ORIGINAL RESEARCH PAPER

Ophthalmology

USE OF SAFTY EYE WEAR IN PREVENTING EYE INJURIES IN RURAL WORKER

KEY WORDS: Agriculture, eye injuries, goggles, primary prevention, safety eyewear.

Dr.G.Balaji Associate Professor of Ophthalmology of ophthalmology, Govt. villupuram medical college

Dr.Tharanivel .V* Assistant professor of Ophthalmology, Govt. villupuram medical college. *Corresponding Author

ABSTRACT

The purpose of this study was to determine the effectiveness of preventing eye injury with the use of safety eyewear in rural workers. Methods: A sample group of 500 rural workers (Group A) engaged in agriculture more, construction workers, welders were provided with goggles with side covers. A questionnaire-based survey was carried out to determine the frequency of their eye injuries. Workers with goggles were asked about the duration for which they used the goggles and also list barriers or difficulties with the same. The frequency of eye injuries in this group was compared with another group of agriculture workers (Group B) who did not use any safety eyewear. Results: The frequency of eye injuries in Group A was 4 (0.8%) and Group B was 62 (12.4%) which was highly significant (p= 0.0001). The relative risk calculated was 0.06 (95% confidence interval: 0.02-0.2). Rural workers in Group A had 94% less risk of ocular trauma compared to those in Group B. A significant number (80 %) of workers used the goggles all or most of the time during barriers were discomfort, shyness, forgetfulness, apathy, slowing of work pace, awkward appearance, and breakages. Conclusion: Safety eyewear conferred significant protection against work-related eye injuries in rural workers. Although safety eyewear was widely adopted by the workers, barriers reported by them will need to be addressed to make such programs more effective.

Agriculture ranks among the most hazardous occupations alongside mining, manufacturing, and construction in the prevalence of work. (1-5) 1.In developed countries where most farming practices are mechanized, eye injuries are mostly machine –related, either open or closed globe injuries. (6-8) In contrast, in the developing countries with a lesser degree of mechanization, corneal ulceration is a more common manifestation. (5,9-13) 2.In agriculture workers injury from the paddy leaf during harvesting causes corneal abrasion which gets secondarily infected from lack of care or the use of traditional eye medicines. 3. In welder corneal flash burn leads to corneal damage vision impairment. 4. In construction workers full of cement dust particles corneal aberration, 2% cornea ulcer, and visual impairment (10-13) 5. The resultant corneal ulcer (harvest ulcer, 14) or rice-harvesting Keratitis (11)) is a significant cause of ocular morbidity and visual impairment. (10-12, 15-17) in rural workers result in huge economic losses, (18, 19) placing an enormous burden on the agrarian community across the world.

Work-related eye injuries can be prevented by wearing safety eyewear like goggles. (20-25) while the use of safety eyewear is universally known and advocated by industry, compliance with safety guidelines among workers is poor. (21-25) The reasons are behavioral (indifference and lack of awareness of workplace hazards and safety), lack of safety eyewear in workplaces or inappropriate design of the same.

Compared to other cities, the use of safety eyewear among rural workers is less prevalent, (3, 6, 26-29) and almost nonexistent in India (5, 17) we believe that its use will protect workers from work-related injuries and consequent morbidity. Therefore, the purpose of this study is to evaluate the effectiveness of safety eyewear in Indian rural workers and identify barriers to its use.

METHODS

This prospective comparative study between two groups randomly allocated to goggles-wear and no goggles-wear was carried out in three villages in Villupuram in Tamil Nadu between 2014 to 2015. In these villages, agriculture is the chief occupation.

The risk and consequences of eye injuries during farming and the purpose of the study was explained to all in detail. The sample size was determined considering the prevalence of eye injury at 11% based on a previously published study. (17) It was assumed that goggles wear would confer eye protection to the workers, and the prevalence of injury would reduce to nil and therefore a pooled estimate of 5% was considered as baseline estimate for sample size calculation. The allocation of subjects to each group was randomly done. All households with agricultural workers were pooled and enumerated with the help of the electoral rolls at the village administrative centre. Each worker in the households was assigned a random number generated through a Microsoft Excel spread sheet. Then, on the basis of simple randomization, 575 workers were selected in the study group (Group A). Although 500 subjects fulfilled the sample size, additional workers were recruited to compensate for a higher nonresponse rate than what had been anticipated during sample size calculation. All the rural workers were enrolled after their consent. Subjects already using spectacles were excluded. Those who refused consent were also excluded and replaced by the next worker.

All workers were provided with a pair of nontinted polycarbonate goggles with side covers (Innovision Ltd., Mumbai, India). The distribution of goggles was done in October 2016. The study goggles had side covers that protected the eyes from all directions. The workers were instructed to wear the goggles all the time during work. Members from the study team made random visit to monitor the use of goggles. They also conducted regular awareness meetings, group discussions, house visits, and pamphlet distribution to motivate the workers. Telephone numbers were shared by the study team to provide emergency eye care. After completing data collection, a screening camp for eye diseases was carried out in the villages.

In March-April of the following year, a questionnaire-based survey to collect information on the frequency of eye injury, duration of goggles wear, and barriers was carried out. To achieve a 1:1 ratio between cases and controls, another group of 575 subjects from the existing list of agricultural workers not included in Group A were selected to acts as controls (Group B). Each household was visited by vision technicians and rural workers were interviewed individually. In case of absence of the individual, a second attempt to interview the subject was made,. The frequency of eye injury was obtained by asking "Did you suffer from any eye injury during harvesting," a method used in a previous study. (16) Injuries to other parts of the body or injuries incurred during activities other than farming or outside the study period were excluded. The duration of goggles wear was categorized as: (1) all the time, if the participants spoke of using them at work for the entire duration; (2) most of the time, if they used most but not at all time; (3) Half of the time, if they used them for half the duration; (4) some time, if they used them infrequently; and (5) none of the time, if they did not use them at all. (3)Finally, each worker was asked to list difficulties encountered while wearing the goggles or reasons for not wearing them. The responses were closely matched by the interviewer to a preexisting list. If a response was not present on the list, it was recorded separately.

RESULTS

A total of 1000 subjects were enrolled in the study, and after exclusion, they were allocated randomly to the two groups. Post harvesting, 493 workers in Group A and 498 workers in Group B were available for the survey. Two workers from Group B were excluded from the study when it was later discovered that they had also been using goggles purchased from the local market. There were 270 (52.4%) males and 223 female in Group A with a mean age of 41.2± 13.2 years and 260 (53.2%) males and 238 (46.5%) females in Group B with a mean age of 40.9 ± 13.9 years. The groups were homogeneous in terms of age (p= 0.67) and gender (p= 0.77).

The number of ocular injuries in Group A was 4 (0.8%) and 62 (12.4%) in Group B, which was statistically significant (p= 0.0001). The relative risk was 0.06 (95% confidence interval: 0.02-0.2), signifying that rural workers in Group A had 94% less risk of ocular trauma compared to those in Group B. The four cases of injury in Group A occurred when the participants were not wearing their goggles. Two of the injuries in Group A occurred during harvesting and one during rural worker, In Group B,35 (91.8%) injuries occurred during harvesting and 5 (8.2%) during threshing. Two injuries in this group developed into fungal corneal ulcers which were treated and healed. Three workers in this group reported an injury on more than one occasion. Overall, the injuries were caused by paddy leaf in 47 (72.3%), welding in 11 (16.9%), paddy husk in 3 (4.6%), construction worker 1 (1.5%), and unknown foreign bodies in 3(4.6%) cases.

The duration of goggles wear by the workers is shown in Table 1. About three-fourths of the workers used the goggles all or most of the time. Overall, impaired vision during work due to fogging and slippage of the goggles was the most commonly reported barrier, while female workers reported feeling conscious because of their unaccustomed appearance on wearing the goggles.

Table 1:Gender-wise distribution of barriers reported by agriculture workers in group A (n=553)

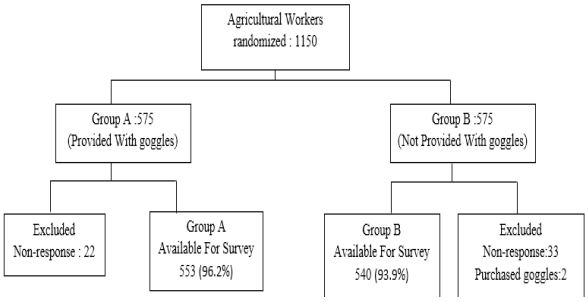
Category	n (%)	Male(%)	Female (%)	P
All time	210 (38)	111 (52.9)	99 (47.1)	0.9
Most Of the time	211 (38.2)	118 (55.9)	93 (44.1)	0.2
Half Of The Time	49 (8.9)	23 (46.9)	26 (53.1)	0.4
Some time	72 (13)	34 (47.2)	38 (52.8)	0.3
None Of the time	11 (1.9)	4 (36.4)	7 (63.6)	0.3

Table 2:Gender-Wise distribution of barriers reported by agricultural Workers

Impaired vision with goggles	21(56.8)	16(43.2)	37	0.59
discomfort	11(57.9)	8(42.1)	19	0.63
shyness	0	19(100)	19	-
forgetfulness	9(47.4)	10(52.6)	19	0.65
Felt goggles to be non beneficial	12(63.2)	7(36.8)	19	0.34
Slowing work pace	9(56.3)	7(43.7)	16	0.76
Awkward appearance	4(26.7)	11(73.3)	15	0.05
breakages	7(46.7)	8(53.3)	15	0.65
No peer pressure	1(50)	1(50)	2	0.94

DISCUSSION

The frequency of eye injuries in agricultural workers wearing goggles was significantly less than those not using goggles. A majority of the rural workers in the study more the goggles for sufficient time during work. This is notable as none of them were acquainted with any form of personal protective equipment nor exposed to workplace-related safety training before the study. (22-25, 33, 34) In agriculture, the use of safety eyewear is variable and generally low. Even in the United States, where there are strict safety requirements at the workplace, safety eyewear use is reported to range from as low as 2% to 50%. (3, 29) Although comparable data are not available for I ndia, usage of protective eyewear among Indian farmers is very low. A study from India reported that a majority of individuals incurring eye injuries residing in rural areas did not use any eye protection. (17) Forst et al. have categorized factors which govern agricultural workers wearing or not wearing protective eyewear like goggles as perception of risk and the expected effectiveness of goggles to reduce that risk, availability of goggles at the workplace and a mandate to use them, impact on visual acuity, comfort and appearance, and the need to carry them to the workplace. (27).Design-related shortcomings in protective eyewear hamper work and are an important concern for rural workers. Health and safety concerns come second to economic considerations and pressure to complete the work at hand. (28)In hot and humid climates, goggles tend to fog or get dirty, obscure vision due to sweat and tend to slip down the nose, all of which slow the work place and cause workers not to use them. (29) In the present study, impaired vision due to goggles was the most common barrier reported by workers (Table 2). Some of the other barriers included discomfort and slow work place. The design of the goggles used in this study is limited by lack of a head strap to prevent slippage, which was reported by the workers in the study, and absence of venting holes, due to which the goggles tended to fog. While harvesting paddy in hot, humid weather, we workers bend down from the waist, and then these design-related flaws become important barriers to the acceptance of goggles among the workers. Therefore, due attention must be paid to the design of the goggles, and further studies are required to design appropriate protective eyewear for agricultural workers in Indian conditions. This design should also allow for concomitant wear of refractive correction if any by the worker. While dome male agricultural workers reported awkwardness due to unfamiliarity, it was more common among female workers.



None of the workers in this study suffered eye injuries while wearing the goggles, but four suffered injuries when they were not wearing them. Studies in different occupational settings have also reported gaps in eye protection at the workplace caused by disregard for work-related dangers, forgetfulness, or reduced risk perception. (23, 24) Welch et al. observed that workers tended to use eye protection only when they perceived the task to be risky. In the present study, safety training was provided through group and one-on-one discussions by volunteers, pamphlets in the local language and intermittent field monitoring.

The study has limitations inherent to its design. It would have been ideal to conduct a randomized trial over a larger area to gain a more representative population. Although the questionnaire-based survey was conducted immediately after harvesting, recall bias may still confound the results. The results of wearing time of the goggles could be more precise if monitoring had been done by means of a daily log, but such an approach was not feasible. Our study extends this concept of prevention of corneal ulcers a step further by attempting to prevent eye injuries altogether. This may significantly lessen corneal blindness in this region.

CONCLUSION

This study has clearly demonstrated that goggles are effective in lessening work-related eye injuries during construction and that agricultural workers can be motivated to use them at work. Barriers existing in particular communities need to be adequately addressed. Hazards in agriculture and construction and their prevention in developing countries need to provide comprehensive safety guidelines.

ACKNOWLEDGEMENT

Dr. Ravikumar, Assistant Professor Govt.villupuram medical college, for helping during data collection

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

REFERENCES

1. Islam SS, Doyle EJ, Velilla A, Martin CJ, Ducatman AM. Epidemiology of compensable work-related ocular injuries and illnesses: Incidence and risk factors. J Occup Environ Med 2000; 42:575-81.
2. Forrest KY, Cali JM. Epidemiology of lifetime work-related eye injuries in the U.S. population associated with one or more lost days of work. Ophthalmic Epidemiol 2009; 16: 156-62.
3. Centers for Disease Control and prevention (CDC). Eye injuries to agricultural workers-Minnesota, 1992-1993. MMWR Morb Mortal Wkly Rep 1995; 44: 364-6.
4. Solomon C. Accidental injuries in agriculture in the UK. Occup Med (Lond) 2002; 52: 461-6.
5. Vasu U, Vasnaik A, Battu RR, Kurian M, George S. Occupational open globe injuries. Indian J Ophthalmol 2001; 49: 43-7.
6. Saari KM, Aine E. Eye injuries in agriculture. Acta Ophthalmol suppl 1984; 161: 42-51.
7. Schelp L. The occurrence of farmk – Environmental injuries in a swdish municipality. Accid Anal Prev 1992; 24: 161-6.
8. Sprince NL, Zwerling C, Whitten PS, Lynch CF, Burmeister LF, Gillette PP, et al. Farm activities associated with eye injuries in the Agricultural Health Study. J Agro medicine 2008; 13: 17-22.
9. Khatry SK, Lewis AE, Schein OD, Thapa MD, Pradhan EK, Katz J. The epidemiology of ocular trauma in rural Nepal. Br J Ophthalmol 2004; 88: 456-60.
10. Upadhyay MP, Karmacharya PC, Koirala S, Tuladhar NR, Bryan LE, Smolin G, et al. Epidemiologic characteristics, predisposing factors, and etiologic diagnosis of corneal ulceration in Nepal. Am J Ophthalmol 1991; 111:92-9.