarding oral health, (28, 29) as children pass through several developmental stages while at school. Traditionally, teachers educate children about oral health and participate in school prevention programs. (30)

Poor oral health may have a negative impact on the quality of life of children, their school performance, and later on their success in life. (2) A cross-sectional survey conducted in Saudi Arabia to evaluate the knowledge and attitude of male teachers toward primary dental care found that teachers had a positive attitude and a fair amount of knowledge (65.4%). Teaching experience and knowledge showed a statistically significant relation. (31)

Another similar study conducted in Davangere, India found that the majority of teachers had good knowledge regarding oral health and recognized the importance of this. (27) A survey conducted in school teachers in public and private schools in Nigeria using a self-administered questionnaire also found a positive attitude toward oral health, although many of the participants admitted to poor oral health practice themselves; 90% of participants were involved in the teaching of oral health despite their poor knowledge. (32)

A similar study in Riyadh, Saudi Arabia found that 90% of male teachers and 98% of female teachers considered that sugar and sugar drinks were the main cause of dental caries followed by the wrong method of tooth brushing. Teachers should improve their knowledge regarding oral health. (33) A study in Jordan to determine the knowledge and attitude of schoolteachers towards emergency health trauma found that only about 20% of them were officially trained in child health. (34) A one-year interventional study that used a 30-min oral health education program for guardians, their children and teachers in Myanmar found that the guardians' knowledge about oral health had significantly increased at the one-year follow up, while there was a significant decrease in gingival and debris scores, illustrating that oral health education improves knowledge about oral hygiene and habits. (35) Teachers in our study were more knowledgeable (74.1%) about the effect of irregular tooth brushing on decay, gum disease, bad breath, and stains on teeth than participants in a similar study conducted in India which showed that only 17.3% of participants were aware of the effect of irregular brushing on these factors. Likewise

only 6.5% of teachers thought that eating sweets and ice cream causes dental problems, although this percentage was higher (23.3%) in the study in Davangere in India and studies conducted by Petersen et al. (27, 29)

About 4% of teachers in our study thought that dental problems could be prevented by avoiding sweets and sticky foods, compared with two-thirds of participants in a study conducted by Ramroop et al. (36) Around 94% of teachers were aware of the importance of a healthy mouth and 87.8% of them had visited a dentist previously, similar to the percentages reported by Almas et al. (33) and Lang et al. (37) A high proportion (90.5%) of teachers were aware of the importance of regularly visiting a dentist, unlike those in a study by Chikte et al. (38)

A high percentage (87.8%) of teachers used a toothbrush and toothpaste to clean their teeth, similar to the result of a study conducted in India. (27) Around half of the teachers brushed their teeth twice daily, similar to the studies conducted by Chikte et al. (38) and Al-Mansour and Al-Zarea. (39) In our study, teachers showed good knowledge regarding brushing techniques, consistent with the study conducted by Almas et al. (33)

More than two thirds (77.9%) of teachers stated that subjects related to the teeth and mouth were taught in school, similarly to the study in India in which 100% of teachers gave this response.

However, only 37.6% of teachers had been trained to provide education on topics related to the teeth and mouth, a much lower proportion than in the previous study (83.33%). (27)

For all ages, there was a statistically significant difference for DMFT between male and female, and there was no statistically significant difference for Knowledge teacher between male and female. Various studies have been conducted around the world to evaluate the attitude, knowledge, and practices of schoolteachers regarding oral health. Some of these studies have reported positive attitudes and knowledge regarding oral health, such as those from Romania, China, Saudi Arabia, and the USA. (29, 40, 41.) Other studies have shown inadequate oral health knowledge, such as those from Michigan, USA, (42) Minnesota, USA (43) and some parts of India. (30, 44, 45)

The knowledge of teachers about preventative measures regarding oral hygiene and health is very important. Motivation to visit the dentist regularly as a preventative measure should be encouraged and teachers should teach this culture to their students. Regular checkups and visits to the dentist, not only for emergencies due to pain and decay, will decrease the psychological stress experienced by patients, and reduce the duration and the costs of these tooth problems if they are diagnosed early.

5. Conclusion

Education about oral health for school children is very important as healthy habits begin early in life. The role of school teachers during these stages is thus critical in

developing healthy habits, as children spend a considerable amount of time in school.

The majority of teachers in this study showed good knowledge, attitudes, and practices regarding oral health. More teachers should be included in the educational programs and adequately trained in order to have an efficient

role in the promotion of good oral health to their students. The knowledge of teachers about preventative measures must be strengthened by the establishment and adoption of a comprehensive oral health - promotion program by the government so that they can be trained efficiently and regularly to teach children about this topic.

Table 1: Frequency and percentage of responses regarding teachers' knowledge about aspects of oral health (N=263)

Question	Answer	N	%
Does oral health play a role in general health?	Yes	233	88.6
	No	30	11.4
How does irregular tooth brushing affect your teeth?	Decay	46	17.5
	Gum disease	4	1.5
	Bad breath	11	4.2
	Stains on teeth	4	1.5
	Nothing	3	1.1
	All of the above	195	74.1
What causes dental problems?	Eating sweets and ice cream	17	6.5
	Not brushing properly	32	12.2
	Not rinsing the mouth	4	1.5
	Not regularly visiting a dentist	11	4.2
	All of the above	199	75.7
How can you avoid dental problems?	Avoiding sweets and sticky foods	10	3.8
	Brushing properly	24	9.1
	Mouth rinsing after meals	7	2.7
	Regularly visiting a dentist	22	8.4
	All of the above	200	76
Do you know that a clean mouth can protect against tooth decay?	Yes	217	82.5
	No	46	17.5

Table 2: Frequency and percentage of responses regarding teachers' attitudes towards oral health

Question	Answer	N	%
Do you think maintaining a healthy mouth is your own responsibility?	Yes	247	93.9
	No	16	6.1
Have you visited a dentist before?	Yes	231	87.8
	No	32	12.2
If yes, then for what reason?	Decay	36	14.7
	Pain	69	28.2
	Filling	54	22
	Extraction	23	9.4
	Any others, please specify	59	24.1
Do you think it is necessary to visit a dentist regularly to maintain the oral health?	Yes	238	90.5
	No	25	9.5

Table 3: Frequency and percentage of responses regarding teachers' oral health practices

Question	Answer	N	%
What do you use to clean your teeth?	Toothbrush and toothpaste	231	87.8
	Toothbrush and toothpowder	19	7.2
	Finger and toothpowder	8	3
	Neem stick	5	1.9
	Any others, please specify	0	0
How many times a day do you clean your teeth?	Once daily	38	14.4
	Twice daily	134	51
	More than twice daily	45	17.1
	After every meal	46	17.5
How do you brush your teeth?	Use horizontal strokes	35	13.3
	Use vertical strokes	38	14.4
	Both in horizontal and vertical directions	119	45.2
	Circular strokes	71	27
How frequently do you change your brush?	Once every 3 months	116	44.1
	Once every 6 months	58	22.1
	Annually	35	13.3
	When bristles become frayed	26	9.9
	Do not know exactly	28	10.6
What amount of paste do you add to your brush?	Full length of bristles	121	46.7
	Half - length of bristles	77	29.7
	Pea - sized amount	65	25

Table 4: Frequency and percent for General information on oral health in school curriculum

Question	Answer	N	%
Are the subjects related to teeth and mouth in the current school curriculum?	Yes	205	77.9
	No	58	22.7
Have you been trained to give education on topics related to teeth and mouth	Yes	99	37.6
	No	164	62.4
Have you made an attempt to educate your students with topics related to teeth and mouth?	Yes	166	63.1
	No	97	36.8
If yes, what type of oral health education have you given to your schoolchildren?	About the teeth types, function, structure, and eruption	34	20.5
	About brushing, good dietary habits, injurious oral habits	93	56
	Education about tooth decay, gum diseases, irregular teeth, their causes, treatment, and prevention	9	5.4
	All of the above	30	18.1
What methods are you using to give oral education to students at your school?	Oral health talks	140	53.2
	Models, charts, and posters	20	7.6
	All of the above	103	39

Table 5: Independent Sample T - test for DMFT score by gender for each age

Age	Gender	N	Mean	SD	T	P.
(9 – 11) year	Male	105	4.45	2.93	- 2.32	.021*
	Female	175	5.35	3.31		
(12 – 14) year	Male	75	5.75	2.93	- 1.7	0.09
	Female	125	6.65	3.98		
Total sample	Male	180	4.99	2.99	- 2.81	.005*
	Female	300	5.89	3.65		

Means (M) and standard deviations (SD) of decayed, missing and filled teeth (DMFT) scores of all subjects and for males and females of the study population (n=480)

Table 6: Independent Sample T - test for Knowledge teacher score by gender

Gender	N	Mean	SD	T	P.
Male	104	10.73	2.64	.800	.424
Female	160	10.47	2.57		

Means (M) and standard deviations (SD)

References

- [1] Rajab LD. Oral health status among 6 - and 12 - year - old Jordanian schoolchildren. *Oral health Prev Dent.*2014; 12 (2): 99 - 107.
- [2] Rajab LD. Impact of Dental Caries on the Quality of Life of Preschool Children and Families in Amman, Jordan. *Oral Health Prev Dent.*2020; 18 (1): 571 - 582.
- [3] Abanto J. impact of demographic and clinical variables on the oral health - related quality of life among five - year old children: a population - based study using self - reports. *Int J Paediatr Dent* 2018; 28: 43 - 51.
- [4] Haag DG. Oral conditions and health –related quality of life: a systematic review. *J Dent Res* 2017; 96: 864 - 874.
- [5] Slade GD, Caplan DJ. Methodological issues in longitudinal epidemiologic studies of dental caries. *Community Dent Oral Epidemiol.*1999 Aug; 27 (4): 236 - 48
- [6] Thwin KM, Zaitso T, Ueno M, Kawaguchi Y. Early childhood caries and related risk factors among Myanmar preschool children. *Int J Clin Prev Dent* 2016 Dec 30; 12 (4): 229 - 36.
- [7] Department of statistics 2015. Analytical report of multipurpose household survey 2015, Amman, Hashemite Kingdom of Jordan.
- [8] Benzian HM, Nackstad C, Barnard JT. The role of the FDI World Dental Federation in global oral health. *Bulletin of the World Health Organization* 2005; 83: 719 - 20.
- [9] Petersen PE. Global policy for improvement of oral health in the 21st century - - implications to oral health research of World Health Assembly 2007, World Health Organization. *Community Dent Oral Epidemiol.*2009 Feb; 37 (1): 1 - 8.
- [10] Jürgensen N, Petersen PE. Promoting oral health of children through schools - - results from a WHO global survey 2012. *Community Dent Health.*2013 Dec; 30 (4): 204 - 18.
- [11] Broadbent JM, Thomson WM. (2005). For debate: Problems with the dmf index pertinent to dental caries data analysis. *Community Dent Oral Epidemiol*, 33 (6): 400–9
- [12] Moradi G, Mohamadi Bolbanabad A, Moinafshar A, Adabi H, Sharafi M, Zareie B. Evaluation of Oral Health Status Based on the Decayed, Missing and Filled Teeth (DMFT) Index. *Iran J Public Health.*2019 Nov; 48 (11): 2050 - 2057.
- [13] Marthaler TM. (2004). Changes in dental caries 1953–2003. *Caries Res*, 38 (3): 173–81., Nadanovsky P, Sheiham A. (1995). Relative contribution of dental services to the changes in caries levels of 12 - year - old children in 18 industrialized countries in the 1970s and early 1980s. *Community Dent Oral Epidemiol*, 23 (6): 331–9.)
- [14] Quteish Taani D. Dental health of 13 - 14 - year - old Jordanian school children and its relationship with socio - economic status. *International Journal of Paediatric Dentistry* 1996; 6: 183 - 1 86.
- [15] Quteish Taani D. Relationship of socioeconomic background to oral hygiene, gingival status, and dental caries in children. *Quintessence Int* 2002.33: 195 - 198.

- [16] El - Qaderi SS, Quteish Taani D. Dental plaque, caries prevalence and gingival conditions of 14–5 - year - old schoolchildren in Jerash District, Jordan. *Int J Dent Hygiene* 2006; 4: 150–153
- [17] Rodan R, Khlaifat F, Smadi L, Azab R, Abdalmohdi A. Prevalence and severity of gingivitis in school students aged 6 - 11 years in Tafelah Governorate, South Jordan: results of the survey executed by National Woman's Health Care Center. *BMC Res Notes*.2015 Nov 9; 8: 662.
- [18] Petersen PE. Global policy for improvement of oral health in the 21st century -- implications to oral health research of World Health Assembly 2007, World Health Organization. *Community Dent Oral Epidemiol*.2009 Feb; 37 (1): 1 - 8.
- [19] Cahen PM, Obry Musset AM, Grange D, Frank RM. Caries prevalence in 6–15 years–old French children based on the 1987 and 1991 national Surveys. *J Dent Res* 1993; 72: 1581–1587.
- [20] González - Jaranay M, Téllez L, Roa - López A, Gómez - Moreno G, Moreu G. Periodontal status during pregnancy and postpartum. *PLoS One*.2017 May 19; 12 (5): e0178234.
- [21] Albashaireh Z, Hamasha AA. Prevalence of dental caries in 12 - 13 - year - old Jordanian students. *South Afr Dent J* 2002 57: 89 - 91.
- [22] Hazem M. Khraisat. Oral Hygiene, Caries Prevalence and Oral Health Knowledge among 12 to 15 Year Old Schoolchildren in Al Karak, Jordan. *Journal Of The Royal Medical Services JRMS* December 2012; 19 (4): 31 - 36
- [23] Mota A, Oswal KC, Sajnani DA, Sajnani AK. Oral Health Knowledge, Attitude, and Approaches of Pre - Primary and Primary School Teachers in Mumbai, India. *Scientifica (Cairo)*.2016; 2016: 5967427.
- [24] Baltaci E, Baygin O, Tuzuner T, Korkmaz FM. Evaluation of the knowledge, attitudes and behaviors of pre - school teachers on oral and dental health in the city center of Trabzon. *Eur Oral Res*.2019 Jan; 53 (1): 12 - 20.
- [25] Masanja IM, Mumghamba EG. Knowledge on gingivitis and oral hygiene practices among secondary school adolescents in rural and urban Morogoro, Tanzania. *Int J Dent Hyg*.2004 Nov; 2 (4): 172 - 8.
- [26] Rajabiun S, Fox JE, McCluskey A, Guevara E, Verdecias N, Jeanty Y, DeMayo M, Mofidi M. Patient perspectives on improving oral health - care practices among people living with HIV/AIDS. *Public Health Reports*.2012 May; 127 (2_suppl): 73 - 81.
- [27] Maganur PC, Satish V, Marwah N, Vishwas TD, Dayanand MC. Knowledge, attitudes, and practices of school teachers toward oral health in Davangere, India. *International Journal of Clinical Pediatric Dentistry* 2017 Jan; 10 (1): 89.
- [28] Arndt J, King S, Suter E, Mazonde J, Taylor E, Arthur N. Socialization in health education: encouraging an integrated interprofessional socialization process. *J Allied Health*.2009 Spring; 38 (1): 18 - 23.
- [29] Petersen PE, Danila I, Samoila A. Oral health behavior, knowledge, and attitudes of children, mothers, and schoolteachers in Romania in 1993. *Acta Odontologica Scandinavica* 1995 Jan 1; 53 (6): 363 - 8.
- [30] Mota A, Oswal KC, Sajnani DA, Sajnani AK. Oral Health Knowledge, Attitude, and Approaches of Pre - Primary and Primary School Teachers in Mumbai, India. *Scientifica (Cairo)*.2016; 2016: 5967427.
- [31] Gowdar IM, Aldamigh SA, Wabran MS, Althwaini AS, Alothman TA, Alnafisah AM. Knowledge and attitude of male schoolteachers towards primary dental care. *Journal of Family Medicine and Primary Care* 2020 Mar; 9 (3): 1594.
- [32] Ehizele A, Chiwuzie J, Ofili A. Oral health knowledge, attitude and practices among Nigerian primary school teachers. *International Journal of Dental Hygiene* 2011 Nov; 9 (4): 254 - 60.
- [33] Almas K, Al - Malik TM, Al - Shehri MA, Skaug N. The knowledge and practices of oral hygiene methods and attendance pattern among school teachers in Riyadh, Saudi Arabia. *Saudi Medical Journal* 2003 Oct 1; 24 (10): 1087 - 91.
- [34] Al - Jundi SH, Al - Waeili H, Khairalah K. Knowledge and attitude of Jordanian school health teachers with regards to emergency management of dental trauma. *Dental Traumatology* 2005 Aug; 21 (4): 183 - 7.
- [35] Thwin KM, Zaitsu T, Ueno M, Kawaguchi Y. Effects of oral health education in Myanmar preschool children and guardians. *Journal of Investigative and Clinical Dentistry* 2018 Aug; 9 (3): e12346.
- [36] Ramroop V, Wright D, Naidu R. Dental health knowledge and attitudes of primary school teachers toward developing dental health education. *West Indian Medical Journal* 2011 Oct 1; 60: 576 - 80.
- [37] Lang P, Woolfolk MW, Faja BW. Oral health knowledge and attitudes of elementary schoolteachers in Michigan. *Journal of Public Health Dentistry* 1989 Jan; 49 (1): 44 - 50.
- [38] Chikte UM, Brand AA, Gilbert L. Suitability of teachers as oral health educators. *The Journal of the Dental Association of South Africa= Die Tydskrif van die Tandheelkundige Vereniging van Suid - Afrika*.1990 Oct; 45 (10): 429.
- [39] Khan N, Mansour M, Zarea B. Caries status, hygiene and fluorosis of primary school teachers in Riyadh urban area. In An internship seminar, KSU, College of Dentistry 1999.
- [40] Liu J, Zhang SS, Zheng SG, Xu T, Si Y. Oral Health Status and Oral Health Care Model in China. *Chin J Dent Res*.2016; 19 (4): 207 - 215.
- [41] Ahmad MS. Oral health knowledge and attitude among primary school teachers of Madinah, Saudi Arabia. *J Contemp Dent Pract* 2015 Apr 1; 16 (4): 275 - 9.
- [42] Woolfolk MW, Lang WP, Faja BW. Oral health knowledge and sources of information among elementary schoolchildren. *Journal of Public Health Dentistry* 1989 Jan; 49 (1): 39 - 43.
- [43] Lopez N, Quick K, Sager J. Rural schoolteachers' knowledge about oral health and perceived roles in oral health education. *J Public Health Dent*.2020 Dec 28.
- [44] Amith HV, D'Cruz AM, Shirahatti RV. Knowledge, attitude and practice regarding oral health among the rural government primary school teachers of Mangalore, India. *American Dental Hygienists' Association* 2013 Dec 1; 87 (6): 362 - 9.

[45] Sukhabogi JR, Shekar BC, Hameed IA. Knowledge, attitude and practices related to oral health among English and Telugu medium school teachers in two districts of Andhra Pradesh, India: a comparative

study. Journal of Indian Association of Public Health Dentistry 2014 Oct 1; 12 (4): 306.

Appendix I

The items of the questionnaire completed by the study sample:

Teachers' knowledge on oral health

- 1) Does oral health play a role in general health?
Yes No
- 2) How does irregular tooth brushing affect your teeth?
Decay Gum disease Bad breath Stains on teeth Nothing All of the above
- 3) What causes dental problems?
Eating sweets and ice cream Not brushing properly Not rinsing the mouth
Not regularly visiting a dentist All of the above
- 4) How can you avoid dental problems?
Avoiding sweets and sticky foods Brushing properly Mouth rinsing after meals
Regularly visiting a dentist All of the above
- 5) Do you know that a clean mouth can protect against tooth decay?
Yes No

Attitudes of teachers towards oral health

- 1) Do you think maintaining a healthy mouth is your own responsibility?
Yes No
- 2) Have you visited a dentist before?
Yes No
- 3) If yes, then for what reason?
Decay Pain Filling Extraction Any others specify
- 4) Do you think it is necessary to visit a dentist regularly to maintain oral health?
Yes No

Practices of teachers regarding oral health

- 1) What do you use to clean your teeth?
 Toothbrush and toothpaste
 Toothbrush and toothpowder
 Finger and toothpowder
 Neem sticks
 Any others, please specify
- 2) How many times a day do you clean your teeth?
 Once daily
 Twice daily
 More than twice daily
 After every meal
- 3) How do you brush your teeth?
 Use horizontal strokes
 Use vertical strokes
 Both in horizontal and vertical directions
 Circular strokes

- 4) How frequently do you change your brush?
- Once every 3 months
 - Once every 6 months
 - Annually
 - When bristles become frayed
 - Do not know exactly
- 5) What amount of paste do you add to your brush?
- Full length of bristles
 - Half - length of bristles
 - Pea - sized amount

General information on oral health in school curriculum

- 1) Are subjects related to the teeth and mouth included in the current school curriculum?
Yes No
- 2) Have you been trained to provide education on topics related to the teeth and mouth to school children?
Yes No
- 3) Have you made an attempt to educate your students about topics related to the teeth and mouth?
Yes No
- 4) What methods are you using to give oral education to students at your school?
- Oral health talks
 - Models, charts, and posters
 - All of the above
- 5) If yes, what type of oral health education have you given to your school children?
- Information about tooth types, function, structure, and eruption
 - Information about brushing, good dietary habits, detrimental oral habits
 - Education about tooth decay, gum diseases, irregular teeth, their causes, treatment, and prevention
 - All of the above