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Utilization of mouthguards among school children in Saudi Arabia

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ABSTRACT

Aim: To evaluate attitude towards mouthguard utilization among school children.

Methods: This cross-sectional study was conducted among students of both genders, aged between 8 to 16 years, attending school in Riyadh, Saudi Arabia. A structural questionnaire was prepared consisting of questions related to the demographic details, attitude, and conception of children towards using a mouthguard. The questionnaire was sent to the school teachers to distribute among the respective school children. Descriptive statistics were used to analyze the data.

Results: A total of 1116 children completed the survey form, of which 488 were female and 628 male. The prevalence of use of mouthguard among Saudi school children was found to be 3.32%. Out of the total study subjects, 72.68% of the subjects believed that mouthguards could protect them from injuries. The most

common reasons for not wearing mouthguards were: they never thought about it (38.47), they felt it was not necessary (30.58%), it was expensive (11.02%), and they never had any injury (19.93%). Out of 37, 2 subjects never experienced any problem with mouthguards. The most common problems with the mouthguards were: difficulty in speech, being uncomfortable and expensive, followed by interference with breathing.
Conclusion: The prevalence of mouthguard use was 3.32% in Saudi school children aged between 8-16 years. The most common reason for not using it was found to be lack of knowledge. Counseling the young children interested in sports activities is the need of the hour.

Keywords: *mouthguard, orofacial trauma, school children, sports injuries*

INTRODUCTION

A mouthguard, also known as gum shield, mouth protector, or sports guard, is an appliance that covers the teeth and surrounding mucosa to prevent trauma to the dentition, gingival tissue, lips, and jaws.[1] The mouthguard is usually worn on the maxillary arch, and it separates the maxillary and mandibular teeth, protecting the teeth from the surrounding soft tissue, thereby absorbing or redistributing shock and stabilizing the mandible during traumatic jaw closure.[2,3] They may also help prevent concussion by absorbing the impact forces that would get transmitted through the base of the skull to the brain.[4] Athletic mouthguards are intended to protect the lips and intraoral tissue from injuries, teeth fractures and avulsions, and jaws from fractures and dislocations. The three most common types of mouthguard are categorized as follows: stock mouthguards (ready to use and are believed to give the least protection), the boil and bite type (which are heated in hot water, placed in the mouth, and molded to the teeth), and custom-made mouthguards (which are usually made by the dentist on a stone model of the maxillary teeth and surrounding tissue, and are thought to give the most protection).[2,4] These devices can be prepared from different materials, but ethylene-vinyl acetate is the most popular material.[5]

The need for such a device was realized as far back as 1927.[2] In addition to the importance of utilizing a mouthguard, other studies showed that mouthguards in contact sports assume new importance in addition to preventing mechanical injury to the oral tissues.[3] Subsequently, they effectively prevent oral trauma in sports, and became popular even in non-contact sports to protect the teeth, periodontal tissues, and temporomandibular joints from excessive occlusal force.[4] In a Swedish county, approximately 25% of oromaxillofacial injuries occurred in the age interval of 7–30 years during the period of 1989–1990 due to sports activities.[5] In addition, another study showed that sports account for 3% to 29% of facial injuries and 10% to 42% of facial fractures.[6] Mouthguards or mouth protectors are the appliances worn by athletes to protect their dentition.[6] Recently, there has been a significant increase in injuries caused by sports activities. To prevent or minimize such injuries, using a protective equipment such as a mouthguard can be helpful. It is the duty of a dentist to create awareness on the importance, advantages, and necessity of utilizing the mouthguard throughout the community, especially among parents to educate, influence, and encourage their children to make use of it during their daily practices, accidents, or even sports practice or exercise.

LITERATURE REVIEW

A comprehensive literature search was done using keywords “mouthguard” and “children” on PubMed from January 2000 - December 2020. The search was confined to literature in the English language, and only full text available online was

taken for the analysis. The studies involving school children only were included in the study. Studies involving adults, football players, and sports persons were excluded. There were six studies available on school children, and one study was performed on both adults and children (Table 1). Fakhruddin et al.[8] reported that 5.5% of the study subjects from Canada used mouthguards. Ramagoni et al.[9] reported mouthguard usage of about 1.25% among South Indian school children. Another study from India reported by Sethi et al.[11] found that only 4.25% used mouthguards while playing sports. Pribble et al.[7] found that 14% of the American subjects used mouthguards. An Irish study[10] found that 12% of the study participants use mouthguards. A Croatian study[12] found that 41% of the children were using the mouthguards of 229 subjects. The literature review showed a discrepancy in the prevalence of utilization of mouthguards among school children.

Additionally, the mouthguard seems not a comfortable device, especially for very young children, according to a study conducted with the aim to examine children's compliance on wearing mouthguards at the Hadassah School of Dental Medicine, who received free mouthguards.[13] The prevalence of mouthguard use has been reported be low in various studies conducted across the globe.[7-12] However, educating and motivating the children and their parents is an important key to reducing the prevalence of injuries. Also, the dentist plays such an important role in the procedure. Thus, the present study aimed to evaluate the attitude towards mouthguard utilization among 8-16 year old participants who are athletically active in the Arabic children schools.

MATERIALS AND METHODS

A cross-sectional survey was conducted among the children aged between 8 to 16 years of both genders in Saudi Government schools. A stratified random sampling was used to select the children from government schools across different provinces of Riyadh, Saudi Arabia. A total of 20 schools were selected, from which a sample of 1116 was considered for the present study. Consent was taken from the parents of the included children.

Inclusion criteria: The children of both genders between the ages of 8-16 in Saudi Arabia, and those active in sports activities of the schools were included in the study.

Exclusion criteria: The adults of both genders in Saudi Arabia were excluded. Children who never participated in any sports activities were also not considered as study subjects for the present study.

Questionnaire: The questionnaire was prepared in English and the local language by the Senior Pediatric Dentist based on the previous studies.[11] A pilot study was conducted on 50 school children (not included in the final analysis) to check the validity of the questionnaire. The confusion related to the questionnaire was critically analyzed, and the questions were accordingly modified. The questionnaires were given to the respective teachers to distribute to the included children. The questionnaire included information about the use of any type of mouthguard, their conceptions regarding the protective part of the mouthguard, and the reason for not using it. The mouthguard users were asked about their age, and their attitude towards playing without a mouthguard. The ethical approval was received from Deanship of scientific research, Majmaah University, Al Majama'ah, Saudi Arabia. The distribution of questionnaires and data collection was done a month after the initial approval from the university ethical committee. Also, the children were asked about the problems associated with mouthguard usage. Children were given 5 minutes to read and fill the questionnaire; in case of any confusion, they were free to ask their doubts from the author (present to help, in case of any doubt only).

STATISTICAL ANALYSIS

The responses from the participants were computed into a Microsoft Excel worksheet, and then

TABLE 1. Prevalence of Mouthguard use in previous studies

Author	Year	Place	Aim	Subjects	Age (years)	Prevalence
Pribble et al.[7]	2004	United States of America	To understand factors that influence parental perceptions regarding mandatory mouthguard use in competitive youth soccer.	120*	11.8±1.5	14% wore mouthguards, and 11% suffered orofacial injuries.
Fakhruddin et al.[8]	2007	Canada	To investigate the frequency of use of mouthguards among Ontario school children.	2422 children	12 to 14	5.5% of children wore mouthguards for school sports, and 20.2% wore protection in league sports.
Ramagoni et al.[9]	2007	India	To assess the levels of awareness regarding orofacial injuries and the use of mouthguards.	719 children	11 to 14	Mouthguard usage was about 1.25%.
O'Malley et al. [10]	2012	Ireland	To determine the extent of mouthguard use, dental trauma, and barriers to use among children.	1111 children	9 to 13	Mouthguards were worn by 22% of children during sports.
Sethi et al. [11]	2016	India	To evaluate the attitude toward mouthguard utilization among 8–11-year-old athletically active school children.	2000 children	8 to 11	The prevalence of mouthguard use was found to be 4.25%.
Galić[12]	2018	Croatia	To assess athletes' attitudes and habits regarding mouthguard use.	229 children	12.9 ± 3.2	Most participants were aware of mouthguards for dental trauma prevention and considered them efficient for preventing dental injuries during sports activities, but only 94 (41%) used them.

**Parents of 120 children participated in the study*

coded, cleaned, and analyzed using SPSS (version 17.0, Chicago, USA) used for descriptive statistics.

RESULTS

A total of 1116 children filled the survey form. Of the 1116 children who filled the survey form, 488 (43.72%) of them were female and 628 (56.27%) were male (Table 2). Most of the included subjects were 13 years old. The prevalence of mouthguard use was found to be 3.32%. Out of 37, 25 students used the boil and bite mouthguards, while the remaining 12 used custom-fabricated mouthguards. Male students (28) were more comfortable wearing the mouthguard than girls (9). The reasons for not wearing mouthguards included: being expensive (11.02%), not necessary (30.58%), lack of knowledge (Never thought about it), and never having any sports injury. A total of 72.68% believed that mouthguards could protect them from injuries, while 23.56% did not believe in using the mouthguards (Table 2). When asked about the age at which the children started using mouthguards, out of 37 subjects, 21 (56.76%) participants reported that they started using it at the age of 10, and only 5 (13.51%) were found using it from an age lesser than 5 years. When asked about their feeling while playing or training without using mouthguards, 26 (70.28%) children said that they would be willing to play without a mouthguard, while four children said that they would be reluctant to play without a mouthguard, and only seven subjects accepted that they would not play without it. Of the total 37 subjects who wore mouthguards, 2 (5.40%) subjects never experienced problems with their mouthguard. However, the common problems faced by the subjects are: difficulty in speaking, discomfort, affects the looks, feels loose, interferes with breathing, and expensive (Table 3).

DISCUSSION

Many children traumatize their anterior teeth even before reaching adolescence during sports

TABLE 2. Demographic characteristics of the study participants

Details		**N**	**%**
Age	9	24	2.2%
	10	169	15.1%
	11	246	22.0%
	12	218	19.5%
	13	326	29.2%
	14	98	8.8%
	15	32	2.9%
	16	3	0.3%
Gender	Female	488	43.7%
	Male	628	56.3%
Class	Fifth-grade primary school	257	23.0%
	First-grade intermediate school	315	28.2%
	Fourth-grade primary school	171	15.3%
	Second-grade intermediate school	118	10.6%
	Sixth-grade primary school	230	20.6%
	Third-grade intermediate school	25	2.2%

TABLE 3. Overall responses of the study participants

Question	Response	N	%
Have you ever used mouthguards?	No	1079	96.68%
	Yes	37	3.32%
If yes, what mouthguard do you use? N=37	Boil and bite	25	2.24%
	Custom made	12	1.08%
If no, why? N=1079	It is not necessary	330	30.58%
	Never had an injury	215	19.93%
	Never thought about it	415	38.47%
	Too expensive	119	11.02%
Do you believe that mouthguards protect your teeth? N=1116	Don't know	42	3.76%
	No	263	23.56%
	Yes	811	72.68%
How old were you when you first started wearing a mouthguard? N=37	10 years	21	56.76%
	8 years	6	16.22%
	6 years	5	13.51%
	Less than 5 years	5	13.51%
How would you feel before playing or training without using your mouthguard? N=37	I would be reluctant to play without it	4	10.81%
	I would be willing to play without it	26	70.28%
	I would not play without it	7	18.91%
Have you ever experienced problems with your mouthguard? N=37	May be	16	43.24%
	No	2	5.40%
	Yes	19	51.36%
What problems do you think are to occur after wearing a mouthguard? N=35 (may choose more than 1 option)	Difficult to speak	22	59.45%
	Don't know about it	1	2.7%
	Feels loose	5	13.5%
	Interferes with breathing	8	21.6%
	Too expensive	11	29.7%
	Uncomfortable/ does not look good	20	54.0%

activities. Mouthguards are designed for young athletes to prevent such orofacial injuries. With this background, the present study was designed to evaluate the attitude of 8-16 years old athletically active school children in Saudi Arabia towards mouthguard utilization. In the present study, out of 1116 participants, 2.24% used the boil and bite mouthguards. In the survey conducted by Sethi et al.[11] it was found to be 3.65%, which is in concordance with the present study. However, the survey conducted by Fakhruddin et al.[8] reported that 48.2% of the subjects wore boil and bite mouthguards. Custom made mouthguards were worn by 12 out of 37 subjects in the present study, similar to the survey conducted by Sethi et al.[11] High impact activities like martial arts, football, wrestling, and boxing can cause serious health risks if not played correctly. The impact of these sports can lead to avulsed teeth, facial injuries, and fractured facial bones. In this study, 72.68% of the children believed

that mouthguards could protect them from injuries. Similar to the present study results, other authors[9,11] found that 73.2% and 78.2% of the population, respectively, had a positive knowledge about the protective role of mouthguards. Biagi et al.[14] from Italy reported that 80% of the population believed that mouthguards could protect their teeth from sports injuries. On the other hand, 23.56% of the population of this study believed that mouthguards do not protect them from injuries, while Perunski et al.[15] reported it as 60%, which is not in favor with the present research. Sethi et al.[11] reported that 21.8% of the children believed that mouthguards do not protect them from injuries, which is in favor of this study. An athletic mouthguard should be placed inside the mouth to reduce direct and indirect impact on the teeth and the surrounding structures. This must be inculcated in children from the very beginning by their respective coaches, parents, and dentist. A review by Yadiki et al.[16] highlights the awareness and utilization of mouthguards and reasons for not wearing the mouthguards. In the present study, when the children were asked about the reasons behind not wearing a mouthguard, 38.53% revealed that they never thought about it, and 28.6% revealed that they could not see a reason to wear one. While 55.51% and 17.91% respectively selected the same option in a south Indian study.[11] This could be probably due to a lack of knowledge among the study participants. Proper guidance must be provided to the children regarding the protective effects of mouthguards during sports to avoid sports related dentofacial injury. Furthermore, in this study, only 9% of the population did not wear the mouthguards as they are too expensive. Sethi et al.[11] found it as 10.81%, favoring the present study. Matalon et al.[13] reported the compliance of children and youngsters in the use of mouthguards. It was reported that 20.8% of children had never possessed a mouthguard due to its significant expense.

Among the participants in the present study using mouthguards, 21(56.76%) of the 37 subjects started using the mouthguards at the age of 10 years, followed by 16.22% at the age of 8 years. The results are in concordance with the study conducted by Sethi et al.[11.] It could be attributed to children becoming sports oriented around 8-10 years of age. When we asked about their attitude towards the use of mouthguards, 70.28% of the participants were willing to play without them. They never suffered from any orofacial injuries while playing any sports. Sethi et al.[1] found it as 74%. The findings from the study by Sethi et al. are in favor of the present study. When asked if they faced any problems with mouthguards, most said that it caused difficulty in speaking (59.45%), followed by being uncomfortable/does not look good (54%). In another study on the compliance of children and youngsters in the use of mouthguards, 44.9% reported that they did not wear the mouthguards because they forgot, and 42% reported that the reason for not wearing the appliance was because it was not comfortable.[13] A Canadian study[8] reported that a high proportion of ill-fitting mouthguards was the major contributor to the commonly perceived problems of speech, breathing discomfort, and poor appearance associated with mouthguard use.[8] Further studies also reported the reason for not wearing mouthguard as: impaired breathing, is too expensive, feels loose, and interferes with breathing.[8-11] Children who participate in contact games are more prone to dental injuries. Hence, it is imperative to wear mouthguards to avoid dental trauma in those children and be aware of oral health.[17-18] Furthermore, wearing mouthguards during non-contact events such as skateboarding, biking, and mountain climbing also benefit the children. The percentage of children using mouthguards is low in the present study despite having a lack of awareness regarding mouthguards. The usage of mouthguards in the study population is very low, and it is imperative to educate the school children regarding the mouthguard. Traumatic dental injuries (like avulsion, laceration, etc.) are more common among preschool and young school children. So, it is essential to teach children about mouthguards at a very early stage

when they are naïve in the sports field. It is known that trainers have a massive influence on the attitude of their players. They follow their teachers' instruction much better than anyone else. So, coaches/ Trainers can educate the school children and their parents about the risk of dentofacial injuries associated with contact sports and the cost and morbidity they carry. Wearing of mouthguards during sports activities should be compulsory during practice and competition events.[19,20] Moreover, as parents have knowledge about the significance of using protective appliances and mouthguards during sports activities, they might be encouraged to look for the use of mouthguards for their children. In layman language, mouthguards help to prevent broken and chipped teeth. They protect the child's lips, tongue, and face and help redistribute forces. The American Dental Association recommends wearing custom mouthguards for the following sports: basketball, boxing, field hockey, football, gymnastics, handball, ice hockey, lacrosse, martial arts, racquetball, roller hockey, skateboarding, skiing, skydiving, soccer, squash, and surfing.[21] Hence, mouthguards should be a mandatory equipment in sports activities, and awareness should be raised among children and their parents.[22] Even though the study has a reasonably good sample size, the comparisons were not made based on gender and education. However, these are considered potential limitations. This study could stand as a good reference for further research. This study also explains the need to create awareness regarding mouthguards among school children. Future studies must be conducted in different parts of the country with more sample size. Also, the Arabic population must be educated about the importance of mouthguards.

CONCLUSION

It was evident that the attitude of the enrolled children toward the protection role of mouthguards was positive, and most of the participants (96.68%) were not using it due to the lack of guidance by their parents, dentists, or coaches. Thus, increasing awareness in children about the risk of injuries, and focusing on the protective role of mouthguards at an early age is recommended. Dentists need to recommend a properly fitted custom made mouthguard to improve the positive attitude towards mouthguards and decrease its problems.

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors without undue reservation.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

ETHICS STATEMENT

The study was approved by the institutional ethical committee, Majmaah University, Saudi Arabia, under the No MUREC-September.16/COM-2021/5-2.

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