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Published

2023

Journal Title

Dental Traumatology

Version

Version of Record (VoR)

DOI

[10.1111/edt.12916](https://doi.org/10.1111/edt.12916)

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## ORIGINAL ARTICLE

# Oro-dental trauma burden and mouthguard usage among contact sports players: A call for sports dentistry initiatives in Sri Lanka

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## Abstract

**Background/Aim:** Contact sports-related oro-dental trauma contributes to a significant proportion of sports injuries among school children. Oro-dental trauma imposes a detrimental impact on the oral health-related quality of life. However, the burden of oro-dental trauma among contact sports players and their practices of mouthguards remains a research gap in Sri Lanka. The current study bridges that while providing evidence for contextual changes such as initiating sports dentistry.

**Materials and Methods:** The study was conducted among 1340 adolescent contact sports players in Colombo district, Sri Lanka; 63.1% males and 36.9% females (age 13–18), who were enrolled in football, rugby, hockey, boxing, basketball, and martial arts in the school setting. A checklist was administered to obtain demographic information, sports practices, and the use of mouthguards. An oral examination was conducted for those who experienced oro-dental trauma during the last 12 months.

**Results:** Self-reported oro-dental trauma pooled prevalence of the contact sports players was 35.9% (95% CI=33.3–38.5), with males' preponderance. Dental trauma was present in 23.8% ( $n=319$ ), while 15.8% were uncomplicated and 8% were complicated. Soft tissue injuries were present in 12.1% ( $n=162$ ). Oro dental trauma (ODT) was highly prevalent among boxing, rugby, and hockey players. Only 20.8% ( $n=279$ ) of players used mouthguards. However, 91.0% ( $n=254$ ) of them were using ready-made mouthguards. Mouthguard use and the type of mouthguard showed statistically significant associations across the type of oro-dental trauma among contact sports players.

**Conclusions:** Contact sports-related oro-dental trauma prevalence is as high as 35.9% among Colombo district school children in Sri Lanka. However, their level of mouthguard usage is shallow at 20.8%. Further research is necessary to investigate the reasons behind this, and national guidelines should be developed to prevent and manage sports-related accidental injuries.

## KEYWORDS

athletic injuries, mouth guards, mouth protectors, tooth fractures

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## 1 | INTRODUCTION

Engaging in sports is a fantastic way of improving physical fitness and health. Sports have potential benefits to individuals, such as enhancing cardiovascular fitness, maintaining correct body mass index (BMI), socialization, relaxation, and pleasure.<sup>1</sup> The Sports Medicine and Fitness Council, the American Academy of Pediatrics executive committee, has categorized sports according to the probability of causing an acute injury. Contact sports are sports where athletes deliberately strike or come into contact with one another and inanimate objects, such as the ground, with significant impact. It is evident that contact sports are becoming progressively more popular, and children are encouraged to enroll in them early. This scenario is prominent in the Southeast Asian region amidst the recognition of sports and physical activities as promotive health activities that prevent non-communicable diseases.<sup>2</sup>

Despite the beneficial effects of sports, negative factors such as sports-related injuries are unavoidable. Studies among school children have revealed that contact sports such as boxing, martial arts, and rugby are highly risky for sports-related general injuries.<sup>3</sup> Usually, competitiveness, together with higher participation in contact sports, increases with time. Thus, it is logical to assume the increment of traumatic accidents in sports over the past several decades.<sup>4</sup>

Tooth fractures have been a public health problem for decades in many societies, and there is a significant association between traumatic dentofacial injuries and sports.<sup>5-7</sup> A systematic review and meta-analysis reported the world traumatic dental injury (TDI) prevalence for permanent dentition at 15.2% (95% CI, 13.0%–17.4%); primary dentition at 22.7% (95% CI, 17.3%–28.7%) and 12-year-old prevalence 18.1% (95% CI, 15.3%–21.0%). Furthermore, they estimated that globally, more than 1 billion subjects had TDI.<sup>8</sup>

Athletic injuries bear a higher risk for oro-facial injuries, and recent systematic reviews and meta-analyses support this.<sup>3,4</sup> Contact sports players are more prone to injuries in the oro dental complex than their counterparts of non-contact sports players.<sup>9</sup>

Ball and stick games such as hockey cause many tooth fractures, while falling and colliding cause traumatic dental fractures.<sup>3</sup> Basketball, a sport played with considerable speed, shows a higher prevalence of dental trauma due to hand or elbow contact or collision with other players. With an increased potential for possible orofacial trauma.<sup>9-11</sup> Karate, soccer, rugby, basketball, hockey, and martial arts account for most of the orofacial injuries caused by athletics.<sup>11</sup> Boxing is played with vigorous shots and movements; if not, the mouthguards are worn and are at high risk for oro dental trauma (ODT).<sup>12</sup>

Adolescents are more prone to exposure to ODT with male predominance (often twice excessively) with a significant effect on the soft tissues like the upper lip and the hard tissues of the upper central incisor (50–90%).<sup>13,14</sup> In some injuries, the dental tissues may lose irretrievably during the incident and with the passage of treatment procedures or posttreatment.

The sole factor of concern in ODT is not only the physical and functional impact but also its aesthetic ramifications, psychosocial impairment, and incurred cost.<sup>15,16</sup> ODT occurs in childhood and may affect oral health-related quality of life for the rest of life.<sup>13</sup> Children and adolescents can have a detrimental psychological impact due to ODT, leading to withdrawing themselves from society and negatively affecting their self-confidence.<sup>17</sup> Furthermore, ODT is challenging and expensive to treat, causing a considerable financial burden to the patient.<sup>7</sup>

Interestingly, most of the ODT in contact sports can easily be prevented. The blows that convey substantial energy, possessing the potential to cause ODT, can be cushioned away by using personal protective equipment/protective gear such as mouthguards.<sup>18,19</sup> However, it has been revealed that the coaches' practices do not align with imposing personal protective equipment utilization on their trainees,<sup>20</sup> which should be thoroughly considered to obtain a better outcome. Moreover, enlightening the burden of ODT would support developing national guidelines on ODT preventive strategies and more contextual reforms.

The prime goal of oral health care personnel is to uplift the oral health-related quality of life (OHRQoL). In the sports context, it is crucial to understand the prevalence and type of oro-dental injuries that occur and the information on dental trauma preventive adjuncts such as mouthguards. Sports dentistry is the field designated as the composite of skills for prevention, treatment, education, and research in which dentistry and sports come together.<sup>21</sup> American Academy of Pediatric Dentistry has implemented a policy document on "Prevention of Sports-related Orofacial Injuries" since 1991,<sup>22</sup> and the last revision was published in 2018.<sup>23</sup> Australian Dental Association (ADA) and Sports Medicine of Australia have also instigated a collaborative mouthguard policy.<sup>24</sup> However, studies on contact sports related ODT using robust methodology have not been conducted in Sri Lanka, and it is needed to bridge this information gap.

Generally, contact sports-related ODT is highly anticipated. However, much background information is essential for evidence-based policy interventions. The current study would reflect the pattern of ODT and the use of mouth guards in a lower middle-income country such as Sri Lanka, steering for planning preventive strategies. With a proper understanding of the prevalence of ODT among adolescents in the local setting, it would be possible to target ODT reduction, plan oral health promotional programs among school players, and rationalize logistic allocation for oral healthcare professionals catering to school players.

## 2 | MATERIALS AND METHODS

A cross-sectional descriptive study was conducted among 13- to 18-year-old contact sports players in the school settings of the Colombo district in Sri Lanka to assess the prevalence of ODT and the practice of mouthguards while engaging in contact sports. The study sample consisted of 1340 contact sports players: males  $N=846$  (63.1%) and females  $N=494$  (36.9%).

The sample was ascertained from the randomly selected schools from the entire school list, including government, private, and international schools in the Colombo district, obtained from the Western Provincial Director of the Education Department. As no sampling frame was available, the subsequent approach was used to obtain a representative sample accurately representing the population. The first school was selected randomly from the entire list, and the school's list of contact sports and the registered players were obtained. Twenty members were randomly selected from each contact sport from under 15 and 19 groups. A cluster of 20 players from each contact sport was decided by averaging the number of team members for a game of hockey, basketball, rugby, and football. The sample size was determined as follows.<sup>25</sup>

$$n = \frac{Z^2 P(1-P)}{D^2} = (1.96)^2 \times 20.2(100 - 20.2)$$

[ $n$ =sample size;  $Z$ =standard normal deviation (1.96 for 95% CI);  $P$ =Proportion of children with ODT due to contact sports injuries (20.2%) (According to the pilot study done in a convenient sample of 67 students in three schools in Kalutara District). The Design effect =  $1 + (b-1) \rho$  and  $\rho$  were taken as 0.122,<sup>26</sup> giving a design effect of 3.09. The final sample size was 1435.

The following school was selected randomly after selecting the players from the first school, and the previous methodology was followed. When the number of players available was less than 20, all available were enrolled. Likewise, contact sports players from schools were recruited for the study until obtaining the whole sample of 1435 during the study period of 1 year.

Note: There are 47 National schools, 76 provincial schools, 42 private schools, and 22 international schools in Colombo district. Participants in hockey, football, rugby, martial arts (karate, taekwondo), and boxing were the study population.

A self-administered checklist on (a) basic demographic information, (b) experience with various kinds of contact sports-related injuries, (c) information regarding personal protective appliances/mouthguards, and an oral examination according to Andreason's classification.<sup>27</sup> The most prevalently used classification of ODT is Andreason's classification, according to a systematic review done using 54 distinct classifications.<sup>28</sup> Moreover, in the local context, clinicians use the same classification. According to that, ODT can be classified as un-complicated crown fractures, complicated crown fractures, crown-root fractures, root fractures, luxation injuries, bone injuries, and soft tissue injuries.<sup>27</sup> This classification is a more comprehensive system that allows minimal subjective interpretations of traumatic oro dental injuries.

As the first part of the survey, the checklist was self-administered to assess the information. The principal investigator (PI) obtained the past dental history of each student on contact sports-related ODT during the previous year. Appointments were given for all the contact sports players for oral examination for ODT. The PI performed the oral examination of all the participants using mirrors and blunt probes and examined them under natural light. Moreover, treated

TABLE 1 Reliability analysis of the selected variables in clinical diagnosis of the ODT ( $n = 10$ ).

ODT	Level of agreement between PI and the consultant in restorative dentistry (Kappa coefficient)	
	PI	Consultant in restorative dentistry
Enamel fractures	1.00	1.00
Dentinal fracture	1.00	1.00
Pulp exposed tooth	0.79	1.00
Tooth concussion	0.79	1.00
Tooth subluxation	0.80	1.00
Soft tissue laceration	1.00	1.00

Abbreviations: ODT, oro dental trauma; PI, principal investigator.

traumatic injuries from contact sports in the oro dental region were recorded. PI was calibrated with a consultant in restorative dentistry to assess the treated and untreated dental trauma. The reliability analysis with the Kappa coefficient of the calibration is shown in Table 1.

Moreover, the dental trauma management records available with them were reviewed for verification. Participants with contradictory findings were excluded from the sample. Data analysis was completed with IBM Statistical Package for Social Sciences (SPSS) version 29.0. Descriptive statistics with frequencies and Chi-square tests for rigorous data analysis were employed to shed light on key patterns and relationships within our dataset.

The research project received ethical approval from the Ethics Review Committee. When incorporating children, parental consent was obtained. Permission to enter the school premises and carry out the study was obtained, followed by the permission of the principal of the school. Permission from the class teachers/coaches of the sports were obtained. The entire procedural performance in the study was by the institution's ethical standards and with the Helsinki Declaration and the later amendments or comparable ethical standards. Before the study participation, written informed consent was obtained from each participant.

After ascertaining the sample of contact sports players according to the defined criteria, informed consent was obtained for the participation of the players. Moreover, the oral examination of the students was performed with informed consent from the parents/principal caregivers. The parents and the adolescents were provided with all the relevant information about the study, and their queries were answered. Moreover, they were given sufficient time to decide on their participation status and allowed to withdraw from the study at any stage according to their wish without compromising the services. Otherwise, they were entitled. The oral examinations were performed in a separate classroom where their privacy was not breached. Sterile instruments were used for the oral examinations and universal precautions for infection control. Those with unmet treatment needs were referred to the closest dental surgeon for necessary management. The data collected from the study was treated as strictly confidential and was not divulged to any third party.

### 3 | RESULTS

A total of 1435 schooling contact sports players from various parts of the Colombo district in Sri Lanka have been invited, and 1340 participated in this study. Their basic socio-demographic features are shown in Table 2.

Table 3 illustrates the prevalence of various types of ODT across males and females.

According to Table 3, the ODT prevalence of contact sports players was as high as 35.9% (95% CI=33.3–38.5), and male preponderance was evident for ODT. Younger players exhibited a higher prevalence of soft tissue injuries, whereas players above 15 displayed a greater preponderance for un-complicated ODT. Notably, a statistically significant association was observed with gender ( $\chi^2=6.13$ ) and age categories ( $\chi=62.2$ ) across various types of ODT among the contact sports players.

Before collecting data on the dental trauma status, the PI was calibrated in collaboration with a restorative dentistry specialist to ensure data quality and validity. The reliability analysis results are displayed in Table 1.

Table 1 shows that the minimum Kappa coefficient was 0.79, considered an “excellent” agreement.<sup>29</sup> Moreover, the values between

0.8 and 1.0 are “extremely good.” The Kappa coefficient values of 0.6–0.8 are considered “good agreement.”<sup>29</sup>

Intra-examiner variability was minimized by reassessing the 10th subject for ODT classification.

The diagnosis of ODT has been illustrated in Table 4.

According to Table 4, most players experienced soft tissue injuries such as soft tissue cuts, lacerations, and contusions. This was followed by enamel with dentinal fractures.

Without pulp involvement and tooth displacement, ODT was collectively identified as un-complicated ODT, with which most players were present. Soft tissue injuries followed un-complicated ODT. Moreover, the overall dental trauma prevalence (un-complicated and complicated DT) was 23.8% (95% CI=21.2–26.4). Soft tissue injuries were more common among the younger players. However, uncomplicated and complicated trauma prevalence was high among older student-players.

Table 5 shows a breakdown of contact sports by the prevalence of ODT categorized into different types, including uncomplicated, complicated, and soft tissue injuries. Most importantly, there was a statistically significant association between the contact sports and the type of ODT.

Table 6 shows the practice of mouthguards while engaging in contact sports.

TABLE 2 Basic socio-demographic characteristics of 13–18 year-old contact sports players ( $n=1340$ ).

Characteristics	Number	Descriptive statistics (%)
Gender		
Male	846	63.1
Female	494	36.9
Age in years		
13	464	34.6
14	237	17.7
15	304	22.7
16	109	8.1
17	132	9.9
18	94	7.0
Ethnicity		
Sinhala	1250	93.3
Tamil	48	3.6
Muslim	35	2.6
Burger	7	0.5
Highest level of education of the parents/primary caregiver		
Father $n$ (%)		Mother $n$ (%)
Passed G.C.E. O/L and below	511 (38.1)	523 (39.0)
Passed G.C.E. A/L	628 (46.9)	666 (49.7)
Degree/diploma/postgraduate	150 (11.2)	106 (7.9)
Do not know	51 (3.8)	45 (3.4)
Total family income		
<LKR 25,000	-	259 (19.3)
Between LKR (25,000–50,000)	-	563 (42.0)
More than LKR 50,000	-	487 (36.3)
Do not know	-	31 (2.3)

TABLE 3 Prevalence of oro dental trauma (ODT) according to ODT category among the contact sports players.

Variable	Gender		Age category	
	Male N (%)	Female N (%)	Below 15 years	15 and above
Un-complicated ODT	151 (41.1)	61 (53.5)	79 (33.2%)	133 (54.7)
Complicated ODT	83 (22.6)	24 (21.1)	38 (16.0%)	69 (28.4%)
Soft tissue trauma	133 (36.3)	29 (25.4)	121 (50.8%)	41 (16.9%)
Sub-total	<b>367 (100.0)</b>	<b>114 (100.0)</b>	<b>238 (100.0)</b>	<b>243 (100.0)</b>
Statistical significance of the association	$\chi^2 = 6.13$ $df = 2$ $p = .047$ (95% CI = 0.042–0.053)		$\chi^2 = 62.20$ $df = 2$ $p < .001$	
Total ODT in the sample of 1340	481 (35.9%) 95% CI = (33.3–38.5)			

TABLE 4 Diagnosis of oro dental traumatic (ODT) conditions among the contact sports players.

Diagnosis of ODT	Frequency N	Percent (%) from the total No. of injuries	95% CI
Enamel with dentine fracture	118	8.8	6.7–11.3
Enamel fracture	94	7.0	4.7–9.3
Soft tissue cut/laceration/contusion	162	12.1	9.1–15.0
Tooth subluxation and luxation	46	3.4	1.8–5.0
Tooth fracture involving the pulp	27	2.0	0.8–3.2
Avulsion	07	0.5	–0.1–1.3
Bone fracture (mandible/ maxilla)	13	1.0	0.1–1.9
Multiple oro dental injuries <sup>a</sup>	14	1.0	0.1–1.9
Total	481	35.9	33.3–38.5

<sup>a</sup>Adolescents with multiple oro dental traumatic conditions are classified under "Multiple oro-dental injuries". It was interesting to note that those who had multiple ODTs had even a single complicated dental trauma.

A chi-square analysis was used to assess the statistical significance of the association between the ODT, the use of mouthguards, and the type of mouthguards among the contact sports players. This analysis showed a statistically significant association between the variables, as displayed in Table 6.

Another predominant observation among the players who underwent ODT was that most were not wearing mouthguards when the injury happened ( $N=53$ ). Scrutinizing this subset revealed that 24 (48.9%) players exhibited un-complicated ODT, 11 (22.4%) presented with complicated cases, and an additional 14 (28.6%) suffered from soft tissue injuries. Specifically, despite wearing mouthguards, only some players sustained ODT.

## 4 | DISCUSSION

The overall prevalence of ODT among the contact sports players was 35.9% (95% CI = 33.3–38.5), ( $n=481$ ), and the dental trauma pooled prevalence was 23.8% (95% CI = 21.2–26.4) during a recall period of 1 year. Most contact sports players sustained un-complicated dental injuries followed by soft tissue injuries with male predominance,

and among the contact sports analyzed, boxing, rugby, and hockey emerged as progressively more prominent in contributing to contact sports-related ODT. Mouthguard utilization demonstrated a significant reduction in ODT among contact sports players, particularly emphasizing the substantial risk reduction associated with custom-made mouthguards.

ODT prevalence of the present study resembled the findings of the systematic review conducted recently by Polman et al., who have found that the dentofacial prevalence was 30.3 (95% CI = 18.1–44.1) and dental pooled prevalence of 25.2% (95% CI = 12.3–40.8).<sup>4</sup> Further to this, the results closely resemble the research findings of the systematic review and meta-analysis by Oliveira et al. who have the general prevalence of dentofacial injuries was 27.57% (95% CI = 17.87–38.47) and dental injury prevalence of 19.61% (95% CI = 8.13–34.56).<sup>3</sup> Both studies resemble the overall contact sports prevalence shown in the current study. This observation underscores the global prevalence of ODT as a significant concern among contact sports players worldwide.

The prevalence of ODT among males outnumbers that of females by a ratio of 1.4. Nevertheless, there is contradictory evidence of sustaining ODT related to gender in contact sports according to

TABLE 5 ODT associated with different types of contact sport among players in the schools of Colombo district.

Contact sport	Total No. of players	Frequency N (%) of ODT among the sport	Type of ODT		
			Un-complicated N (%)	Complicated N (%)	Soft tissue injury N (%)
Football	235	52 (22.1)	28 (11.9)	9 (3.8)	15 (6.4)
Rugby	283	157 (53.4)	52 (18.4)	46 (16.3)	55 (19.4)
Hockey	135	63 (46.0)	35 (25.9)	12 (8.9)	16 (11.9)
Boxing	13	7 (53.8)	3 (17.6)	1 (5.9)	3 (17.6)
Martial arts	340	103 (30.3)	40 (11.8)	15 (4.4)	48 (14.1)
Basketball	334	103 (31.2)	54 (16.4)	24 (7.3)	25 (7.6)
Total	1340	481 (35.9)	212 (15.8)	107 (8.0)	162 (33.7)

$\chi^2 = 26.73$ ;  $df = 10$ ;  $p = .003$

TABLE 6 Oro dental trauma (ODT) and mouth guard use by the adolescent contact sports players in the schools of Colombo district.

Characteristic	Presence of ODT			Statistical significance of the association
	Yes N (%)	No N (%)	Total N (%)	
<b>Mouthguard use (N = 1340)</b>	<b>481</b>	<b>859</b>	<b>1340</b>	
Yes	72 (25.8)	207 (74.2)	279 (100.0)	$\chi^2 = 15.59$ $df = 1$ $p < .001$
No	409 (38.5)	652 (61.5)	1061 (100.0)	
<b>Type of mouthguard (N = 279)</b>				
Ready-made	72 (23.8)	182 (71.2)	254 (100.0)	$\chi^2 = 9.55$ $df = 1$ $p = .002$
Custom-made	0 (0)	25 (100.0)	25 (100.0)	
Total mouth guard usage prevalence among contact sports players				N = 279 (20.8%)

other studies in the region.<sup>30</sup> However, most studies have polarized to male predominance related to ODT in contact sports in the region<sup>13,31</sup> and outside of it,<sup>3,4,13,32,33</sup> resembling the current study. The reason behind this can be the gender disparity in participating in contact sports. Since historical times, male participation has been predominant in contact sports. Societal and cultural norms can also explain this, as most contact sports are traditionally associated with masculinity.

Soft tissue trauma, such as lacerations to the lip, cheek, and tongue, were the most frequently occurring injury 12.1 (9.5–14.7) when various types of dental injuries, maxillary and mandibular bone injuries, and luxation injuries are considered separate entities as shown in Table 4. Moreover, when all kinds of un-complicated dental trauma are categorized according to International Dental Trauma Guidelines,<sup>34</sup> they showed a pooled prevalence of 15.8 (13.2–18.4), outnumbering soft tissue injuries. However, the pooled prevalence of dental trauma was 23.8% (95%CI = 23.5–24.1), and it closely followed the values obtained in recent literature.<sup>3,4</sup> Dental trauma pooled prevalence is comparatively higher than soft tissue injuries, which can be attributed mainly to the nature of most contact sports where direct and forceful blows to the face are frequently possible in cases such as boxing, hockey, and martial arts. Moreover, the lack of protective gear usage attributed to a lack of awareness and no

mouthguard policy (no rules and penalties enforced) can contribute to this.

Soft tissue injuries are notably prominent in athletic injuries among younger age groups, and it was observed that there is a marked reduction of soft tissue injuries in those who are above 15 years old. Adult players are more skilled and experienced with improved game strategies, and their physique is better developed. Thus, special attention needs to be given to young school-going contact sports players. However, they are also vulnerable to ODT, according to Table 3.

The present study shows that the frequency of ODT observed among rugby and hockey players was as high as 53.4% ( $n = 157$ ) and 46% ( $n = 63$ ), respectively. Martial arts and basketball players had approximately similar prevalence, 31.4% (105) and 29.6% ( $n = 106$ ), respectively. Among the contact sports considered, football had the least prevalence of ODT, 22.4% ( $n = 52$ ). A recent contemporary systematic review revealed that the prevalence of ODT related to basketball and field hockey resembled the current findings, while rugby showed low ODT prevalence.<sup>3</sup> Another systematic review by Selva et al. found that the lowest ODT prevalence was related to football (16.6%) and contact sports.<sup>35</sup> However, a study in the region showed that 50% of school basketball players were affected by oro dental injuries,<sup>30</sup> which is higher than the current study. However, they have

not assessed rugby and martial arts. Moreover, their study group consisted of players aged 8–16 years. In the current study, contact sports players under 15 show a higher prevalence of soft tissue injuries than their counterparts.

A study conducted in 2008 among basketball players in China showed that of the semi-professional players, 37.7% of dental and soft tissue injuries resembling the current study. However, in developed countries, the ODT prevalence among rugby players is less (34.4%)<sup>36</sup> than the current findings from Sri Lanka. This may be mainly attributed to the prevailing sports-related mouthguard policies, penalties and increased awareness, and practice of mouthguards by players in developed countries.

It has been revealed that the impact of traumatic dental injuries on OHRQoL is significant.<sup>37,38</sup> As the current study shows that ODT among contact sports players is high in the context, it is logical to assume the presence of a significant impact on their OHRQoL. Contemporary literature shows that there is a novel index to assess the perceived impact of ODT on adolescent contact sports players,<sup>39</sup> and it is recommended to assess the impact using the newly developed and validated index.

The mouthguard use during contact sports was only 20.8% among the present study group, and males used mouthguards more than females. Nevertheless, only 1.9% were using custom-made mouthguards. Out of all mouthguard users, 68.1% were not wearing the mouthguard when the ODT happened. Despite this, in the region, the use of mouthguards is low among contact sports players in many countries.<sup>4,40,41</sup> Socio-economic related factors, lack of awareness and mouthguard policies can contribute to this. Therefore, school contact sports players must receive proper attention to prevent ODT and increase their awareness and practice of using personnel protective equipment during contact sports.

The present study was conducted using a good sample size of 1340 contact sports players and selected schools randomly, representing whole districts from the complete list of government, semi-government, and private schools, contributing to the findings' validity. Furthermore, as the Colombo district represents urban, semi-urban, and rural populations, the study has good internal validity. Only the PI carried out the data collection with an oral examination. The PI was calibrated against a specialist in restorative dentistry to reduce the examination bias (Table 1).

One of the drawbacks of the current study was that 6.6% of participants did not finish the survey. Recall bias in assessing past dental history is another drawback, which was minimized by asking the participants to provide past dental treatment records for evidence. Nevertheless, minor soft tissue injuries can be missed due to recall bias. Multiple ODTs in a single contact sports player have been categorized separately for easy analysis and to provide information regarding the prevalence. It can be associated with information bias. The contact sports players themselves reported the type of mouthguard, and this could have led to information bias. However, the bias associated with this was mitigated by asking for details about the type of mouthguard the contact sports player used. The current

study's generalizability to the whole island and the region must be studied further.

Moreover, further research is needed to identify the reasons for not using mouthguards, assess the impact of ODT on OHRQoL among schooling contact sports players, and generalize the findings to the whole island. Additionally, future research needs to be focused on evaluating the efficacy of mouthguard policies and the interventions that mitigate ODT prevalence among contact sports players on the island.

## 5 | CONCLUSION

In conclusion, the present study highlights a significant burden of ODT among school-going contact sports players in Colombo, Sri Lanka, with an overall prevalence of 35.9%. Traumatic dental injuries, including soft tissue injuries, were markedly high, alarming the need for increased awareness and preventive measures in contact sports. Consistent with the global trend, males showed a higher prevalence of ODT. Remarkably, the younger age groups exhibit soft tissue injuries more commonly. At the same time, direct and forceful blows to the face, particularly in sports like boxing, hockey, and martial arts, contributed to a higher prevalence of dental trauma. However, mouthguard use was alarmingly low at 20.8%, and most were not wearing them during the ODT incident. These findings underscore the imminent threat to their OHRQoL and the need to enhance awareness, monitor protective gear use among school contact sports players, and introduce sports dentistry policies.

## AUTHOR CONTRIBUTION

Iresha Udayamalee: Collection, analysing, and interpretation of data and manuscript writing. Hemantha Amarasinghe: Supervision, supported during the conceptualisation of the paper, interpretation of data. Ping Zhang: Support data analysis, review and editing the manuscript. All authors read and approved the final manuscript.

## ACKNOWLEDGEMENTS

The support from the principals, sports coaches, adolescent contact sports players, and their parents of the schools in the Colombo district, Sri Lanka, is gratefully acknowledged. Open access publishing facilitated by Griffith University, as part of the Wiley - Griffith University agreement via the Council of Australian University Librarians.

## DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

## ETHICS STATEMENT

The study received approval from the Ethics Review Committee, Faculty of Medicine, University of Colombo, Sri Lanka (EC-17-160).

All procedures performed in the study involving participants were by the institution's ethical standards and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

## CONSENT

Written informed consent was obtained from each participant before participation in the study.

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**How to cite this article:** Udayamalee I, Amarasinghe H, Zhang P. Oro-dental trauma burden and mouthguard usage among contact sports players: A call for sports dentistry initiatives in Sri Lanka. *Dental Traumatology*. 2023;00:1-9. <https://doi.org/10.1111/edt.12916>