Primary Prevention of Ocular Injury in Agricultural Workers with Safety Eye Wear

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Aim: To study the effectiveness and acceptance of safety eye wear in preventing corneal injury in farmers. Methods: A group of farmers were randomized after sample size calculation into Group A, who were given transparent plastic goggles with side cover and Group B, who were given none. Outcome: Injury during harvesting and usage pattern. Student t test, chi-square. P value <0.05 was significant. Result: There were 553 in Group A and 540 in Group B. Injuries occurred in 4 (0.72%) cases in Group A and 61 (11.30%) cases in Group B (p=0.0001). 2 (0.4%) cases in Group B had subsequent corneal ulcers. 76% subjects in Group A wore the goggles most or all the time during work. Conclusion: Goggles significantly reduced corneal injuries in farmers during harvesting. Majority accepted and used it. Its widespread use by farmers will reduce the morbidity related to corneal injury and subsequent ulceration. Minor corneal injury during harvesting is major risk factor for corneal ulcers in farmers.

Contrary to popular perception ocular injury is common in agriculture. In the west agriculture is one of the top three industries with highest frequency of ocular injury.¹ The prevalence of ocular injury in agriculture-workers is unknown in India but data from few studies seem to suggest that this may be common.²³ In India and other developing countries superficial injury causing corneal abrasion in agriculture-workers are a major risk factor for causation of microbial keratitis.⁴ Such ‘rice harvesting keratitis’ or ‘harvest ulcer’ in Asia and Africa is an important cause of visual loss.

Safety eyewear devices have been found to be effective in prevention of ocular injuries in various industries.⁵ Use of protective goggles in prevention of ocular trauma would be beneficial as they are cheap, readily available and offer safety from all types ocular injuries. This study demonstrates the effectiveness of plastic goggles in the prevention of ocular injuries in agriculture-workers in central India.

MATERIALS AND METHODS

This was a prospective study designed to assess if safety eyewear could reduce the frequency of ocular injury in agricultural workers in the state of Chhattisgarh in central India. It was carried out in 2010-11 amongst agriculture-workers engaged in paddy harvesting in three villages of a single
administrative block in Raipur district. The practice of paddy cultivation in this block was representative of the entire state.

Sample size calculation was done prior to the study reported the requirement of 500 persons in each group of cases and controls to achieve a power of 80%, effect size of 1.5% at confidence level of 95%, a follow-up rate of 10%. The population of agriculture-workers in the three villages was enumerated before the study and simple randomization was done using MS Excel spreadsheet. All the member of case group were provided with plastic goggles with transparent plastic lenses and side-covers prior to harvesting. Consent was taken at three levels – village administration, head of house-hold and individual workers. The study was explained to them through one-to-one discussions, pamphlets and group discussions. During the study period regular field visits were made to monitor goggles wear. Following the harvesting a door-to-door survey was carried out by trained optometrists, vision technicians and ophthalmologists to identify cases of ocular trauma amongst the cases and controls and responses recorded on questionnaires.

All the data from the survey was entered in a computer database. Central tendencies were measured with mean and median. Student T test was used to calculated difference in means and 2x2 tables were constructed and Fishers-exact test was used to calculate difference in incidence of injury among the cases and controls. P value < 0.05 was considered significant.

RESULTS

Group A (cases) comprised of 575 agricultural workers and Group B (controls) comprised of another 575 agricultural workers. For the final survey 553 (96.17%) workers in Group A and 540 (93.91%) workers in Group B participated. There were 290 males (52.44%) males and 263(47.56%) females in Group A with a mean age of 41.20± 13.21 years and 289(53.52%) males and 251(46.48%) females in Group B with a mean age of 40.86 ± 13.92 years. There was no statistical difference in gender composition (p=0.7665, z test) or age group (p=0.6695, t test) between both the groups.

The number agriculture-workers who reported ocular injuries in Group A were 4(0.73%) and in Group B were 61 (11.30%) and this was statistically significant (p=0.0001, Fisher’s exact test). Two workers (0.4%) in Group B also reported the development of corneal ulcers after injury.

In Group A, 210(37.97%) workers reported wearing the goggles all the time during agricultural related work, 211 (38.16%) reported wearing it most of the time, 49 (8.86%) reported wearing it half of the time, 72 (13.02%) reported wearing it some of the time and 11 (1.99%) reported not using the goggles at all. Reasons for not using the goggles or difficulties faced during its wear were impairment or clouding of vision in 37 (6.7%) cases, discomfort 19 (3.43%)
cases, shyness 19 (3.43%) cases, absentmindedness 19 (3.43%), a non beneficial perception in 19 (3.43%), slowing the work pace in 16 (2.89%), undesirable appearance in 15 (2.71%), breakage in 15 (2.71%) and absence of peer pressure in 2 (0.36%) cases.

DISCUSSION

Safety eyewear devices have been found to be effective in prevention of ocular injuries in various industries like chemical plants, shipyard, manufacturing, etc.5 This study found that the protective eyewear (goggles) was effective in reducing the frequency of ocular injury in agriculture-workers (p=0.0001).

There are always barriers in the usage of safety eyewear amongst workers. In our study about three-fourth of the workers reported using it all or most of the time during work. Despite knowing that protective eyewear devices offer safety from work-related injuries workers do not tend to use them for multiple reasons.6 These include impaired vision, discomfort, fogging, less attractive
appearance, slipping of the goggles due to sweat and slowing work pace. In our study the following reasons were offered by agriculture-workers: clouding of vision, discomfort, shyness, absentmindedness, perceived to be non beneficial, slowing the work-pace, undesirable appearance, broken goggles, and absence of peer pressure. Workers can be motivated to wear goggles through education about hazards in work-place and safety methods and such education by trained personnel was found to be effective in increasing usage of protective eye wear amongst them.

Prevention of ocular injuries in agriculture workers will indirectly reduce the incidence of microbial keratitis amongst them. Srinivasan et al had demonstrated that treating corneal abrasions with antibiotic ointment by health workers at the village level significantly reduced the incidence of bacterial and fungal corneal ulcers. Preventing ocular injuries in agriculture-workers with safety eyewear like plastic goggles is a step better as it is a more primary form of prevention which is directed at the root of the pathogenesis – corneal injury and abrasion. In addition it also will prevent the eyes from serious penetrating injuries and from exposure to wind, dust and agriculture-chemicals. In conclusion adoption of protective eyewear by agriculture-workers will reduce the burden of ocular morbidity caused by ocular injuries. Barriers to use of goggles needs to be addressed through education and awareness.

REFERENCES