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Ocular morbidity due to Holi colors: a study at tertiary eye care centre at Aimer, Rajasthan, India

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Abstract
PURPOSE:
Extent of ocular toxicity and clinical findings due to Holi colors. A three years study 2017 to 2019.
Methods:
A three consecutive years, retrospective study involving the patients presenting with holi colors related toxicity in holi festival years 2017 to 2019.
Results:
In 2017 year; out of total 22 patients, 17 (77.27%) were mild, 3 (13.63%) were moderate and 2 (9.09%) were severe injuries seen.
In 2018 year; out of total 16 patients, 10 (62.5%) were mild, 4 (25%) were moderate and 2 (12.5%) severe injuries seen.
In 2019 year; out of total 29 patients, 14 (73.68%) were mild , 4 (21.05%) were moderate and 1 (5.25%) was severe injury seen.
A majority was seen in young adult males (between 21 and 30 years of age, >3/4th were males). Bilateral ocular toxicity were seen in more than half patients.
Conclusion:
Ocular toxicity due to colors used during Holi mainly involves the surface epithelium and the superficial stroma. The colors can diffuse into the anterior chamber causing an inflammatory reaction. This was observed clinically and by measuring visual acuity. This may results in mild to severe form of ocular morbidity.

Keywords: *Holi colors, ocular toxicity or injuries.*

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I. Introduction

Throwing of colors on each other is the hallmark of this festival. It symbolizes the surrender of lust, forgiving the past mishaps and embracing each other, by immersing them in vibrant colors.[1]

Traditionally, holi colors were derived from natural sources and are either particulate powders or liquid splashes, applied by hand, toy guns, or pounding balloons. Later have been contaminated with hazardous compounds.[2,3]

Direct toxic effect of the chemicals or local inflammatory cytokines induced by the colors lead to toxicity from corneal epithelium to stroma and/or inflammatory reaction with generalized haze.[1,4,5]

Ocular injuries during holi primarily involve the young population. [5,6]

In order to preserve the essence of the festival, these toxins need to be urgently substituted with natural colors. Government imposed bans on manufacturing, sale and use of these chemicals are mandatory.

Provoke awareness and personal safety in the community, by public health education programmes, recommendation guidelines regarding personal safety measures and first aid like washing of eyes with clean water for these injuries.

II. Material And Methods

Retrospective study of three consecutive years; involving the patients presenting in casualty eye department with holi colors-related ocular toxicity in holi festival years 2017,2018 and 2019.

Although most patients were treated on as outpatient basis and severe injured were advised admission for further management and observation.

Detailed ocular examination, i.e., initial visual acuity, adnexal, anterior segment examination by slitlamp biomicroscopy, intraocular pressure (IOP) measurement, and fundus or posterior segment examination with B scan.

III. Results

Chemical injury caused by holi colors did not fit into the conventional Roper Hall and Duas classification, So different classification given here by us in absence of limbal ischemia.

A) Mild Grade: include superficial foreign body, conjunctival tear, subconjunctival hemorrhage, corneal epithelial defect.

B) Moderate Grade: superficial stromal hazyness iris details seen or color and/ or it's particle in superficial stroma.

C) Severe Grade: deep stromal haze iris details obscured, anterior chamber reaction or hyphema.

Table: 1 Initial presenting conditions

Years	Mild	Moderate	Severe	Total patients
2017	17 (77.27%)	3 (13.63%)	2 (9.09%)	22
2018	10 (62.5%)	4 (25%)	2 (12.5%)	16
2019	14 (73.68%)	4 (21.05%)	1 (5.25%)	19

Table: 2 Presenting visual acuity

Visual acuity	2017	2018	2019
>20/40	17 (77.27%)	10 (62.5%)	14 (73.68%)
20/40-20/200	3 (13.63%)	4 (25%)	4 (21.05%)
20/200-CF	1 (4.54%)	0	1 (5.26%)
HM	1 (4.54%)	2 (12.5%)	0
No PL	0	0	0

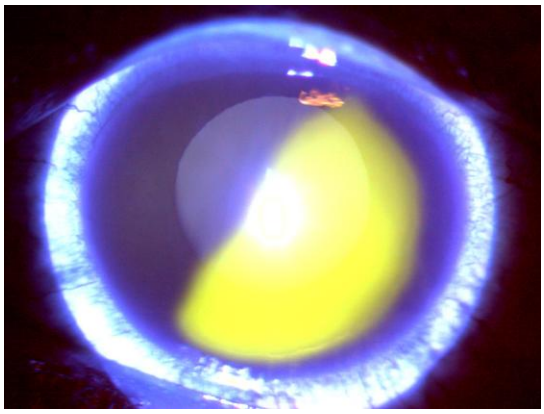
[CF = counting finger, HM = hand movement, PL = perception of light]

Table 1 and 2 show most of patients are in range of mild to moderate ocular toxicity and good visual condition.

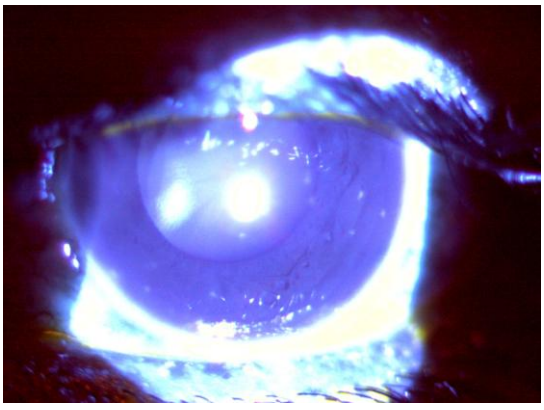
Table: 3 Mean age, Male Female ratio, Bilaterality

Years	Mean age	Male: Female	Bilateral	Total patients
2017	24.45 year	17:5 (77.27%: 22:72%)	13 (59.09%)	22
2018	26.72 year	13:3 (81.25% : 18.75%)	10 (62.5%)	16
2019	25.84 year	15:4 (78.95%: 21.05%)	9 (47.37%)	19

A majority were between 21 and 30 years of age. There were more than 3/4th were males. Bilateral ocular toxicity were seen in more than 50% patients.



Picture: 1



Picture:2

Pictures 1 and 2 show of Epithelial defect and and healed after treatment.

IV. Discussion

Holi festival is celebrated not only in India; also across the world. The injuries reported in holi festival are conjunctival hemorrhage/ tear, cornea epithelial defect, stromal haze, anterior chamber reaction, hypheama etc.[1,5]

A majority were young adults male, (between 21 and 30 years of age, >3/4th were males).[5,6] Bilateral ocular toxicity were seen in more than half patients.[5]

In order to preserve the essence of the festival, these toxins need to be urgently substituted with natural colors. Government imposed prohibition of manufacturing, sale and use of these chemicals are mandatory. [1]

These chemical morbidities can be prevented or reduced with awareness, use of natural colors and personal safety measures, other ways of celebrations such as flowers and first aid like washing of eyes with clean water. These injuries constitute an important cause of preventable chemical toxicity among young adults.[1,5] Thus, color-related celebrations should be monitored with a stringent protocol.

V. Conclusion

To prevent ocular morbidity due to colors raise the awareness, use of natural colors, personal safety measures and first aid like washing of eyes with clean water are very important. Further morbidity can be reduced with consult to Ophthalmologist as early as possible.

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