

Pattern of Eye Diseases among Tea Workers

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Abstract

Background: Bangladesh's tea industry is essential to the country's economic expansion. Since tea workers in Bangladesh are marginalized within our community, they have limited access to comprehensive eye care services. Productivity and well-being are cornerstones of comprehensive health care strategy. Ocular disorders are influenced by life expectancy, sociodemographic status, and the epidemiological transition. In this context, the state of ocular health and the many eye illnesses remain to be significantly addressed. **Purpose:** To evaluate the pattern of eye diseases among tea workers in a tea estate of Bangladesh. **Methods:** This cross-sectional observational study was carried out in Halda Valley Tea Estate, Nazirhat, Fatickchari, Chattogram, Bangladesh, under the supervision of the Department of Community Ophthalmology, BSMMU, following ethical clearance and approval by the IRB board of BSMMU. With informed written consent and approval from the authority of the tea estate, a total of 110 tea workers were recruited. Socio-demographic characteristics, ocular findings, and patterns of eye diseases were determined and recorded. **Results:** The mean age of the study participants was 39.60 ± 11.63 years. The maximum (58.1%) study participants were 31 - 50 years old, female (64.5%), illiterate (82.7%), and tribal (71.8%) indigenes. Eye diseases were found in 94.5% of workers. Presbyopia (28.2%), cataracts (27.3%), and refractive error (26.4%) were the most common. Tea workers with eye diseases were significantly older than those who did not have any eye diseases (40.20 ± 11.57 vs. 29.17 ± 7.31 years, $p < 0.05$). Participants who had various eye diseases were mostly female (67.3%), illiterate (83.7%), and of tribal race (75.0%) ($p < 0.05$). **Conclusion:** A significant number of tea workers had eye diseases, of which presbyopia, cataracts, and refractive error were the most common.

Keywords

Tea Workers, Eye Diseases, Presbyopia, Cataract, Refractive Errors

1. Introduction

Visual impairment and age-related eye diseases resulting disability remain major public health concern. In 1999, The World Health Organization (WHO) and its collaborators inaugurated a slogan—"The Right to Sight" as a global initiative [1]. According to WHO, 45 million peoples worldwide are blind, with cataracts (51%), glaucoma (8%) and age-related macular degeneration (5%), these are the most common causes of blindness, accounting for about 314 million of visually impaired individuals. In 2020, about 596 million people worldwide, including 43 million blind people, had distance vision impairment in 2020. Owing to the unavailability of reading glasses, another 510 million people had uncorrected near vision impairment. 90% of those are located in LMICs, or low- and middle-income countries [2].

Health and productivity are interrelated—it is a fundamental precept of comprehensive health policy pertaining to the Sustainable Development Goals (SDG-3) [3]. The UN SDGs are a group of broad target-driven goals for 2030, designed as "blueprint to achieve a better and more sustainable future for all". Universal health coverage (UHC) ensuring all people can receive the high-quality health services they need, without experiencing financial hardship—is a WHO strategic priority [4]. Mobility reduction, mental health issues, an increased risk of dementia, an increase in the likelihood of falls and accidents, an upsurge in the demand for social care, and ultimately higher mortality rates are all effects of vision impairment. In contrast, vision enables better educational outcomes, increases work productivity, and facilitates many facets of life, thus raising the standard of living. Most of the principle causes of visual impairment including cataract and under corrected refractive error are subjected to an epidemiological transition relating with socio demographic status and life expectancy. A cross sectional national survey on Bangladeshi adults of both male and female gender aged 40 years and older was published in 2022. In that survey among 7200 study participants blindness was higher in those aged 55 years or older (1.8%) compared with the younger people (0.2%) and cataract is the most predominant cause (80%) [5].

Bangladesh is one of the major manufacturers and exporters of tea in the world. In 1854, Malnichara was the first inaugurated tea garden of our country as the journey of this industry started ages ago of British colonial era [6]. Currently, the country has around 167 tea gardens and 23 of those are in Chittoogram. In the year 2022, about 49,000 hectares of our land produced more than 93 million kilograms of tea [7]. A significant proportion of the population of our country with a diverse origin, caste and culture playing marked role in the economy in growth are directly or indirectly dependent on this tea industry.

Tea workers mostly are of diverse racial communities, under privileged with minimal gateway to state given services. Tea garden workers are nearly 14% of the total ethnic minorities and 0.22% of the total population in Bangladesh [7]. The numbers of tea workers vary, around 359,085 people live in tea garden areas,

of these 89,812 registered workers and 19,592 casual workers working in the tea gardens. The workers are mainly progenies of colonists who came from various parts of Indian subcontinent during British reign [8]. Being the most peripheralized segments of society, tea plantation labourers are facing substantial deprivation of essential rights and needs [9]. Due to lack of access to education they are ignorant about their wellbeing. Their working condition, illiteracy, unhealthy life style *i.e.* smoking, addiction to local homemade beer, alcoholism make themselves vulnerable to various diseases [10]. Economic status, level of education, lack of health expense and multi-morbidity may be the causes of diseases and mortality for minority [11]-[16].

Promoting eye health is a worldwide imperative that can positively impact the lives of individuals in both impoverished and affluent communities. Hence it is crucial to re-conceptualized ocular health as an issue that intersects with both health and development with profound importance in the national policy for health and development. Visually impaired persons are at a higher risk of poverty, despite the fact that 80 percent or more of worldwide visual impairment is curable or avoidable, and data demonstrates that cataract surgery improves quality of life and boosts economy. The Productivity Study of Presbyopia Elimination in Rural-dwellers (PROSPER) trial, published in Lancet Global Health found that after refractive correction tea workers productivity increased by 21.7 percent—and for those aged over 50 the increase was 31.6 percent [17].

To assess population eye health requirements, develop effective treatments, optimize delivery, and promote successful advocacy for comprehensive eye care delivery, research is critical to improve universal eye health. The study was conducted in light of the above significances for prevailing standardized occupational health as well as national demographic productivity of tea workers by assessing their various categories of eye diseases.

2. Methods

This cross sectional observational study was carried out in a tea estate in Chatto-gram district, Bangladesh, under the supervision of the Department of Community Ophthalmology at Bangabandhu Sheikh Mujib Medical University (BSMMU), Dhaka. Prior to the study, ethical clearance was obtained from the Institutional Review Board (IRB) of BSMMU. Data collection was conducted from September 2022 to May 2023 among the tea workers of Halda Valley tea estate in Chittagong district, aged 18 to 60 years. The details of the research project were discussed with the managing director and manager of the tea estate, and a letter explaining the objectives was given. Screening was carried out to find out the eligible tea workers. After considering the inclusion and exclusion criteria, a total of 110 tea workers were finally included in the study. The objective of the study was discussed in detail with the study participants. Informed written consent was obtained from each participant. The demographic data, medical history, and ophthalmic history were noted. Visual acuity was tested with a Snellen chart with needed refraction, and spectacles were prescribed after retinoscopy. Vision

was assessed with glasses whenever the subject used them. A near vision test was done with both eyes together using an N-type handheld chart at a distance of 40 cm. Ocular examination was conducted with a torch light and handheld slit lamp, and intraocular pressure was measured by a rebound tonometer. A fundus examination was done using a Keeler direct ophthalmoscope to evaluate the posterior segment. The subjects who needed further medical or surgical treatment were referred to the Community Ophthalmology Department of BSMMU. All the data were collected in a pre-tested, semi-structured questionnaire by the researcher herself. Data entry and analysis were done using SPSS version 26.0. A “p” value less than 0.05 was considered significant.

3. Statistical Analysis

The socio-demographic characteristics, ocular findings, relevant history, examination findings of eye diseases were reported. All data was compiled in Microsoft Office Excel datasheet. Statistical analysis of the results was done by using computer based software, SPSS version 26 (IBM Corp., Armonk, NY). Frequencies and percentages were for the qualitative variables. Quantitative variables denoted with Arithmetic mean and standard deviation. Chi-square statistics was used to compare categorical variables. Mean difference of two variable denoted with independent t test. A “p” value < 0.05 was considered as statistically significant.

4. Results

Table 1 states mean visual acuity of distance vision of right and left eye of the study participants was 0.31 ± 0.41 and 0.29 ± 0.39 logMAR, respectively. Maximum study participants had up to N6 near vision in both eyes (56.4%).

Table 1. Visual acuity of the study participants (n = 110).

	Right eye		Left eye	
	<i>n</i>	%	<i>n</i>	%
Distant vision (logMAR)				
0 - 0.3	77	70.0	76	69.1
0.47 - 1	29	26.4	30	27.3
>1	4	3.6	4	3.6
Mean \pm SD (median, range)	0.31 \pm 0.41 (0.17, 0 - 0.2)		0.29 \pm 0.39 (0.09, 0 - 1.3)	
Near vision				
Up to N6	62	56.4	62	56.4
N8 - N12	39	35.5	39	35.5
N14 - N24	9	8.2	9	8.2

n is frequency.

Table 2. Intra-ocular pressure of the study participants (n = 110).

Intra-ocular pressure (mmHg)	Mean \pm SD	Median (min-max)
Right eye	11.87 \pm 2.05	12 (10 - 18)
Left eye	11.84 \pm 1.98	12 (10 - 18)

Table 2 denotes mean intra-ocular pressure of right and left eye of the study participants was 11.87 ± 2.05 and 11.84 ± 1.98 mmHg, respectively.

In **Figure 1**, 94.5% tea workers had eye disease and 5.5% are devoid of eye diseases.

Figure 2 shows that most of the study participants were Tribal (71.8%) compared to non-tribal (28.2%).

Table 3 denotes presbyopia (28.2%), cataract (27.3%) and refractive error (26.4%) were the most common eye diseases among tea workers.

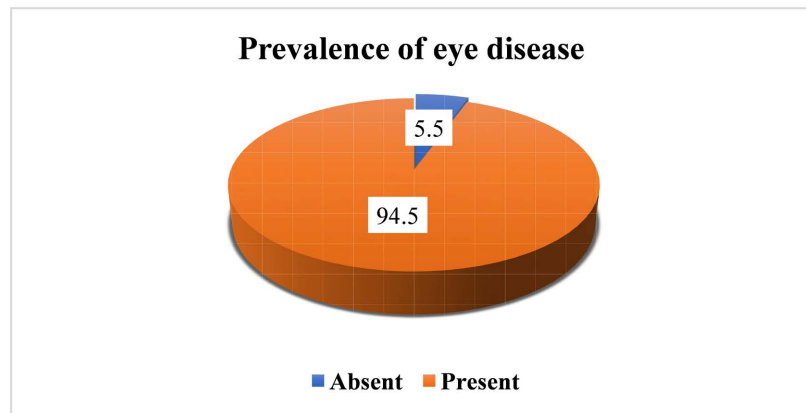


Figure 1. Prevalence of the eye diseases among study participants (n = 110).

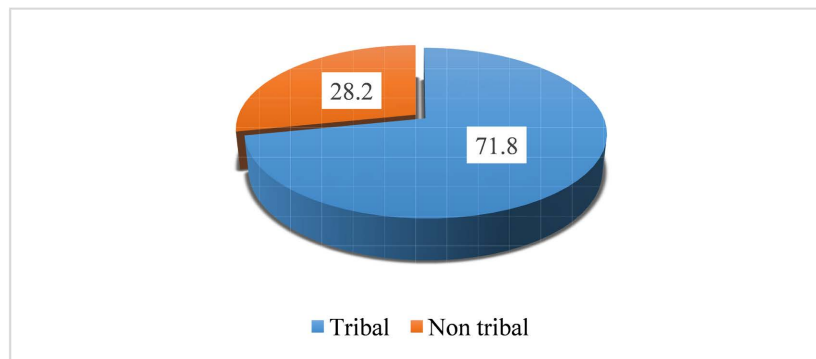


Figure 2. Racial distribution among study participants (n = 110).

Table 3. Distribution of eye diseases among study participants (n = 110).

	Frequency	Percentage
Presbyopia	31	28.2
Cataract	30	27.3
Refractive error	29	26.4
Pterygium	12	10.9
Conjunctivitis	9	8.2
Dry eye	7	6.4
Blepharitis	5	4.5
Pinguiculae	3	2.7
Corneal ulcer	2	1.8
Chalazion	2	1.8

Continued

Episcleritis	1	0.9
Optic atrophy	1	0.9
Subconjunctival haemorrhage	1	0.9
Strabismus	1	0.9

Table 4. Distribution of eye disease by demographic variables among tea workers (n = 110).

Variables	Eye disease		p-value
	Absent (n = 6)	Present (n = 104)	
Age			
Mean ± SD	29.17 ± 7.31	40.20 ± 11.57	0.023
Gender			
Male	5 (83.3)	34 (32.7)	0.021
Female	1 (16.7)	70 (67.3)	
Race			
Non-tribal	5 (83.3)	26 (25.0)	0.002
Tribal	1 (16.7)	78 (75.0)	
Level of education			
Illiterate	4 (66.7)	87 (83.7)	0.034
Primary	0 (0.0)	11 (10.6)	
Secondary	2 (33.3)	6 (5.8)	

Table 4 showed that tea workers having eye diseases were significantly older than those who did not have any eye disease (40.20 ± 11.57 vs. 29.17 ± 7.31 years, $p < 0.05$). Values are expressed as mean \pm SD and within parenthesis percentage over column in total. P-value was determined by Independent sample t test. Eye diseases occurred more in females (67.3%), which was statistically significant ($p < 0.05$). Values are expressed within parenthesis percentage over column in total. Tribal participants (75.0%), which was statistically significant ($p < 0.05$). Values are expressed within parenthesis percentage over column in total, tea workers having eye diseases had significantly higher illiteracy rate than those who did not have any eye disease (83.7% vs. 66.7%, $p < 0.05$). Values are expressed within parenthesis percentage over column in total. P-value was determined by Pearson chi-square test.

5. Discussion

In this study, 94.5% of tea workers had eye disease. Presbyopia (28.2%), cataracts (27.3%), and refractive error (26.4%) were the most common eye diseases among tea workers. In a previous Bangladeshi study on eight tea gardens in Sylhet, it was found that visual difficulty was the predominant (74%) problem among the health conditions [18]. Though several studies have been conducted revealing ocular conditions in rural communities, there is still a dearth of literature on the ocular diseases among tea garden workers.

A study among farmers found that eye disease prevalence was 78.9%, and

most had presbyopia (47.5%) [19]. Most of the population-based studies on eye diseases explored presbyopia as the commonest burden of all [20] [21] [22]. In rural impoverished populations in the Nigerian states of Edo and Delta, a study was conducted to determine the pattern and prevalence of eye diseases. Refractive error, including presbyopia, accounted for 41.8% of the cases, cataracts for 20.0%, glaucoma for 9.4%, allergic conjunctivitis for 8.3%, pterygium for 5.7%, and macular degeneration for 3.8% [23].

The research from Kaduna state in Nigeria found that the most prevalent senile eye disease observed was cataract (34.5%). Other conditions included anterior segment disorders like conjunctivitis (32%), glaucoma (5.8%), refractive errors (4.2%), and pterygium (3.1%) [24]. In general, differences in age groups and occupational exposures of the various study populations were most likely the reason of the deviations from others that were observed in the current research. Other than this work, the other general population studies had a greater proportion of older participants and used different diagnostic criteria [25] [26].

In this study, the average age of the study participants was 39.60 ± 11.63 years, ranging from 18 to 60 years. The maximum (58.1%) study participants were 31 - 50 years old, which is in parallel to the results of an earlier study about tea garden workers in Bangladesh [27]. This study also observed that tea workers with eye diseases were significantly older than those who did not have any eye disease (40.20 ± 11.57 vs. 29.17 ± 7.31 years, $p < 0.05$). Similarly, an Indian study on the tea garden community reported that the prevalence of eye disease significantly increases with increasing age [10].

In the current study, a greater proportion of the tea workers were female (64.5%) compared to male (35.5%), with a female-to-male ratio of 1.82:1. Women workers in tea estates account for about 64% of the female dominance in this industry, as explored by a Bangladeshi study 8. Moreover, this study also observed that eye diseases occurred more frequently in females (67.3%). A multitude of surveys and reviews have ascertained that women are more vulnerable to poor vision and sightlessness than men [28] [29] [30].

In this study, the majority of participants were illiterate (82.7%), while 10% had a primary level of education and only 7.3% had a secondary level of education. Several previous Bangladeshi studies also reported a high illiteracy rate among tea garden workers [8] [18] [27]. The low literacy rate of these communities is primarily caused by childhood marriages, poverty, and a lack of educational facilities nearby [8]. Besides, tea workers with eye diseases had a significantly higher illiteracy rate than those who did not have any eye diseases (83.7% vs. 66.7%, $p < 0.05$). Likewise, several studies also reported the association between literacy rate and eye diseases [31] [32] [33].

In the present study, the majority of participants were tribal indigents (71.8%), out of which Tripura (84.82%) was predominant. Previous Bangladeshi studies also reported the predominance of indigenous populations among tea garden workers [8] [18]. Moreover, this study revealed that among the workers who had eye diseases, most were tribal (75.0%). Studies on the wellbeing of indigenous

people are, however, relatively rare, but a study that was focused on the self-reported wellbeing of aged tea workers discovered a high prevalence of multimorbidities among them [34]. It is yet to be explored about the health care requirements, health status, associated factors, and living standards of the indigenous community in Bangladesh [18], which indicates the need for extensive research tailored to this group.

6. Conclusion

This study concluded with the finding that a significant number of tea garden workers on a selected tea estate had a variety of eye diseases. The most common diseases were presbyopia, cataracts, and refractive errors. Eye diseases were more evident in the elderly, females, illiterate, and tribal workers of the tea estate. A multicenter study with long-term follow-up would give a generalized evaluation.

Recommendations

Tea workers should be routinely screened for eye diseases. Providing free near vision spectacles to the workers is needed. Above all awareness building about eye health promotion and education is necessary for tea workers.

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Ethical Approval

The study was conducted in accordance with the Declaration of Helsinki. This study was approved by the institutional review board of BSMMU. Written informed consent was obtained from the patients for research and publication of this study.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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