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Comparison and Evaluation of Prefabricated Mouthguards and Replaced Customized Mouthguards in Children of Bhopal.

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ABSTRACT

Aim and Objectives: To assess the change in perspective, when prefabricated mouthguards were replaced with customized mouthguards among children in Bhopal, Madhya Pradesh. **Materials and Method:** This survey was conducted among children between 8 to 18 years age in two phases. The first phase included a 10 item questionnaire to be filled by athletes participating in different sports which consisted of three sections a) mouthguard awareness b) reasons for not wearing a mouthguard and the third section consisted of c) evaluating the level of acceptance of customised mouthguards. The latter part of the survey was completed after 25 randomly selected participants who were made to use customised mouthguards to evaluate the acceptability for the same. The statistical analysis was performed using the SPSS (21.0 version; Inc., Chicago IL, USA) for descriptive and multivariate analysis, and the level of statistical significance used in this study was at $P < 0.005$. **Results:** Use of contact mouthguard was more significant (P-value was 0.0001.) when the use of mouthguards were compared with non contact sports. It was found that custom made mouthguards are more comfortable than prefabricated one with significant difference ($P = 0.051$). **Conclusion:** Custom made mouthguards can prevent dental and orofacial injuries better than the preformed mouthguards. So considering the high level of willingness to wear mouthguards efforts should be made towards increasing the awareness on its benefits. The players were

CCLicense CC-BY-NC-SA 4.0	comfortable with custom made mouthguards so it can be proposed to the government officials to make their use mandatory with some subsidy to decrease the number of accidents. Keywords: Mouth guards, awareness, contact and non- contact sports, custom made mouthguard.
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Introduction

Sports activities carry a certain risk of orofacial injuries as they are at increased risk because of inability to systematically scan the environment and interpret this information for their physical safety.^{1, 2} Growth is expressed first in long bones, and then in the muscles, which leads to a loss in flexibility. This might be one of the reasons of maximum injuries in the adolescent age group.³ Some of sports related oral and maxillofacial injuries include facial laceration, facial bone and tooth fracture, temporo-mandibular disorders and these injuries can lead to dental aesthetic and functional problems.^{4,5}

Mouthguard is a resilient appliance placed in the oral cavity to reduce injuries, particularly to the teeth and surrounding structures. They prevent the tongue, lips, and cheeks from laceration against the teeth, reduce the risk of injury to anterior teeth following posterior teeth of both jaws, and reduce the risk of concussion from impacts to the lower jaw.^{6, 7} While protecting against injuries, mouthguards may have disadvantages like discomfort because of improper fit, tissue reactions, impaired normal breathing and speech, or restricted intake of fluids.⁸

Many authors have reported that mouthguards can prevent some sports-related concussions, by helping to absorb shock, stabilize the head and neck, and limit movement caused by a direct hit to the jaw. Players wearing store-bought mouthguards were more than twice as likely to suffer mild traumatic injuries as those wearing well fit custom made mouthguards. There are many studies regarding mouthguard fabrication, their awareness and their advantages in contact sports like Cricket, Taekwondo, Football and karate. Poor compliance was because of the fitting mouthguards. Therefore we found the need to investigate the acceptability and compatibility, awareness and attitude of mouthguards among the athletes and compare the prefabricated mouthguards and custom-made mouthguards.

Materials and method:

This study was conducted on the players at tatya tope nagar stadium, Bhopal, Madhya Pradesh with children of age of 8-18 years. The study was carried out in two parts. The first part aimed at screening the players regarding their awareness for mouthguards and assessing their needs and expectations via a questionnaire. The second part involved fabrication of customised mouthguards for a randomly selected group of players to assess the acceptance and compatibility.

502 players were explained about the study briefly and asked to fill up the 10 item questionnaire. In the second part of the study 25 players were randomly selected from 502 players for fabrication of customised mouthguards. The impressions were made in alginate and casts were poured immediately. BIOPLAST 2mm clear transparent sheet was used for fabrication of mouthguards using vacuum formed technique in Biostar IV. All the Mouthguards were trimmed to extend 1mm short of the vestibule and were adequately finished for a comfortable and convenient fit. Finishing was done during try in procedure where mouthguards were delivered to respective athletes and checked for proper fit and convenience. Post insertion instructions were given to all the athletes.

Follow up was done after 24 hours of wearing the mouthguards. During follow up it was noticed that most of the patients were satisfied with the customised mouthguards while few complained about discomfort and the required adjustments was done with slight trimming and they were encouraged to wear. After 15 days to check the satisfaction of customised mouthguard the questionnaire was given to all the athletes.

RESULTS

The first part consisted of 502 players out of which the cricket players were 123(24.5%), taekwondo 125(24.9%), karate 119(23.7%) and Football players were 135(26.9%). It was found that 312 (100%) players were using mouthguards out of which 237(76%) were using preformed mouthguards and 75(24%) were using custom made mouthguards. Table 1 shows that there was significant difference in the use of mouthguards and sports played by the participants (P-value was 0.0001.) i.e. use of mouthguard by contact sports (taekwondo and karate) was more than that of non contact sports (cricket and football). 305 players had history of trauma and out of these 232 were not wearing mouthguard and the type of trauma which was commonly seen was soft tissue laceration (45.9%) followed by tooth fracture (28.2%), dislocation (52), avulsion (27%). Players 190(37.85%) were not using mouthguard because the Preventive effect of mouthguards were not known to them (34.7%), Mouthguard is Unnecessary (38%), some of them were not known about the shops(18%), 41% players found them Uncomfortable and 27% players said that mouthguards are expensive. There was significant difference seen in the sports played by male and female participants of the study (Table 2). Table 3 shows that there was no significant difference in the type of mouth guards used among males and females (P= 0.722). There was no significant difference in reasons for not using the mouthguard among males and females (P= 0.051). Statistically significant differences were seen in the the complaints of the patients wearing pre-formed and custom made mouthguards (Table 4). There was no significant difference for responses of willingness for the use of custom made mouthguards among males and females (P=0.202). There was significant difference in responses for willingness for use of custom made mouth guard among different sports players (Table 5).

Discussion:-

Depending on the direction of the force, dental injuries can be caused either directly or indirectly. Direct dental trauma may be caused by a hockey stick, fist or elbow, etc. hitting the teeth, and can

occur in both contact and non contact sports.⁹ In the present study it was seen that the number of male players were significantly higher in both the contact and non-contact sports which completely represents a typical Indian scenario and hence less number of females. The age group selected ranged from 8-12 years as this is the most common age group in which enter into the professional coaching for contact and non contact sports and hence more chances of encountering oral and maxillofacial injuries.

The use of mouthguards was higher for contact sports than for non contact sports which shows that the participants were aware that the dental and other associated injuries of the oro-facial region can be avoided by using mouthguards.^{10,11} The reasons stated for not wearing mouthguards varied and were largely identical with other surveys. The most frequent reason was never having had the need of a mouthguard and, therefore, not seeing any necessity of wearing one. This shows a typical human attitude. People will only start thinking about prevention once an accident has happened. Furthermore, breathing problems, impairment of communication and irritating aesthetics were mentioned in declining order in the present study. Irritating aesthetics and impairment of communication are, however, purely subjective feelings. Athletes often link these irritating factors to a negative influence on their performance. This might be the reason for players abstaining themselves from wearing mouthguards despite of knowing the advantages. In the present study all these complaints and the associated problems were encountered on using pre-formed mouthguards. 76% of the participants had used preformed mouthguards whereas only 24% were using custom made mouthguards.

The majority of surveys show that wearing an exactly fitting mouthguard impairs breathing only in an insignificant manner and thus does not reduce the performance of the athletes. Players should only wear custom-made mouthguards today because of their high degree of comfort and acceptance. The best mouthguard (based on research evidence), remains one that is custom designed and made by a dental professional with the athlete's individual needs taken into account. It allows the dentist to address questions at a "pre-season" screening or dental examination. The age of a child or adolescent athlete and the possibility of providing space for erupting (growing) teeth and jaws, can be accommodated with a custom-made guard. Even the very best over the counter product cannot insure quality and effectiveness.¹²

Custom mouth guards are made from exact and precise models of an individual's own teeth; are made of resilient and tear resistant materials ensuring a proper fit; are comfortable, easy to clean, and do not restrict breathing. A properly fitted mouthguard must be protective, comfortable, resilient, tear resistant, odorless, tasteless, not bulky and have excellent retention, fit, and sufficient thickness in critical areas. It has been proved that mouthguards especially custom made decreases trauma rates significantly.

In the present study the usage of mouthguard by different players were assessed. It has been seen that the players were using preformed mouthguard while playing. Some of them were having problems during speech and some of the players found preformed mouthguard uncomfortable due

to improper fit especially those who appeared at national level games which was directly or indirectly affecting their performance. So to overcome these problems custom made mouthguard were delivered to 25 players in latter part of the study and their acceptance to it was assessed. When the custom made mouthguard were delivered all instructions about safety and proper usage were given to them. After 24 hour of follow up players were totally satisfied with this mouthguard because of proper fit. Some of them were facing problem in custom made mouthguard so the problem were rectified accordingly.

Conclusion: This survey shows that customised mouthguard enhances the player's performance due to the comfort fit. So considering the high level of willingness to wear mouthguards efforts should be made towards increasing the awareness on its benefits. The players were comfortable with custom made mouthguards so it can be proposed to the government officials to make their use mandatory with some subsidy to decrease the number of accidents.

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TABLES :

Table 1: Use of mouthguards while playing different sports by study participan

Mouthguards		Sports				Total (n=502)
		Cricket	Taekwondo	Karate	Football	
Yes	n	42	106	97	67	312
	%	34.1	84.8	81.5	49.6	62.2
No	n	81	19	22	68	190
	%	65.9	15.2	18.5	50.4	37.8
Total (n=502)	n	123	125	119	135	502
	%	100.0	100.0	100.0	100.0	100.0

Table 2: Genderwise distrib ution of sports played by participants

Sports		Gender		Total (n=502)
		Male	Female	
Cricket	n	93	30	123
	%	24.3	25.0	24.5
Taekwondo	n	96	29	125
	%	25.1	24.2	24.9
Karate	n	76	43	119
	%	19.9	35.8	23.7
Football	n	117	18	135
	%	30.6	15.0	26.9
Total (n=502)	n	382	120	502
	%	100.0	100.0	100.0

Table 3: Preference (type) of mouthguard among user and its genderwise Distribution.

Type of Mouthgaurd		Gender		
		Male	Female	Total (n=312)
Preformed	n	172	65	237
	%	75.4	77.4	76.0
Custom made	n	56	19	75
	%	24.6	22.6	24.0
Total (n=312)	n	228	84	312
	%	100.0	100.0	100.0

Table 4 .Complaints after using Pre-formed & Custom made Mouthguards.

Type of mouthguard	Complaints of the patients wearing Pre-formed and Custom made				
	Speech	Breathing	Dry mouth	Bad taste and odour	Nausea
Pre formed	45	39	16	10	48
	28.48%	24.68%	10.13%	6.33%	30.38%
Custom made	12	18	4	4	14
	23.08%	34.62%	7.69%	7.69%	26.92%

Table 5: Responses of participants for willingness for the use of custom made mouth guards according to sports played.

Custom made	Sports	Total
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Mouthguards		Cricket	Taekwondo	Karate	Football	(n=427)
Yes	n	97	79	85	127	388
	%	85.1	84.9	93.4	98.4	90.9
No	n	17	14	6	2	39
	%	14.9	15.1	6.6	1.6	9.1
Total (n=427)	n	114	93	91	129	427
	%	100.0	100.0	100.0	100.0	100.0