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AWARENESS OF MOUTHGUARD USE AMONG SECONDARY SCHOOL STUDENTS IN BRUNEI DARUSSALAM.

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ABSTRACT

Introduction: This study assesses the awareness and utilization of a protective device (mouthguard) among secondary school children in Brunei Darussalam. **Materials and Methods:** A questionnaire was sent to 500 children aged 11 to 20 years attending in ten secondary schools in Brunei Muara District through their parents. The questionnaire sought information regarding their child's sporting activities, awareness and utilization of mouthguards. The level of awareness and utilization of mouthguards were analysed using R studio (version 1.1.383). **Results:** A total of 384 secondary school children (aged 11-20) consisting of 154 males (40.1%) and 230 females (59.9%) from years 7 to 11 participated in the study, giving a response rate of 76.8%. Among the participants, 64.6% had knowledge regarding a mouthguard. It was found that 99% of the participants did not use a mouthguard while playing sports. More than half of the students (57.3%) were aware that mouthguards can prevent dental injuries during sports. 45.8% of parents felt that their child should wear a mouthguard to prevent injuries during sports while 54.2% did not think that their child needed a mouthguard. **Conclusion:** Although majority of the students were aware of mouthguards and its function, sadly only 1% of them actually used a mouthguard during sport to prevent injuries. Furthermore, it is recommended that the parents who have children taking part in sport activities where they are at risk of orofacial injuries during sports should be educated on the benefits of mouthguards.

Keywords: Awareness, Mouthguard, (Oro)-Facial injuries, School, Children, Sport, injuries.

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Keywords: Awareness, Mouthguard, (Oro)-Facial injuries, School, Children, Sport, injuries.

INTRODUCTION

Mouthguard is a device that is used in the maxillary arch or both maxillary and mandibular arch to protect the wearer's teeth and oral cavity against dental trauma and reduce injuries.[1] A study done in Chennai found 63.4% of sportsperson reported incidences of dental trauma during contact sports.[2] Prevalence of orofacial injuries among Japanese students who took part in sports was reported to be as high as 43%.[3] A similar study in central India reported prevalence of orofacial injuries of 39.1% and 25.3% in contact sports and non-contact sports athletes respectively.[4]

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Mouthguards were created by a London dentist, Woolf Krause in 1890 where it was tailored to protect boxers' lips from tearing.[3] in 1890, mouthguards were made of gutta percha and was held in place by clenching the teeth.[5] Modern-day materials used for mouthguards include polyvinylacetate-polyethylene or ethylene vinyl acetate (EVA) copolymer, polyvinylchloride, latex rubber, acrylic resin, and polyurethane.[6] Mouthguards play a role in preventing dental trauma and the cost of injuries significantly.[7]

Mouthguards come in three different types, the pre-fabricated, mouth-formed and custom made.[8] The pre-fabricated or "stock" mouthguards are based on the best fit for the individual, mouth-formed or "boil-and-bite" mouthguards are made of thermoplastic material where the user can place the mouthguard in hot water until it is mouldable, then it is formed according to the person's teeth. Lastly, the custom-made mouthguards which has the best fit made according to the patient's dental impressions. All three mouthguards have their own advantages and disadvantages including cost, ease of production, fit, and materials used.[8]

In Brunei Darussalam, the proportion of children who uses mouthguard during sports is unknown. Hence this study aimed to investigate on the awareness of mouthguard use among school children, as they are continuously involved in contact sports held by their school and outside their school.

METHODS

Study Design and Participants

This was a cross-sectional study conducted at 10 randomly selected schools from a list of secondary government and private schools in Brunei-Muara District (Sekolah Menengah Katok, Sekolah Menengah Menglait, Sekolah Menengah Masin, Sekolah Menengah Sayyidina Husain, Sekolah Menengah Pengiran Anak Puteri Hjh Masna, Sekolah Menengah Sayyidina Umar Al-Khattab, Sekolah Menengah Rimba II Model School, Sekolah Menengah Pengiran Isteri Hajah Mariam, Sekolah St. Andrew, St. George's School).

Parents of fifty students (aged between 12-20 years) from each secondary school, from year 7 to year 11 were randomly selected and questionnaires were sent to these students to be taken home to be filled and completed by their parents and then returned to the school. The completed form were later collected by the study investigator. Exclusion criteria were students who were medically or physically unable to perform any sports activities. Hence a total sample size of 500 students/parents were sent questionnaires. This study was approved by the Research Ethics Committee of PAPRSB Institute of Health Science (IHSREC).

Data Collection

The study questionnaire was designed to collect relevant information regarding awareness and utilization of mouthguards. A pilot study was done on one of the schools involved before the main study. Personal identifiers were excluded to ensure participant confidentiality. Participants' socio-demographic data (age, gender, year group, and ethnicity) were recorded.

Data Analysis

All data were entered into Microsoft Excel, compiled, and analysed using R Studio version 3.4.3. Descriptive statistics and prevalence estimation was conducted using 95% confidence interval approximation method. The association between the variables in the questionnaire was tested against the socio-demographics of the participants using the independent t-test and one-way ANOVA. P-values reported below 0.05 ($p < 0.05$) was considered statistically significant.

RESULTS

Out of the 500 students from the 10 schools who were invited and sent questionnaires to participate in the survey, 384 questionnaires were returned and analysed, giving a response rate of 76.8%. Table I shows the socio-demographic characteristics of the study sample (n=384). The mean age of the 384 participants was 14.2 (SD 1.5) years. The majority of the participants were Malay (n=304, 79.2%) followed by Chinese. Other ethnicities included Indonesian, Arab, Filipino, Iban, Indian, Kadazan and Melanau.

Table II shows the questionnaire responses of the study sample (n = 384) with 53.9% of the students stated that they were involved in sports which included football, badminton, netball, rugby, table tennis, running, futsal, and basketball. Two hundred and forty-eight (64.6%) students were aware of mouthguards, while 136 (35.4%) did not. Only 4 (1.0%) students reported using mouthguard during szport ativities. Just over half (57.3%) of the students thought that mouthguards can prevent injuries to the oral tissues during sport, while the remaining did not think (12.2%) that mouthguards can prevent injuries to oral tissues, or did not know (30.5%). Majority of the students (83.1%) did not know where they can get hold of a mouthguard and only 19.0% knew that mouthguards can be made at the Government Dental Services.

Just under half of the parents (45.8%) stated that they recommended their child to wear a mouthguard during sports while the other half (54.2%) said that they did not think their child need a mouthguard during sport. There were no differences in gender responses to the questionnaires except boys tended to take part in sports more than girls (Table II: $p<0.05$).

Table I: Socio-demographic characteristics of 384 participants.

Variable	n (%)	(95% CI)
Gender		
Male	154(40.1)	(35.2, 45.2)
Female	230(59.9)	(54.8, 64.8)
Age (years)		
11	3(0.78)	(0.2, 2.5)
12	60(15.6)	(12.2, 19.7)
13	66(17.2)	(13.6, 21.4)
14	84(21.9)	(17.9, 26.4)
15	89(23.2)	(19.1, 27.8)
16	62(16.1)	(12.7, 20.3)
17	19(4.95)	(3.1, 7.8)
20	1(0.26)	(0.001, 1.7)
Year of Education		
7	74(19.3)	(15.5, 23.7)
8	61(15.9)	(12.4, 20.0)
9	94(24.5)	(20.3, 29.2)
10	83(21.6)	(17.7, 26.1)
11	72(18.8)	(15.0, 23.1)
Ethnicity		
Malay	304(79.2)	(74.7, 83.0)
Chinese	45(11.7)	(8.8, 15.5)
Others	35(9.1)	(6.5, 12.6)

n: frequency, CI: Confidence Interval

DISCUSSION

The results suggested that a large proportion of school children (64.6%) were aware of mouthguards, and more than half (57.3%) believed that mouthguard can prevent orofacial injuries during sports. The prevalence of awareness of similar studies done in Barcelona, India, Nigeria, and Japan was much higher at 94.5%, 94.1%, 82.8%, 81.9% and 67% respectively with the exception of Croatia which was about similar to our study at 67%.[2, 3, 9, 10, 11] On the contrary, in Turkey and Israel, the prevalence of awareness mouthguard and its purposes were much lower at 44.1% and 27% respectively.[12, 13] The Federation Dentaire Internationale suggested that the advantages of mouthguards should be informed to the general population by national dental associations and oral healthcare workers.[14]

Table II: Gender responses of study sample (N=384).

No.	Question	Total N(%)	Male n(%)	Female n(%)	p-value [a]
Q1	**Do you (child) know what a mouthguard is?**				
	Yes	248 (64.6)	99 (64.3)	149 (64.8)	1.0
	No	136 (35.4)	55 (35.7)	81 (35.2)	
Q2	**Do you (child) participate in any sports activity held in school / outside school?**				
	Yes	207 (53.9)	100 (64.9)	107 (46.5)	***<0.05***
	No	177 (46.1)	54 (35.1)	123 (53.5)	
Q3	**Do you (child) have a mouthguard?**				
	Yes	7 (1.8)	5 (3.3)	2 (0.9)	0.11 [b]
	No	320 (83.3)	122 (79.2)	198 (86.1)	
	Don't know	57 (12.8)	27 (17.5)	30 (13.0)	
Q4	**Do you (child) use a mouthguard while playing sports?**				
	Yes	4 (1.0)	3 (1.9)	1 (0.4)	0.31 [b]
	No	380 (99.0)	151 (98.1)	229 (99.6)	
Q5	**Who recommended the mouthguard to you(child)?**				
	Dentist	88 (22.9)	29 (18.8)	59 (25.7)	0.31
	Teacher	27 (7.0)	13 (8.4)	14 (6.1)	
	Other	79 (20.6)	36 (23.4)	43 (18.7)	
	No Response	190 (49.5)	76 (49.3)	114 (49.6)	
Q6	**Do you (child) know that injuries to the mouth and teeth can occur during sports?**				
	Yes	300 (78.1)	117 (76.0)	183 (79.6)	0.48
	No	84 (21.9)	37 (24.0)	47 (20.4)	
Q7	**Do you (child) think a mouthguard will help reduce dental injury during sports?**				
	Yes	275 (71.6)	109 (70.8)	166 (72.2)	0.86
	No	109 (28.4)	45 (29.2)	64 (27.8)	
Q8	**Do you (child) know that using a mouthguard can prevent dental injuries during sports?**				
	Yes	220 (57.3)	91 (59.1)	129 (56.1)	0.67
	No	47 (12.2)	20 (13.0)	27 (11.7)	
	Didn't know	117 (30.5)	43 (27.9)	74 (32.2)	
Q9	**Have you (child) thought about using a mouthguard to prevent dental injuries during sports?**				
	Yes	119 (31.0)	47 (30.5)	72 (31.3)	0.96
	No	265 (69.0)	107 (69.5)	158 (68.7)	
Q10	**Do you (child) know where to get a mouthguard?**				
	Yes	319 (83.1)	23 (14.9)	42 (18.3)	0.48
	No	65 (16.9)	131 (85.1)	188 (81.7)	
Q11	**Were you (parent) aware that a mouthguard can be made for your child through the Government Dental Services in Brunei Darussalam?**				
	Yes	311 (81.0)	30 (19.5)	43 (18.7)	0.95
	No	73 (19.0)	124 (80.5)	187 (81.3)	
Q12	**What is your (parent) thoughts about wearing a mouthguard to prevent dental injuries during sports?**				
	Yes, I will make sure my child wears one	176 (45.8)	70 (45.5)	106 (46.1)	0.99
	No, I don't think my child needs it	208 (54.2)	84 (54.5)	124 (53.9)	

Note: Q1-10 responses from student or guardian/parents; Q11-12 responses from guardian/parents only.

a: Calculated using Pearson's Chi-squared test

b: Calculated using Fisher's Exact test

n: frequency

Although there was a high level of awareness, mouthguards were hugely underutilized in Brunei Darussalam where only 1.0% of the participants used a mouthguard during sports.. In India, Croatia, and Malaysia, the reported usage of mouthguard-samong atheletes were 4.25%, 28.0%, and 31.1% respectively.[11, 15, 16] In Barcelona, where awareness was very high, the usage of mouthguards during sports was still considerably low at 61.4%, although it is a lot more higher than the countries reported above including Brunei.[11] Some studies suggested that the low prevalence of utilization of mouthguards could be due to several factors which include limited information available regarding mouthguards, experiencing discomfort when wearing a mouthguard, difficulty in communication, breathing interference, and aesthetics.[15-17] However, some of these difficulties can be overcome by using the appropriate type of mouthguard for each individual. A study suggested that participants who use custom made mouthguards performed better in soccer compared to the other types as the custom made mouthguards can be made such that it is thin enough to adapt to the oral cavity which reduces discomfort and does not obstruct breathing.[18]

As reported in other studies, mouthguards were not utilized because the athletes were not informed or advised to wear a mouthguard, never thought of wearing it, could not see a reason to wear one, the cost of a mouthguard can be expensive, and mouthguards caused masticatory muscle fatigue.[10, 15, 17] To ensure that the athletes wear a mouthguard when needed, the benefits of the mouthguard should be reinforced through their coaches, parents, teachers and oral healthcare professionals.[19] To overcome the issue of masticatory muscle fatigue, it is recommended to wear a custom made mouthguards to ensure a better fit to the athlete's oral cavity.[17]

In Table II, there was mostly no significant difference between gender and the awareness and utilization of mouthguards. A study done in Ireland found a significant difference among the children who were involved in sports where more boys wear a mouthguard compared to girls.[20] It was suggested that the difference in gender could be due to attitudes towards mouthguards and cultural differences, peer pressure and the nature of the sports.[20] Further research is needed to establish the reasons why gender differences exist in awareness and usage of mouthguards if there is any significant difference.

It is recommended that sports coaches, parents, teachers, and oral healthcare professionals educate and emphasize the benefits of using a mouthguard to students who are actively involved in sports. By doing so, trauma rates to the orofacial region can be reduced significantly.[21]

Study Limitations

As this study only approached the parents of the children, the responses obtained were indirect. Some parents might not be aware of their children's activity in school. This could be improved by approaching the sample population directly and performing interviews. More than ten percent of the students refused to participate (non-response bias). In order to reduce the bias, the students could be explained about the importance of the study and their contribution directly. This study only approached students who are in Brunei-Muara District which may not be a representative of the whole Brunei population. A study done on all the districts would represent the awareness and utilization of mouthguards in Brunei Darussalam.

CONCLUSION

Amongst the secondary school students in Brunei Darussalam, majority of the students

are aware of mouthguards, but only very few of them used it during sport activities to prevent injuries. It is recommended to educate the parents who have children who are actively participating in sports about mouthguards and its benefits for their children long term, to ensure that the parents' are encouraging their child on the usage of mouthguards to prevent orofacial injuries. This study will benefit children directly by introducing the use of mouthguards for those who were unaware and indirectly educating the public, specifically the children's parents about the importance of using a mouthguard, especially during sports to reduce dental injuries. In Brunei Darussalam, mouthguards can be obtained through stores or the nearest Dental Clinic which should be a long term investment that prevents dental injuries for school children.

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DISCLOSURE

There was no financial or conflicts of interest between authors in preparing this manuscript.

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