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Saudi population knowledge and awareness about orthodontic space maintainers

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ABSTRACT

Background: Premature loss of deciduous teeth results in arch discrepancy, crowding, permanent tooth impaction, midline shift, and thereafter function impairment. Due to these reasons, we need a "space maintainer" which is an appliance utilized to maintain a space in a certain arch that had previously been filled by a tooth or more. The purpose of our study was to determine if the Saudi populace has adequate knowledge and awareness of the necessity of space maintainers. *Methodology:* A population-based cross-sectional survey was conducted in different regions of Saudi Arabia from January 2020 until November 2021. An online questionnaire was used; collect data in Saudi Arabia with a sample size consisting of 690 Saudi adults. Microsoft Office Word Software program (2020) for windows was used to data entry. Data was shifted to the (SPSS) program to be statistically analyzed. *Results:* The study sample consisted of 690 participants. 16.4% of study sample were males and 83.6% were females. 51.3% aged between 20-30 years old. 54.9% of all participants take their children to the dental clinic twice a year, 16.8% every year and 21% only if there's a problem with the child. Only 27.5% or our participants knew space maintainers. *Conclusion:* Finally, there was a lack of knowledge and awareness of space maintainers among the Saudi people. Parents should be urged to clean their children's teeth in order to avoid the development of dental caries and the premature loss of primary teeth.

Keywords: Space Maintainers, Premature Loss, Primary Teeth, Crowding, Tooth Impaction.

1. INTRODUCTION

In the child's development, deciduous dentition plays an important role in esthetics, chewing, speech and enable normal growth and function, in addition to those important functions, it can preserve space for the permanent successor until it is capable of erupting in the oral cavity (Samal, 2020). Premature loss of deciduous teeth results in arch discrepancy, crowding,

permanent tooth impaction, midline shift, and thereafter function impairment (Moses et al., 2018). In 1887, Space loss as a result of premature loss of the primary molar was described for the first time (Ahmad et al., 2018). In history, archeological research showed that ancient mummies from 1000 years AC used metal bands tied around the teeth for aligning them. From 1924 there were beginnings of efforts to use space maintainers (Adak et al., 2018). In 1941, JC Brauer invented the term "space maintainer" and it is an appliance utilized to maintain a space in a certain arch that had previously been occupied by a tooth or group of teeth. Space maintainers are primarily responsible for guiding the eruption of the coming permanent teeth into their suitable space to avoid impaction, crowding, over-eruption or drifting of teeth (Vignesh et al., 2020).

Space maintainers are primarily responsible for guiding the eruption of the coming permanent teeth into their suitable space to avoid impaction, crowding, over-eruption or drifting of teeth. The study is conducted due to limited research available about the topic, insufficient samples of the studies conducted. In 2016, an online survey was carried out at king Abdelaziz university, Saudi Arabia, found that knowledge and awareness of the detrimental effect of early loss of deciduous teeth and the usage, care, and monitoring of space maintainers in Saudi Arabia are quite poor (Linjawi et al., 2016). This study is conducted due to the limited research available about the topic; insufficient samples of the studies conducted, and limited generalizability of them.

Our study was designed to assess whether the Saudi population have sufficient knowledge and awareness about the importance of space maintainers to eliminate or reduce the severity of malocclusion.

2. METHODS

Study design

Cross-Sectional study was conducted in different regions of Saudi Arabia from January 2020 until November 2021.

Subject

The study's population consisting of Saudi adults from all regions of Saudi Arabia

Sample size

The estimated population size (Saudi adults) is about 26 million according to Saudi General Authority for Statistics. The sample size was estimated using the "Raosoft" and "Survey System" calculators with a confidence level of 95%; a sample size of 690 was collected. The sample size of this study is calculated by using the formula:

$n = P(1-P) * Z_{\alpha}^2 / d^2$

n: Calculated sample size

Z: The z-value for the selected level of confidence (1- a) = 1.96.

P: An estimated prevalence of knowledge

Q: (1 – 0.50) = 50%, i.e., 0.50

D: The maximum acceptable error = 0.05.

So, the calculated minimum sample size was:

n = (1.96)2 X 0.50 X 0.50/(0.05) 2 = 384. The final sample size was 690 participants.

Inclusion criteria

All Saudi adults are included

Exclusion criteria

People who refused to participate

Adults with a specialty related to dentistry

Data collection tool

A systematic structured questionnaire was used to collect data covering study objectives. The tool was developed based on previous studies (Alduhaymi et al., 2020; Linjawi et al., 2016) conducted in Saudi Arabia and elsewhere and modified. The final version of the questionnaire consisted of 18 questions classified into main three sections: Section one included questions about demographic data. The second section contained information about oral health knowledge. The third part asked questions about previous experience to early loss of primary teeth and space maintainers of related children and awareness toward the space maintainers.

Data collection technique

The researchers distributed the questionnaire online as the questionnaire on social media sites (WhatsApp- Facebook- Twitter- etc.) to be filled out personally. The questionnaire had a brief introduction explaining the nature of the research and confidentiality of the information that given to participants.

Analysis and entry method

Data was entered on the computer using the "Microsoft Office Word and Excel Software" programs (2020) for windows. Data was transferred to the Statistical Package of Social Science Software (SPSS) program to be statistically analyzed.

3. RESULTS

As illustrated in table (1); our sample consisted of 690 participants. 16.4% of study sample were males and 83.6% were females. 51.3% aged between 20- 30 years old. 38.3% of all participants were from central region in the kingdom while 33.8% were from western region. 72% had university degree education and 9.1% had diploma. 57.4% had very low family income, 25.4% moderate and 12.6% had high income. In table (2); 54.9% of all participants take their children to the dental clinic twice a year, 16.8% every year and 21% only if there's a problem with the child. 9.9% of our sample reported that incipient caries in the primary teeth can be left untreated because it is simple and the tooth was replaced by a permanent tooth, 52.5% reported that it should be treated as soon as it's detected, and 30.4% think that it should be treated after feeling of pain, seeing changes in the shape or colour of the tooth, or an abscess. 53% had a child or relative child who lost a primary tooth due to caries, abscess, or trauma.

Table 1 Sociodemographic characteristics of participants (n=690)

Parameter		No.	Percent
Age	Less than 20	58	8.4
	20 - 30 years old	354	51.3
	31 - 40 years old	158	22.9
	41 – 50 years old	88	12.8
	51 - 60years old	32	4.6
Gender	Male	113	16.4
	Female	577	83.6
Marital status	Married	377	54.6
	Single	313	45.4
Region in Saudi Arabia	Central Region	264	38.3
	Eastern Region	167	24.2
	Northern Region	13	1.9
	Southern Region	13	1.9
	Western Region	233	33.8
Education level	Primary School	2	.3
	Middle School	5	.7
	High School	80	11.6
	University	497	72.0
	Diploma	63	9.1
	Postgraduate Degree	43	6.2
Specialty	health professional field	152	22.0
	other specialty	538	78.0
Income	Less than 6000	396	57.4
	6000-13000	175	25.4
	13000-22000	87	12.6
	More than 22000	32	4.6

Table 2 Knowledge of participants of oral health of their children and associated variables (n=690).

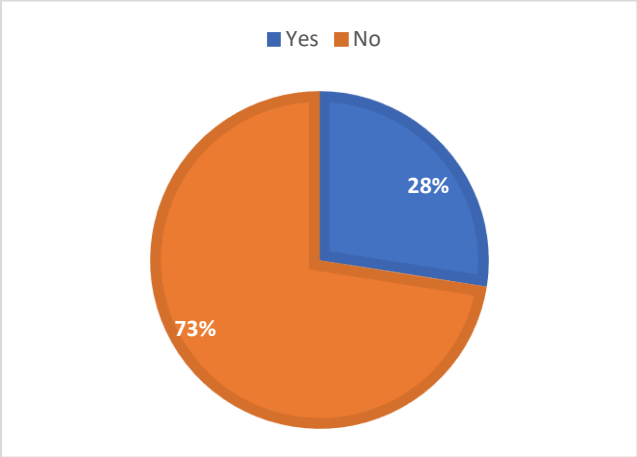
Parameter		No.	Percent
Frequency of dentist visits of child	Every 6 months	379	54.9
	Every year	116	16.8
	Every 2 years	8	1.2
	If there is a problem with the child.	145	21.0
	I don't know	42	6.1
Incipient caries in the primary teeth	Can be left untreated because it is simple and the tooth was replaced by a permanent tooth.	68	9.9
	Treated after feeling of pain, seeing changes in the shape or colour of the tooth, or an abscess	210	30.4
	Treated as soon as it's detected.	362	52.5
	Don't know	50	7.2
Had achild or relative who lostaprimary tooth due to caries, abscess, or trauma	Yes	366	53.0
	No	145	21.0
	Don't know	179	25.9

As illustrated in table (3); only 27.5% of our participants knew space maintainers (Figure 1). Regarding source of information about space maintainers, 57% of who knew it had heard of it from the dentist, 16% from friends or relative, 24% from internet and 1% from general physician. Only 15.9% knew that space maintainers should be used if a primary tooth is lost. 46.4% of participants knew that there are negative effects of leaving empty space after tooth loss. 24.3% know the consequences of empty space if left unattended. 47.7% know when space maintainer can be used. 70.9% of our sample reported that purpose of space maintainer is to prevent malocclusions, 4.1% to prevent gum disease and 3.8% caries. Table (4) shows that knowledge of space maintainers was significantly associated with age, marital status, residence and income (P= or less than 0.05)

Table 3 Participants' knowledge of space maintainer and associated variables (n=690)

Parameter		No.	Percent
Know space maintainer	Yes	190	27.5
	No	500	72.5
If yes, source of information about space maintainers	Dentist	110	57.0
	Friends or relatives	32	16.0
	Physician	2	1.0
	Internet	46	24.0
If a primary tooth is lost, the appropriate action for the resulting space in the jaw is:	Bridge	8	1.2
	Implant	12	1.7
	Leave it, as it was occupied by its permanent successor later	397	57.5
	Space Maintainer	110	15.9
	Don't know	163	23.6
Negative effects of leaving	Yes	320	46.4

empty space after tooth loss	No	96	13.9
	Don't know	274	39.7
Know the consequences of empty space if left unattended	Yes	168	24.3
	No	250	36.2
	Not sure	272	39.4
Have child or relative's child treated with a space maintainer	Yes	112	16.2
	No	381	55.2
	Don't know	197	28.6
Know when space maintainer can be used	Yes	150	21.7
	No	329	47.7
	Not sure	211	30.6
Purpose of space maintainer is to prevent:	Caries	26	3.8
	Gum Disease	28	4.1
	Malocclusion	489	70.9
	Don't know	147	21.3



Figurer 1 The prevalence of Know space maintainer among Participants'(n=690)

Table 4 Association between knowledge of space maintainers with sociodemographic characters of participants

		Know space maintainers		Total (N=690)	P value
		Yes	No		
Age	Less than 20	73	281	354	0.001
		38.4%	56.2%	51.3%	
	20 - 30 years old	64	94	158	
		33.7%	18.8%	22.9%	
	31 - 40 years old	31	57	88	
		16.3%	11.4%	12.8%	
	41 – 50 years old	10	22	32	
		5.3%	4.4%	4.6%	
	51 - 60 years old	12	46	58	
		6.3%	9.2%	8.4%	
Gender	Male	24	89	113	0.101
		12.6%	17.8%	16.4%	

	Female	166	411	577	
		87.4%	82.2%	83.6%	
Marital status	Married	123	254	377	0.001
		64.7%	50.8%	54.6%	
	Single	67	246	313	
		35.3%	49.2%	45.4%	
Residence	Southern area	2	11	13	0.022
		1.1%	2.2%	1.9%	
	Eastern Region	42	125	167	
		22.1%	25.0%	24.2%	
	The northern area	4	9	13	
		2.1%	1.8%	1.9%	
	Western Region	82	151	233	
		43.2%	30.2%	33.8%	
	Central Region	60	204	264	
		31.6%	40.8%	38.3%	
Education level	Primary	2	0	2	0.167
		1.1%	0.0%	0.3%	
	Middle school	2	3	5	
		1.1%	0.6%	0.7%	
	Secondary	17	63	80	
		8.9%	12.6%	11.6%	
	University	137	360	497	
		72.1%	72.0%	72.0%	
	Diploma	18	45	63	
		9.5%	9.0%	9.1%	
	Postgraduate	14	29	43	
		7.4%	5.8%	6.2%	
Income	Less than 6000	91	305	396	0.001
		47.9%	61.0%	57.4%	
	6000-13000	53	122	175	
		27.9%	24.4%	25.4%	
	13000-22000	27	60	87	
		14.2%	12.0%	12.6%	
	More than 22000	19	13	32	
		10.0%	2.6%	4.6%	

4. DISCUSSION

Mother and Father are in charge for their children's oral health. In the first year of infancy, they are accountable for routines dental appointments and oral hygiene for their kids. Many parents assume that losing primary teeth at a young age is unimportant (Ahamed et al., 2012). They believe that losing a milk tooth is not as serious as losing a permanent tooth. Primary teeth serve as temporary substitutes for permanent teeth. The value of primary teeth and preventative oral hygiene care is influenced by parents' understanding of the necessity of primary dentition and the relevance of preventative oral hygiene care in their children's oral health (Al-Shahrani et al., 2015). Space maintainers are preventative methods used to prevent malocclusion (Alamoudi, 1999). Early orthodontic therapies are frequently used to induce beneficial developmental changes in the developing dentition. The most secure strategy to avoid future malocclusions caused by tooth loss is to use an effective and long-lasting space maintainer. A sufficient use of space maintainer is suggested to preserve the space till the emergence of permanent dentition (Setia et al., 2013).

According to (Nagarajappa et al., 2013), the actual condition and perceived treatment requirements are substantially connected with parents' attitudes and understanding of their kids oral health. According to research conducted by (Alshehri & Vs, 2015) on measuring parents' knowledge and awareness of their newborns' oral healthcare, only 25.33 percent of the participants had a good understanding of their children's dental health.

In our study, only 27.5% of participants knew space maintainers, 15.9% knew that space maintainers should be used if a primary tooth is lost and 46.4% of participants knew that there are negative effects of leaving empty space after tooth loss which indicated low level of knowledge among our sample. Previous literature in Saudi Arabia showed that the level of awareness of parents about the factors related to space maintainers in their children's oral cavities is inadequate, whereas the level of satisfaction of their children with space maintainers is good, with the highest satisfaction rate, with band-and-loop space maintainers (Shamsaddin et al., 2019). A study by (Linjawi et al., 2016), reported that awareness of parents in KSA was at a minimum (28 percent) which was on the line with (Alduraihim et al., 2020). where the researchers noted that Saudi Arabian parents had relatively low knowledge (Alduraihim et al., 2020), conducted a study in Alkharj city and reported 82.1 percent of mother &father were unaware of space maintainers and had not received any information about them, 43.7 percent of parents had no personal experience with a child's missing deciduous teeth, and 78.4 percent of parents were unsure whether space maintainers help with the eruption of permanent dentition (Alduraihim et al., 2020). In Dammam city, Out of 200 parents, 18.5 percent were knowledgeable of space maintainers, their application, maintenance, and advantages (Al Meedani et al., 2020).

According to the study done by (Sanjith et al., 2020), 39 percent of parents were aware of the necessity and role of primary dentition in saving space. In our sample, 16.2% had a child of their own or a relative that ever been treated with a space maintainer which was lower than reported only 22.5 percent of parents said their kids had been treated with space maintainers in previous studies (Al Meedani et al., 2020). Professional and academic stake holders throughout the world have long recognized and pushed for the importance of oral health in children's early years. Early childhood dental health impacts and consequences are critical in shaping oral health trajectories throughout life, and they can have an effect on oral health and disease incidence in maturity (Bhaskar et al., 2014).

In our study, 54.9% of all participants take their children to the dental clinic twice a year, 16.8% every year and 21% only if there's a problem with the child. According to another studies, more than 75% of parents believe their kids should visit the dental clinic two times a year (Al Meedani et al., 2020). In our study, age was found statistically significant in space maintainer knowledge, marital status, residence, and income ($P< 0.05$).

5. CONCLUSION

In conclusion, Saudi population had poor knowledge and awareness regarding space maintainers. To reduce the prevalence of dental caries and the early loss of deciduous teeth, parents must be urged to take responsibility for cleaning their children's teeth. It is strongly advised that educational lectures and workshops be established in order to promote knowledge ofkidsabout hygiene of oral cavityamongstfathers and mothers. To pique parents' interest and drive, oral health practitioners must be taught in new effective learning methodologies. According to the discoveries of this paper, the Saudi people need to be more aware of the importance of space maintainers. Future research will be needed to replicate this study in a variety of contexts, settings, and sample populations.

Ethical approval

The research proposal was approved by the Regional Research and Ethics committee of Ibn Sina National College for Medical Sciences with Ethical approval number (IRRB-01017102021).

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Conflict of interests
The authors declare that there are no conflicts of interests.

Data and materials availability
All data associated with this study are present in the paper.

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