



### Original Research

## A hospital based prospective study to analyze the impact of shotgun pellets on the eyes of the people of the world's most militarized war zone-The Kashmir Valley

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### Abstract

**Objective:** *The continuous use of the shotgun pellets has blinded more than 2000 people in Kashmir valley in the last five years alone. In other parts of the world the ocular pellet injuries are usually accidental in nature. Our main aim of this study was to emphasize on the impact of shotgun pellets on the eyes of war torn Kashmiri people.*

**Methods:** *A total of 328 patients were included in the study. All these cases were analyzed prospectively. Majority of these patients reported directly to our accidental and emergency department after being hit by shotgun pellets.*

**Results:** *In our patients the mean age was 19.8 years with SD of 9.6 years. The age ranged from 09-44 years. Males were 304 (93%) and females were 24 (7%). Out of 328 patients, 251 (77%) were in the age group of 15-25 years. Among all the patients right eye was involved in 146 (44.5%) cases, left eye was involved in 138 (42%) and 44 (13.5%) cases presented with bilateral involvement of eyes. Out of 328 cases vitreous hemorrhage was noted in 207 (63%) of cases. Highest number of patients 236 (72%) out of 328 cases were having penetrating type of injury and most common site of injury was cornea noted in 128 (39%) of patients. In this study 121 (37%) of cases were having visual acuity of defective perception of light/perception of ray at the time of presentation.*

**Conclusion:** *Once considered to be the non lethal weapon for humans, time has proved it to be very lethal if not handled in a proper way. Security personnel should be properly trained how to use the shot gun pellets.*

**Keywords:** *Ocular pellet trauma, Penetrating injury, Shotgun pellet, Vitreous hemorrhage.*

### Introduction

It was for the first time in 2010 when shot gun pellet, the so called non lethal weapon was introduced by the police in the Jammu and

Kashmir state during the public mass uprising against the killing of a young separatist leader. A recent civil society fact-finding report notes that the concentration of security forces in the state is

among the heaviest in the world. An estimated 700,000 Army, paramilitary and state police forces watch over a population of just 14 million. The continuous use of the shotgun pellets has blinded more than 2000 people in Kashmir valley in the last five years alone. At present there is very little literature available about ocular pellet injuries, because shot gun pellets are rarely used for control of mob violence anywhere else in the world. In other parts of the world the ocular pellet injuries are usually accidental in nature. Few studies have been conducted on this topic till date<sup>1-2</sup>. The extent of ocular damage depends on several factors: shape and type of pellet, distance from which the pellets are fired, tissue resistance and its velocity<sup>3-4</sup>. Even some studies have shown that perforating injuries with involvement of posterior segment structures have very bad prognosis<sup>5-6</sup>. According to Sharif et al.<sup>7</sup> a standard pellet gun bullet weights 0.345 g and it enters the globe of the eye at an average speed of about 72 meter/second, which has the power to penetrate through the skin, entire globe, and even the orbital bones. Our main objective of this study was to emphasize on the impact of shotgun pellets on the eyes of war torn Kashmiri people.

### Material and Methods

This study was conducted in the postgraduate department of ophthalmology SKIMS medical college hospital Bemina J&K, one off the main tertiary care hospital of the Kashmir valley. A total of 328 patients were included in the study. All these cases were analyzed prospectively, and the study was approved by the ethical committee of our hospital. Majority of these patients reported directly to our accidental and emergency department after being hit by shotgun pellets. Rest of the patients were referred from either primary health or community health centers of the state health department. On the arrival of these patients in our department, we used to collect the information on a proforma about the patients demographic data like age, sex, laterality of eye involvement and time interval between incident

and first contact with the doctor. After filling the above data, we gathered the details of the pattern of clinical findings of the eye injuries as such:- a) type of injury (whether perforating, penetrating, avulsive or rupture)- Figure-1. b) site of injury (whether conjunctival, scleral, corneo-limbal, corneo-scleral, corneal or periocular) -Figure-2. c) visual acuity at the time of presentation to the hospital (like 6/6, 6/12, >6/12 vision, finger count close to face, hand movement close to face, accurate perception of light/ray or defective perception of light/ray). d) presence or absence of foreign body (projectile) inside the eye. e) anterior segment for either hyphema, status of iris, lens involvement or vitrous in anterior chamber. f) posterior chamber for either retinal detachment, vitreous hemorrhage, macular involvement or pre-retinal hemorrhage. g) condition of the periorbital tissue for presence or absence of the injury. Different modalities of imaging were used to locate the foreign body (projectiles) in the eye whether B-scan, X-ray or Computed Tomography (CT) scan. All the data of the patients was then analyzed subsequently.

### Statistical analysis

Descriptive statistics like mean and percentages were used for the analysis.

### Results

The present study was a prospective study in which we included 328 patients for analyses who presented to us with variety of injuries to their eyes due to firing of shotgun pellets by the security forces on the protesting mob. In our patients the mean age was 19.8 years with SD of 9.6 years. The age ranged from 09-44 years. Males were 304 (93%) and females were 24 (7%). Out of 328 patients, 251 (77%) were in the age group of 15-25 years, 33 (10%) patients were less than 15 years of age, 37 (11%) were in the age group of 25-35 years of age and 7 (2%) patients were more than 35 years of age. Among all the patients right eye was involved in 146 (44.5%) cases, left eye was involved in 138 (42%) and 44 (13.5%) cases presented with bilateral

involvement of eyes. The demographic data of all the patients of our study is given in Table-1. The complete pattern of clinical findings of all the patients in the present study with ocular pellet injuries on admission to the hospital is given in Table-2. Out of 328 cases vitreous hemorrhage was noted in 207 (63%) of cases. Highest number of patients 236 (72%) out of 328 cases were having penetrating type of injury and most common site of injury was cornea noted in 128 (39%) of patients. In this study 121 (37%) of cases were having visual acuity of defective perception of light/perception of ray at the time of presentation.

**Table-1** Demographic data of patients with ocular pellet injury.

Age in years	Mean with SD	19.8 SD 9.6
	Range	09-44
Age groups	<15	33 (10%) cases
	15-25	251 (77%)
	25-35	37 (11%)
	>35	7 (2%)
Sex	Males	304 (93%) cases
	Females	24 (07%)
Laterality	Right eye	146 (44.5%) cases
	Left eye	138 (42%)
	Both eyes	44 (13.5%)
Time period between injury and presentation	Same day of incident	288 (88%) cases
	Next day	27 (8%)
	2-3 day	10 (3%)
	>3 days	3 (1%)

**Table- 2** Pattern of injury on presentation to hospital

Type of injury	Penetrating	236 (72%) cases
	Perforating	27 (08%)
	Avulsive	31(9.5%)
	Rupture	34(10.5%)
Site of entry	Cornea	128 (39%) cases
	Sclera	95(29%)
	Cornea + limbal	39 (12%)
	Cornea + Sclera	26 (08%)
	Conjunctiva	20 (06%)
	Periocular	20 (06%)
Anterior segment	HypHEMA	200 (61%) cases
	Lens injury	141 (43%)
	Vitreous in A.C	52 (16%)
Posterior segment	Retinal detachment	109 (34%) cases
	Vitreous hemorrhage	207 (63%)
	Pre-retinal hemorrhage	138 (42%)
Intraocular foreign body	Present	285 (87%) cases
	Absent	43 (13%)



**Figure-1** Perforating pellet injury to upper eye lid



**Figure-2** Penetrating pellet injury to cornea-scleral area

## Discussion

In the last three decades a large number of firearms have been used to control violent protests in Kashmir valley, like conventional bullets, rubber bullets, and tear gas shells. Shot gun pellets have been introduced as the latest method for mob control, assuming to have its lower morbidity and mortality. The mean age of our patients in the study was 19.8 years with SD of 9.6 years. The age ranged from 9-44 years. The highest number of patients 251 (77%) involved in our study fall in the age group of 15-25years. The age group mostly affected in the study conducted by Francis Kwasi et al.<sup>8</sup> was between 10 to 35 years with a mean age of 19.9+5 years, which is almost similar to our results. Our findings are also at par with the results noted by Shuttleworth et al.<sup>1</sup>, in a study of 105 patients with ocular air gun injuries, where they observed that 74% of their patients were less than 18 years of age with a mean age of 17.5 ± 9.12 years. All these findings lead us to accept

that ocular pellet injuries are commonly seen in young age people, the reason being that it is young generation who use pellets guns as a toy to play or take active part in violent protests against troops in war zones.

In the present study we found that 304 (93%) patients were males and 24 (7%) of patients were females. These results were close to the results recorded by Francis Kwasi et al.<sup>8</sup> in their study, where they noted that out of 32 patients who were affected, 30 (93.75%) were males and the other 2 (6.25%) were females. In the study conducted by Langley et al.<sup>9</sup> on 718 patients of air gun injuries, the male female ratio was 6:1. Bowen et al.<sup>10</sup> in their study of 105 cases with pellet gun injuries have reported a 7.5:1 male to female ratio. From these observations we can infer that it is males who take part in mob violence more as compared to females. Though pellets mostly involve one eye at a time, but it may involve both the eyes in some cases. In the current study we found that right eye was involved in 44.5% cases, left eye in 42% of cases and both eyes were involved in 13.5% of cases. Assaf et al.<sup>11</sup> in his study also noted the bilateral involvement in some cases of ocular pellet injury. In a study conducted by Shuttleworth et al.<sup>1</sup> in 2009, observed that the majority of the victims of shot gun ocular pellet injuries reported to hospital immediately after the incident, barring few patients who presented late. Similarly in the present study we have seen that maximum number of patients were admitted on the same day of incident, 88% (288) patients.

Trauma to eyes due to shot gun pellets may be either acute or chronic on the basis of their clinical presentation. Majority of the times these acute injuries occur:- injury to cornea, corneo-limbal or corneo-scleral laceration, hyphaema, globe rupture, vitreous hemorrhage, macular involvement, retinal detachment etc<sup>12</sup>. In the current study we observed the similar findings, with vitreous hemorrhage being the most common presentation seen in 207 (63%) patients out of 328 patients, cornea was involved in 128 (39%) cases, and retinal detachment was noted in 109 (34%) of

cases. We also noted that penetrating injury was present in 226 (69%) patients, which is similar to results observed by S Kounser and K A Ganaie<sup>13</sup> in their study. In our study we found that foreign body (projectile) in the eye was present in 285 (87%) victims. Tabatabaei SA et al.<sup>14</sup> in their study also noted that foreign body was present in the eye of 97 patients out of 116 patients (83%). At par results were recorded by S Kounser and K A Ganaie<sup>13</sup> in their study conducted on 237 patients with pellet injury to eyes, in which they found that 218 (92%) cases were having projectile in their eyes at presentation.

### Conclusion

At present the maximum burden of deliberate and intended pellet injuries in the whole world is on the residents of Kashmir valley, while as in the rest of the world the pellet related injuries are accidental only. Once considered to be the non lethal weapon for humans, time has proved it to be very lethal if not handled in a proper way. Security personnel should be properly trained how to use the shot gun pellets. They can hugely reduce the damage to eyes by firing pellets whenever necessary below the waist while controlling the violent mob.

### Declaration

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Conflict of interest: None declared

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