

Insight to Epidemiology of Sports Related Dental Injuries

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ABSTRACT

Now a day's people are exhausted of their work. Today no one has time to spend even a single moment because in today's era Time is Money. Also the children are spending their childhood on electronic gadgets instead of playing sports. Sports play a vital role in our personality. A famous quote says "A Healty Mind Resides in a Healthy Body". Sports literal meaning is "to carry away from work". The broad range of human activities beyond the daily routine of living and working includes recreation, sports and athletics. Muscle injuries, torn cartilage, fractures bones, tendonitis, soft tissue lacerations, contusions and broken teeth are just some of the many kinds of injuries which are associated with participation in sports. The study of the sports related injuries, its epidemiology and prediction are essential keys in decreasing the incidence of injuries and trauma and also in its treatment plan.

KEYWORDS: Epidemiology, Sports, Maxillofacial Trauma.

INTRODUCTION

With present trend Boxing, Soccer, Basketball, Baseball and Softball are just a few sports that include participants with a wide range of ages and skill levels and that too often involve frequent incidents of oro-facial trauma. Such traumatic treatment of tooth, bone or oral and perioral soft tissue injuries as a result of participation in sports makes this field of dentistry i.e. sports dentistry quite essential. This is a boon in today's dentistry. Sports dentistry has two major components. The first is the treatment of oro-facial injuries and the second is the prevention of sports – related oro facial injuries.¹ Krizek² argues that, dentistry is needed for a practical side of health care as well as for the emotional and esthetic consequences of facial or dental trauma. Fortunately, modern dentistry has developed numerous techniques and appliances to help protect the sports participant from a variety of oro-facial injuries. Knowledge regarding the epidemiology of these sports related injuries will decrease the incidence and impact of these injuries, and hence lessen oro-facial related burden for the patient as well as dentist.

SPORTS INJURY EPIDEMIOLOGY: A MODEL

The **host – agent – environment** can be adapted for understanding the epidemiology of sports injuries.

The agent of injury is the form of energy that damages body tissues. In sports dentistry this is usually the kinetic

energy associated with the rapid deceleration of impact of soft or hard objects causing an injury.

The **host, or injured individual**, can be described not only by age by sex, but also development level, from toddlers learning to run or throw a ball; to school aged children learning to swim and play tennis; to adolescents playing contact sports; to older individuals whose diminished eyesight and slowed reflexes may make them susceptible to injury.

The **environment** includes not only the natural physical situation in which injuries occur, but also the psychosocial one (for e.g. equipment, air etc.) For competitive athletes this can be particularly important.

Injuries occur when the elements of host, agent and environment interact together at a precise time. For some injury types these elements are quite predictable. While for others the elements of the model may be known but the precise mechanisms and timing of the interaction may be quite unpredictable, as in the case in injuries involving bicycles or playground equipment. There are so many sports-related injuries for which research into the characteristics of agent, host and environment are needed. Progress in sports injury prevention will be dependent on this epidemiology research.³

RISK FACTORS FOR SPORTS INJURY

An essential component of any injury prevention programme is to understand the risk factors and

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determinants that can be predictive of these undesirable events.

I. Agent factors:

1. **Type of sport:** Fast moving sports would appear to predispose to injury as a result of collisions. The same is true of those sports that use projectiles such as balls, pucks or some form of a stick. Bats, hockey sticks and similar sports armamentaria are associated frequently with soft tissue lacerations and contusions as well as displaced comminuted – type fractures.
2. **Other factors:** The conditions of the playing fields and the fit of safety equipment affect the amount of risk to which the athlete is exposed. Lack of rules or willingness of officials to enforce them also increases the risk.⁴

II. Host Factors:

1. **Age:** There appears to be an obvious difference in the risk of sports injury with age, although no one generalization can be held to be universally true. Some variations can be explained by the changes in coordination, conditioning, training and playing skills observed with the increasing age of children. Degenerative changes in bone, ligaments and other connective tissues may also be important etiological factors for injury in older players. Various studies reported that the majority of sports injuries occurred in adolescents and young adults. The risk of injury decreased with increasing age as in young children, before the eruption of the permanent incisors, trauma directed to the primary dentition most often results in luxation injuries. A smaller crown to root ratio association with denser and highly mineralized alveolar bone apparently contributes to this phenomenon. So age factor is very essential in determining the treatment planning.
2. **Gender:** Literature supports the fact that boys seem more prone to orofacial injury than do girls. This fact is consistent with the **National Youth Safety Sports Foundation (NYSSF)** 1994 ratio 3:1, which breaks down to 2:2 injuries per 100 girls per season and 3.9 injuries per 100 boys per season for overall injury risk in organized sports.⁴ **Pinkham and Kohn**³, however, suggest that girls are at higher risk than boys when exposure rates are taken into account.
3. **Growth:** Growth also is a relative factor for injury risk in adolescents. The developing child needs to adjust learned skills rapidly to the changing dimensions of his or her body. A theory suggests that children at increased points in their growth rates are at great level of injury risk as the growth is expressed firstly in the long bones of the body, then in the muscles. Loss in flexibility may be the most frequent cause of overall injury in adolescents.⁴
4. **Body size:** body size may contribute to an increased chance of sports related injury. These include a higher center of gravity, increased leverage due to greater length of limbs and stress on joints due to additional weight.³

5. **Aerobic fitness:** It has been assumed that aerobic fitness would at the very least, predict some prevention of sports injuries. This suggests that unfit sports participants would be more prone to injury.⁴
6. **Muscle strength, Imbalance and Tightness:** Localized weakness, muscles imbalances or tightness appear to predispose an individual to sports injury.³
7. **Central Motor Control: Physical handicapped populations,** which displays central motor disabilities, are probably also at a greater risk for injuries associated with physical endeavors.³
8. **Skilled coaching:** Without proper instruction and guidance or coaching in physical fitness and sporting skills, an athlete is less able to respond in game situations, thereby increasing injury risk.
9. **Orthodontic status and history of previous injury:** Numerous studies have shown that orthodontic status plays a significant role in incisal trauma. A class II molar relationship having an overjet greater than 4mm., having a short upper lip or incompetent lips, and breathing through the mouth all increase risk for dental injury.
10. **Psychological factor:** State of mind during play has much to do with the level of concentration and ability to perform in the sports. In instances in which this balance breaks down with stress or pressure, the athlete is more at risk for injury.³

III. Environmental factors:

1. In some of the unforcing circumstances sometimes the nature factors such as condition of light (e.g. dull light), disturbed air conditions, humidity conditions and rain may cause disturbed physical and psychological conditions to the sports person, which may cause direct or indirect injury.
2. Children with emotionally stressful states, as investigated by differences in urinary catecholamines, pose a greater risk of dentofacial injury.⁴

PREDICTION OF SPORTS – RELATED TRAUMATIC OROFACIAL INJURIES

If a clinician had the ability to identify effectively individuals who were at high risk for sports – related dental traumatic injuries, some preventive intervention could be implemented. A number of risk factors have been identified, which are, discussed earlier, for predicting sports – related traumatic injuries. A predictive index has also been developed that determines the likelihood of sports- related traumatic dental injuries in children and adolescents.

Sports classification matrix: Sports can be characterized according to two dimensions:

- **Velocity** of the sport
- **Intensity** of the sport.

Each dimension can be subdivided into three levels:

- **High**
- **Moderate**
- **Low**

After a sport is placed in a portion of the matrix, the specific risk for a sports – related traumatic dental injury, which is associated with the sport itself, can be seen. For examples, league bowling and billiards can be placed in a relatively low risk category: non – contact sport low intensity, low velocity. Conversely, football, hockey and rugby can be placed in a relatively high-risk category: contact sport, high intensity, and high velocity.³

RISK FACTORS AND ASSOCIATED DIMENSIONS

| Factor category | Factor dimensions |
|-------------------------|---|
| 1. Age (Years) | 0-3y, 4-7y, 8-11y, 12-14y, 15-16y, 17-18y |
| 2. Sex | Male , Female |
| 3. Protective Equipment | Mouth guard No, Stock, Custom Facemask No , Partial, Full face Helmet No, Hard hat , Styrofoam Leather |
| 4. Velocity of sport | High , Moderate, Low |
| 5. Intensity of sport | High , Moderate, Low |
| 6. Level of activity | High , Moderate, Low |
| 7. Exposure time | High, Moderate, Low, None |
| 8. Level of coaching | None , Volunteer, Untrained, Part time Trained, Part time, Full time professional |
| 9. Sport Organization | Play, Recreation, Athletics |
| 10. Foci of attention | Solo, One – on – one, Team, Offense Team, Defense |
| 11. Malocclusion | Class I, Class II, Class III |
| 12. Contact sport | Yes , No |
| 13. Previous injury | Yes , No |
| 14. Sport Situation | Game , Practice |

When looking at the 14 risk factors, it becomes obvious that certain condition presented by the patients would signal an alarm, making it reasonable for the dentist to become involved in the evaluation and supervision of the sports behavior of the patient. An intense sport, such as competitive high school football, which is also a contact sport played in both game and practice situation by a variety of athletes who have an emerging or developed physical maturity, is skewed heavily toward male participants, and which may involve on occasion velocity, begs for professional intervention. A severe class II division II malocclusion would make any facial trauma dentally dangerous to the patient. Such patients are at risk from a variety of normal physical circumstances that would not necessarily be risk factors for class I patients. In instances dealing with physical disabled patients, preventive intervention by way of a helmet and facemask may be needed.⁶

COMPUTER-BASED APPLICATION OF THE INDEX

Practical application of the predictive index is an area where the maximal benefit of the model can be realized. The predictive index has been implemented in the form of a computer – based decision model.

The computer-based index is a user-friendly application that involves little computer literacy because of its dependence on click technology. It is implemented in Microsoft Access (Microsoft Corporation, Redmond, WA). The computer-based index has three components: data gathering, data analysis, and reporting of results of the assessment.

This predictive index should prove to be a valuable diagnostic and treatment-planning tool in dentistry for children and adolescents.

DISCUSSION

Studies on Orofacial Sports – Related Injuries⁵

| Study | Age | Sport | Injury assessment | Finding and comment |
|---|---------------------------------|---|--|---|
| Maestrello de Moya and Primosch, 1989 (Florida) | High School | Basketball | Orofacial injury specified. | 30.9% sustained injury during varsity basketball season. 6.8% fold increase in the number of injuries when mouth protectors not used. |
| Morrow et al, 1991 (UNITED STATES) | College and University Athletes | Foot Ball, Basket Ball, Soccer, Volleyball, Ice Hokey, Lacrosse | Lip laceration chin or tongue laceration. | Oral injury rate highest for basketball (10%) and ice hockey (9.8%). Although injury rate for soccer low (2.6%), the reported injuries were more severe. Football oral injuries rate (2.8%) may be understated for college. |
| Soporowski et al, 1994 (Massachusetts) | 3 – 27 years | Multiple | Injuries episodes injury sites Tooth Intra oral Extra oral Bony. | 59% of injury episodes occurred in children ages 7–13 years. 62% of injury episodes occurred in unorganized sports. 45% of injuries limited to teeth. |
| Toe et al 1995 (Singapore) | 264 boys 12–17 years | Multiple | Tooth injury | Injury episodes:1. Injury episodes – 21., 2.Injury episodes – 7, 3 or more 10. 26 luxations, 19 Fractures. |
| Bayliss & Bedi (1996) (United Kingdom) | Various ages | Gymnastics | Oral & Maxillofacial | Most injuries occurred during training Severity of injury strongly associated with skill level 7% experienced damage to hard tissues of the mouth. No gymnast wore a mouth guard. |
| Roberts et al 1996(Minnesota) | High school, <20 years | Hockey (3 – day, 31 – game Tournament) | Injury rates not limited to oro facial | Overall injury rate 26.4 injuries per 1000 athletic exposures and 273.8 injuries per 1000 player’s hours. |
| Acton et al 1996 (Australia) | 813 Children < 15 years | Bicycle | Oral / Maxillofacial, reduction of consciousness | Frequency of oro facial injuries was 39.5% for 8134 children who had bicycle accidents. Most common injuries: facial abrasions (50%), soft tissue injuries to mouth (30.9%) and dentoalveolar trauma (9.7%). |
| Emshoff et al, 1997 (Austria) | Various ages | Multiple | Mandibular fractures | Sports were the most common cause of mandibular fractures (31.5%) followed by road traffic accidents (27.2%). Major causes of sports related mandibular fractures: skiing (55%), cycling (25%), and soccer (9%). |
| Yamanda T, Sawaki Y, Tohnai I, et al 1998 (Japan) | High school Athletes | Soccer & Rugby | Oral injury | Incidence of oral injuries was 32.3% for soccer and 56.5% for rugby with 0% and 24.1% of the respective groups having 82% of soccer athletes thought mouth guards unnecessary. |

CONCLUSION

Sports are not only for relaxation, but it also enhances the physical and mental efficiency. Sports may cause minor or major injuries. Hence, study of sports related injuries and their epidemiology is of prime importance. This will aid in planning out efficient treatment plan in injuries requiring immediate.⁷ Regular check-up and screening programs could be conducted for school children to identify traumatic injury to the anterior teeth so appropriate preventive measures such as preventive orthodontic treatment and use of mouthguards can be implemented.⁸ Besides these, sufficient knowledge regarding the sports injuries and protective devices, equipment available should be disseminated to the sports persons. Also the person should be well educated about the sports injuries and their treatment options. Gone are those days when we had no options for our unaesthetic profile due to any sports trauma. Today a lot of treatment planning are available through sport's dentistry.

REFERENCES

1. Chambers William; Why Sports Dentistry? In Pinkham JR: Pediatric Dentistry: Infancy through Adolescence; Philadelphia, WB Saunders, 1988:642-643.
2. Krizek TJ; Prevention of Intraoral Trauma in Sports; Dental Clinics of North America 1991; 35(4): 666-667.
3. Pinkham JR, Kohn DW; Epidemiology and Prediction of Sports Related Traumatic Injuries; Dental Clinics of North America 1991; 35(4): 609-626.
4. Tesini David A, Soporowski Nancy Jo; Epidemiology of Orofacial Sports Related Injuries; Dental Clinics of North America 2000; 44(1): 1-18.
5. Fos Peter J, Pinkham JR, Ranalli Dennis N; Prediction of Sports Related Dental Traumatic Injuries; Dental Clinics of North America 2000; 44(1): 19-33.
6. Garon MW, Merkle A, Wright JT: Mouth protectors and oral trauma: A study of adolescent football players. JADA 1986;112: 663
7. Kendrick RJ: Some "sporting" injuries. Int J Oral Surg 1981; 10: 245
8. Thompson BD: Protection of the head and neck. Dent Clin North Am 1982; 26: 659

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