Review Article

Maxillofacial injuries due to road traffic accidents in Saudi Arabia: a review of incidence, demographic factors & prevention strategies

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ABSTRACT

Background: *World Health Organization has estimated that nearly 25% of all injuries fatalities worldwide are a result of road traffic crashes with 90% of the fatalities occurring in low and middle income countries. Trauma in Saudi Arabia is a major public health problem with increasing rates of mortality and morbidity.*

Objectives: *To review the incidence of maxillofacial injuries due to road traffic accidents in Saudi Arabia and to highlight the etiological factors, the current preventive strategies and suggestions to reduce such injuries.*

Material and Methods: *This review was conducted through literature search over a period of 25 years. The key words included in the search include road traffic injuries, maxillofacial trauma, Saudi Arabia. The search was conducted through search engines and which included Google, science direct, pub med. A total of 56 reference articles and web pages were reviewed. 31 of these references are cited in this review. The demographic factors involved in road traffic accidents, the existing legislation in the country as cited in the literature, primary care system and recent advances in management are highlighted in this review article.*

Conclusion: *Trauma is a preventable cause of death, morbidity, depression and unemployment. Simple measures such as seat belt legislation, traffic monitoring, creation of awareness among youth will significantly bring down loss of lives. This will create a better society to live and enjoy life.*

Keywords: *Saudi Arabia, trauma, accidents, mortality*

Introduction

Road traffic injuries are one of the leading causes of death worldwide resulting in more than 1.27 million deaths. [1] Over 65% accidents occur because of excess speed, drivers disobeying traffic signals or use of cell phone while driving. [2] World Health Organization has estimated that nearly 25% of all injuries fatalities worldwide are a result of road traffic crashes with 90% of the fatalities occurring in low and middle income countries. [3] Maxillofacial region being prominent, mobile and supported by cervical spine is more to injuries in road traffic accidents. Death and disability is almost instantaneous in severe maxillofacial injuries. Another important concern is the head injury sustained in such accidents. The accident victim may escape with facial deformity in mild to moderate maxillofacial injuries, but with the involvement of head injuries, fatalities are more of significance. The amount of finances lost is definitely significant, not more so the psychological impact on family members is of distressing significance. The loss of a family member leads to a change in the family dynamics and the society they belong. [4]

Trauma in Saudi Arabia is a major public health problem with increasing rates of mortality and morbidity. The socioeconomic burden, depletion of human resources, the emotional and psychological stress on families, and the strain on healthcare facilities are also increasing. [5] The incidence and causes of road traffic accidents vary with geographical location, socioeconomic status, religion and era. [6] The incidence of traffic accidents is high in Saudi Arabia. Age of the driver, education level, profession, violation record, vehicle ownership, joy riding, poor eye sight, sun haze, sand storm, long hours driving, non-observance of speed limit, emerging and exiting from roads without signals, presence of stray animals, non-marking of the road, non-familiarity with the road, lack of regular checking of vehicles, lack of regular servicing of vehicles and driving under medication are factors

associated with high incidence of road traffic accidents in Saudi Arabia. [7] The highest incidence of trauma occurs in the most active and productive age group (21-49 years) and lower in the older age group. [8] The predominance of male victims (93%) is mainly due to exposure and the activity of the males, as females do not drive in Saudi Arabia. Unlike other countries, majority of the road traffic accidents in Saudi Arabia are due to car accidents. Two wheeler accidents are negligible as the proportion of population riding two wheelers is negligible.

This paper aims to review the magnitude of maxillofacial injuries in road traffic accidents in Saudi Arabia. The etiological factors, impact on socio-economic life, preventive strategies are discussed herewith.

Materials and Methods

This review was conducted through literature search over a period of 25 years. The key words included in the search include road traffic injuries, maxillofacial trauma, Saudi Arabia. The search was conducted through search engines and which included Google, science direct, pub med. A total of 56 reference articles and web pages were reviewed. 31 of these references are cited in this review. The demographic factors involved in road traffic accidents, the existing legislation in the country as cited in the articles, primary care system and recent advances in management of road traffic accidents are highlighted in this review article. The key points included in maxillofacial injuries due to road traffic accidents are reviewed along with etiological factors and recommendation made to avoid such injuries. Similar studies conducted in other parts of the world are reviewed, compared and discussed. Recommendations and suggestions herewith will be beneficial to minimize road traffic accidents.

Discussion

Saudi Arabia is undergoing a rapid population growth that along with improved socioeconomics has led many individuals to own a car or even a number of cars per family, resulting in a greater number of vehicles on the roads. [5] According to world report on road traffic injury prevention, about 3000 people worldwide die every day from road traffic injuries. [9] Head and facial injuries account for 30% of all injuries and cause 26% of deaths. [10] Cervical spine injuries associated with these injuries causes hemiplegia, paraplegia and quadriplegia. When such morbid injuries occurs the only bread winner of the family loses source of income and the entire family suffers. The hospital stay significantly increases further leading to financial burden.

Etiological Factors

a) Driver Related Factors: Driver errors account for about 80% of all RTAs in Saudi Arabia. [11] Driver related errors are more common in the younger generation. Road rage, overconfidence, non-compliance of signals, tail gating, undue overtaking, over speeding are few of the factors associated. Within the last ten years, lot of universities had come up in Saudi Arabia. This has resulted in traffic congestions during early morning hours. To keep up with the time, youngsters over speed and violate the traffic signals amounting to road traffic accidents.

b) Road Transport Systems: The public transport system in Saudi Arabia is not very well developed as compared to other developed countries worldwide. This factor makes the population to heavily rely on cars adding up to traffic congestions and increase in road traffic accidents.

c) Roads & Environmental Conditions: Unplanned sudden expansion of roads causing deviation of traffic, narrow roads in rural areas, sudden narrowing of roads add to the poor road conditions. Delayed work in some road projects and flyovers significantly increases road accidents. Poor visibility due to fog in hill stations such as Taif, Asir region causes head on accidents.

d) Vehicle related factors: Though periodic vehicle inspection is mandatory for all vehicles in Saudi Arabia, non-compliance leads to road traffic accidents. Worn out tires, worn out brake pads and very old vehicles are few of the leading factors causing road traffic accidents. Most of the car owners get the vehicle periodic inspection

done during the renewal of registration only. Strict law enforcement in checking the vehicles will significantly bring down the problem.

e) Non Compliance of Saher System: Saher in Arabic means "one who remains awake". Saher cameras are an automated system for the management of traffic and cover major cities in Saudi Arabia. Saher is a multi-objective projective, which can monitor vehicles and track them using license plate recognition technology. The youth bock the registration plate to avoid saher cameras and then over speed. This invariably increases the incidence of road traffic accidents. Strict regulation and enforcement of law will bring down such incidences.

Literature Review

Injuries to the facial region are clinically highly significant. [12] In a report issued by World Health Organization (WHO), Kingdom of Saudi Arabia has the highest road accident toll in the world, which now makes up the country's principal cause of death in adult males aged 16 to 36. [1] Ansari S et al., reviewed the causes and effects of road traffic accidents in Saudi Arabia and stated that between 1971 to 1997 3.5% of the total population died or were injured in road traffic accidents. [13] Over 65% of accidents occur because of vehicles at excess speed and/or drivers disobeying traffic signals. Isam S & Al Ghamdi A in an analysis of injuries resulting from road traffic accidents in Riyadh stated that head and facial injury were the main effects of road traffic accidents in Riyadh. [14] The ratio of accidents to injuries in Saudi Arabia is 8:6 compared to the international estimate of 8:1. In the USA, the ratio of accidents to deaths was 283:1 in 1993; the ratio for Saudi Arabia in 1995 was 32:1. [13,15] Wang Z, Jiang J in an overview of research advances in road traffic trauma in China stated that the statistical analysis from every country showed that human factors were still the main cause of RTAs, accounting for more than 90%. [16] According to them, vehicle and road factors caused 3-5% and less than 2% of the total RTAs, respectively. Unlike China, wherein 70% of RTAs were related to bicycles, road traffic accidents in Saudi Arabia were confined to Cars. Hence, the incidence and pattern of maxillofacial fractures vary from country to country depending upon prevailing geographical, social, cultural and environmental factors. [17] Batouk AN et al., analyzed 303 road traffic accident victims seen dead on arrival at emergency room, Assir Central Hospital, Saudi Arabia.[8] Head & neck injuries (exclusive of skull fractures) accounted for 45% of the injuries in their series. According to them, RTA is a major cause of instant death in Assir region since it consisted of more than half of the cases brought Death on Arrival into the Emergency Department. Shahid HS et al, conducted a study to determine the etiology, pattern and management of maxillofacial injuries in a specific hospital in Pakistan. [17] Their study included 164 patients with 254 fractures. 48% of fractures included road traffic accidents. They stated socioeconomic conditions and violation of traffic rules as the major cause of road traffic accidents.

Al Ahmed HE et al, reviewed the pattern of maxillofacial fractures among 230 cases in Sharjah, UAE. [18] They stated that Road traffic fatalities are the second most common cause of death in all age groups in the UAE. Shekar BRC and CVK Reddy conducted a five-year retrospective statistical analysis of maxillofacial injuries in patients admitted and treated at two hospitals of Mysore city, India. [19] According to their findings, alcohol consumption was the major factor causing road traffic accidents. Studies conducted in Arab countries on the incidence of road traffic accidents suggest speed, violence of traffic laws as the major factor. [1,2,5,7,13,18,20,22] Since alcohol is strictly prohibited by law in Islamic countries, role of drunken driving is negligible or insignificant. Irrespective of the etiological factor, most of the road traffic accidents occur in younger age group. Most of them are in the age group of 1-25 years. [1,5,20,21,22,23,24] Reasons for higher incidence in this age group have been cited earlier in this review which includes road rage, jumping signals, over confidence, use of mobile phones while driving. Most of the literature concludes with the fact

that the incidence of road traffic accidents is comparatively more in males than in females. [6,8,12,13,17,18,20,23,24,25,26] In a country like Saudi Arabia, females are prohibited from driving by law.

Road traffic accident is the first major cause of death among dead on arrival cases affecting the most active and productive age group as stated by Batouk AN et al., in their analysis of 303 road traffic victims seen. [8] Saudi Red Crescent (SRC) plays a major role in transporting victim to the hospital and in providing pre-hospital care. The time of arrival at the accident scene plays a very crucial role in saving the life of the victim. The "Golden Hour" of trauma is in the hands of pre-hospital care. Most of the disabilities can be avoided and deaths prevented if appropriate care is rendered in this golden hour. In a survey conducted by Al-Ghamdi AS, only 3% of those interviewed could recognize/recall that the emergency number is 997. Majority felt that the number is 911 (70%). [27] Another very important component of Saudi Red Crescent system must be trained personnel in maxillofacial trauma. Management of maxillofacial injuries in a pre-hospital setup is definitely different from the regular protocol of managing abdominal or long bone injuries. The importance of cervical spine control and its undue consequences is well known to all medical professionals. Razzak JA & Luby SP in their estimation of deaths and injuries due to road traffic accidents stressed the role of collaboration between traffic police and the medico legal office in the hospital. [28] In Saudi Arabia, this problem of communication gap between medical officers, medical records department and police department does not exist. With the existing law, none can evade entry into police register when the ambulance assistance has been called for. Only hit and run cases can escape without notice to the police. In this author opinion, such incidences are negligible. As such, one can confidently conclude that the existing police regulation in road traffic accidents is well developed and documented.

Preventive Strategies

a) Awareness: a lot can be achieved through proper counseling, conducting traffic safety weeks, awarding prizes or by announcement in social media.
b) Collaboration: A committee needs to be framed exclusively to analyze the frequency of injuries, the most prone roads for accidents, the arrival time of ambulance services. Frequent updates required to correct the measures.
c) Financing: Saudi Arabia is a country with adequate funds. A specific budget needs to be allotted each financial year for trauma care systems. This would include training of existing staff, recruitment of trained personal, upgrading the ambulance services, procurement of latest emergency equipment. Provision of air delivery systems wherever feasible.
d) Strict monitoring of Saher System: Though the saher system is in place, it is frequently been violated. Increase in the cameras, frequent review of speed limits needs to be done. Laws need to be stringent who do not pay fines. Measures need to be taken for suspension of license and registration of vehicles violating traffic laws. Though the point system of penalty is prevalent in Saudi Arabia, it needs to be implemented very strictly.
e) Trauma Care Centers: An increase in Red Crescent Society hospitals is required. Centers with facilities exclusively meant for management of maxillofacial injuries would be a better option. This will require more trained maxillofacial surgeons along with colleagues from neuro-surgery. Advanced emergency medical technicians (EMT) must be efficient in performing in cricothyroidotomy, tracheostomy and endotracheal intubation.
f) Research: Research is the core of trauma care systems.[29] It drives the system and provides the foundation for system development and performance improvement.[30] Regular prospective studies on the incidence of road traffic accidents is suggested. Individual studies by traffic regulation authorities, finance ministry, human resources development personnel, health care workers and maxillofacial surgeons in

collaboration with other medical specialties will significantly increase the collaboration. It will also help in implementing corrective measures and providing safety to the society.

Conclusion

Trauma is a preventable cause of death, morbidity, depression and unemployment. Simple measures such as seat belt legislation, traffic monitoring, creation of awareness among youth will significantly bring down loss of lives. This will create a better society to live and enjoy life. The amount of finances spent on road traffic accidents can be utilized in overall growth and development of the country.

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