

A Study of Effectiveness of Ocular Protection



Medical Science

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ABSTRACT

There was a high incidence of ocular trauma during combat operations all over the world not only during war but also during counterinsurgency. The incidence of combat ocular trauma varies from 2% in World War I and II to 13% in desert storm and Kargil war. No figures are available for ocular injuries during counterinsurgency operations. Most of the injuries to eye were caused by the small high velocity splinters characteristic of artillery fire and improvised explosive devices (IED). Most of the ocular trauma could have been prevented had the goggles been in use. A considerable degree of eye protection is also afforded by ordinary ophthalmic eye glasses.

INTRODUCTION

In all the recent wars and counter insurgency operations there has been exceedingly high proportion of eye injuries among the casualties. Eye protection has been advocated since World War- I, when a review of ocular injuries indicated that 50% of injuries could have been prevented with some form of protection. This was observed in Vietnam War, Lebanon War and other recent wars. In fact it was noted that not a single eye was injured in soldiers who wore ballistic protective goggles properly at the time of injury. The best course of management for eye injuries is, therefore, their prevention. This view has been held by ophthalmologists in every major war. This article summarizes the results of a survey on ocular injuries amongst Indian troops in Kashmir valley from 1999 to 2015 and United Nations troops in Level III hospital of Democratic republic of Congo from 2008 to 2010.

SUBJECTS AND METHODS

The study includes Indian troops in Kashmir valley from 1999 to 2015 and United Nations troops in Level III hospital of Democratic republic of Congo from 2008 to 2010. Not included are those who died of their wounds before reaching the hospital, those who sustained minor ocular injuries and did not require hospitalization and those with non-traumatic eye diseases. The patients were interviewed regarding the circumstances and the causes of their injuries. Clinical data were obtained from hospital records

RESULTS

The survey revealed that 9 % of all hospitalized combat casualties sustained eye injuries. This is between 2% in World War I and II and 13% in Desert Storm (Table-1). This increase is probably due to the development of more efficient weapons with their greater ability to fragment and enhanced survivability of wounded troops because of advancements in the field of medicines.

The injuries reported were caused by artillery shells, grenade, mines, improvised explosive devices (IED) and small arms

The injuries sustained to eye in war scenario ranges from trivial trauma to lids, conjunctiva to complete destruction of eyeball. Injury can also occur to orbit, optic nerve or optic pathway. Comparison of eye injuries among different wars is difficult because of ambiguity in definition and the lack of a recognized standardized classification of ocular trauma. In this article we have adopted the classification proposed by Kuhn et al which has been endorsed by the International Society of Ocular Trauma. The injuries were

caused by fragments of improvised explosive devices, artillery shells or by bullets. The site of perforation was mostly anterior cornea and sclera. The incidence of bilateral eye injuries was 7.2%. This is less than 15-30 % in other wars. Open globe injuries account for 20-50% of all ocular war injuries. The incidence of Close globe injuries was 8%. This is less compared to 16 to 42 % in most wars .External Eye injuries including corneal, scleral and conjunctival foreign bodies are the most commonly sustained ocular injuries seldom leading to long term problems. However multiple corneal foreign bodies are extremely common in war and may lead to permanent dimness of vision. 35.6% patients in the present series had external ocular injuries. Orbital fracture and orbital foreign bodies are common in war injuries. 29.2% patients had orbital and lid injuries in our series (1-10). (Table-2) These ranged from asymptomatic orbital foreign bodies not requiring any surgical intervention to serious orbital fractures and lid injuries. These are sometimes associated with serious ocular injuries even requiring evisceration.

DISCUSSION

Eye protection has been advocated since World War-I. it was noted that not a single eye was injured in soldiers who wore ballistic protective goggles properly at the time of injury in Lebanon War. Majority of eye injuries are caused by small flying Splinters rather than by large shells fragments or by rifle and machine guns. The national society to prevent blindness in the US suggests that 90% of all eye injuries both military and nonmilitary can be prevented with proper precautions and advocates the use of eye protection by the military

Various forms of eye protection have been proposed since 1st World War,. However, any spectacle or goggle will provide only some degree of eye protection. The ideal eye armor lens must be high impact resistant, light weight, scratch proof, easily maintained, comfortable, have no tendency to fog, laser protective and must not impair visual performance of the soldier. Various heat and chemical tempered glasses and plastics like Polycarbonate, CR39, PMMA and cellulose acetate have been tested over the years. Polycarbonate lenses have been shown to be more impact resistant, light weight, absorbs UV rays, comfortable and acceptable especially for emmetropic soldiers. Lenses of this material have been provided to Indian troops. About 7% of eye injuries occurring from the side are also avoided by side shields integral to the goggles. Compliance appears to be the biggest hurdle faced during the eye protection program. The actual compliance rates are not known. It was observed that many soldiers were wearing

their goggles on their helmets rather than on their eyes for reasons of comfort and better visual clarity. The goggles were not universally used due to the restricted visual field that they afford the wearer, the general inconvenience they create and the difficulty in using them with optical equipments such as binoculars. It is likely that goggles of a better design will increase their acceptance by the soldiers. None of the soldiers with ocular injuries wore the goggles when injured. In fact soldiers who wore protective goggles properly did not sustain eye injuries even when multiple splinters were found on face and forehead.

CONCLUSION:

Eye injuries are a severe and common consequence of modern warfare. Because of the exposure of the face in combat and the susceptibility of eye to small particles and fragments, the incidence of eye injuries has increased with each succeeding war compared to injuries sustained by other body parts. Significant medical developments have been made especially with regard to evacuation of casualties, but these are counter balanced by advances in weaponry. The best solution lies in the use of protective measures. 90% of all eye injuries are preventable as per these study conducted by national society to prevent blindness in US. To increase the compliance, the design of protective goggles may require to be improved to suit the convenience of soldiers.

Table-1
Incidence of eye injuries in major wars

War	Year	% of eye casualties
World War-I	1914-18	2.00
World War-II	1939-45	2.0
Korean	1950-53	2.8
Six day	1967	5.6
Yom Kippur	1973	6.7
Vietnam War	1962-72	5-9.0
Lebanon War	1982	6.8
Desert Storm	1991	13.0
Present study	1999-2015	9.0

Table-2
Types of injuries (%)

War	Open globe injuries	Closed globe injuries	External Eye injuries	Orbital and lid injuries
World War-I	38.1%	26.1%	7.2	3.0
World War-II	18.2	20.6	34.0	13.2
Israeli-Arab	20.8	16.9	36.6	17.5
Yom Kippur	42.0	24.7	7.4	13.6
Vietnam	24.4	8.4	27.7	17.6
Lebanon	21.0	25.9	27.2	8.6
Iran-Iraq	33.7	42.8	10.7	2.4
Desert Storm	8.2	20.9	5.6	24
Present study	28.8	8.0	35.6	29.2

Note : Many patients had multiple injuries.

(+) Data not available

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