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A Cross-Sectional Study on the Impact of Occupational Hazards on Ocular Health Among Female Chikankari Workers in Rural Areas of Lucknow, Uttar Pradesh, India.

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ABSTRACT

Background: Chikankari embroidery is a traditional handcraft practiced mainly by women in rural Lucknow, India. The work involves prolonged near vision tasks and repetitive fine motor activity, often under poor lighting and suboptimal ergonomic conditions, which may predispose workers to ocular strain and related visual problems. **Objective:** To assess the prevalence and pattern of occupational ocular health problems among female chikankari workers in rural Lucknow. **Methods:** A community-based cross-sectional study was conducted among 150 female chikankari workers aged 18–45 years from two rural villages of Lucknow district. Participants underwent comprehensive ophthalmic evaluation, including distance and near visual acuity testing, torchlight examination, retinoscopy, ocular motility assessment, cover test, confrontation test, interpupillary distance measurement, and near point of convergence assessment. Demographic and occupational details were collected using a structured questionnaire. Data were analyzed using descriptive statistics. **Results:** Most participants were aged 25–30 years (43.3%), belonged to nuclear families (64.7%), and were predominantly from the Muslim community (54%). A majority reported working more than six hours daily (70.6%) with over ten years of occupational exposure. Common ocular complaints included ocular pain (20%), headache (14%), watering of eyes (6.6%), diplopia (6.6%), and near vision difficulty (6%). Musculoskeletal complaints such as tingling of fingers (16.6%) and back pain (7.3%) were also reported. **Conclusion:** Female chikankari workers experience a substantial burden of occupational ocular morbidity, highlighting the need for regular vision screening, ergonomic improvements, and targeted occupational eye-health interventions.

KEYWORDS: Chikankari embroidery; Occupational eye diseases; Near work; Rural women; Visual strain; socio-economic, convergence, accommodation

INTRODUCTION

Chikankari is a traditional form of hand embroidery originating from Lucknow, Uttar Pradesh, India, and is widely practiced in rural areas by women as a primary or supplementary source of livelihood.[1-4] This craft involves intricate and repetitive stitching on fine fabrics, requiring sustained near vision, high levels of visual concentration, and prolonged static posture. Although chikankari holds significant cultural and socio-economic value, the occupational health risks associated with this craft particularly ocular hazards remain underexplored.[1,2,9]

Workers engaged in chikankari embroidery are routinely exposed to visual strain due to prolonged close work, inadequate illumination, and continuous fixation on fine details.[5] Sustained near tasks can lead to ocular fatigue, dryness, blurred vision, and reduced tear secretion. Extended visual effort often results in headaches and migraines attributable to ocular strain, clinically described as asthenopia.[5,7] Furthermore, repetitive near work places considerable demand on binocular vision mechanisms, particularly convergence and accommodation, potentially leading to binocular vision anomalies such as convergence insufficiency.[6-8]

Convergence and accommodation are essential visual functions that enable the eyes to focus clearly and maintain binocular alignment during near tasks. Prolonged engagement in fine embroidery work without adequate visual breaks can disrupt these mechanisms, resulting in symptoms such as eye strain, headaches, near vision difficulty and diplopia.[6-8] When refractive errors are appropriately corrected but symptoms persist, binocular vision dysfunctions—especially convergence insufficiency.[5-7] must be considered. Convergence insufficiency is characterized by a receded near point of convergence, reduced convergence amplitudes relative to divergence, and delayed recovery following fusion disruption. These abnormalities, individually or collectively, can significantly impair visual comfort and occupational efficiency.[5-8]

In addition to visual demands, chikankari workers often maintain awkward and static postures for extended durations, typically involving a forward-bent head and trunk position. Such postural strain not only contributes to musculoskeletal disorders but also exacerbates ocular discomfort by altering working distance and visual alignment.[10-13] Poor ergonomic conditions, including inadequate seating arrangements and improper working height, further compound visual and physical fatigue.[11-13] Inadequate or excessive lighting in workspaces may cause glare, reduced contrast sensitivity and additional eye discomfort.

The working environments of chikankari artisans are frequently characterized by poor ventilation, limited sanitation, and unhygienic conditions, increasing susceptibility to infectious diseases and overall health deterioration.[9-11] The chikankari production process itself is labor-intensive and time-consuming, involving multiple stages such as cutting, stitching, block printing with indigo dye, embroidery, washing, bleaching, acid treatment, stiffening, and ironing. These processes often span several days and are performed under suboptimal occupational conditions.[3,11]

Most chikankari workers reside in economically disadvantaged rural communities with limited access to healthcare, occupational safety measures and social protection.[1,2,9] The combination of prolonged working hours, low wages, limited health awareness, and inadequate access to eye care services places these women at heightened risk of preventable ocular morbidity. Despite the widespread engagement of women in this traditional craft, there is a paucity of systematic research assessing the relationship between occupational exposure and ocular health outcomes among chikankari workers.

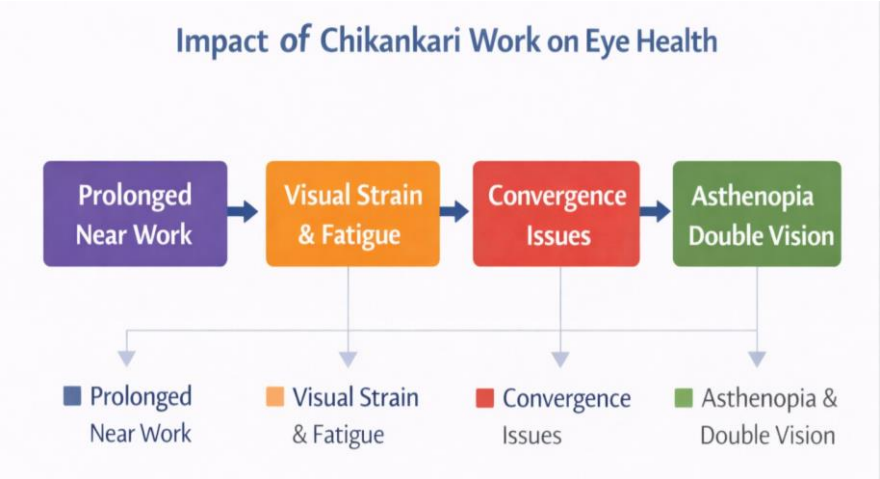

Figure 1: Flow diagram showing the impact of chikankari works on ocular health.

Therefore, this cross-sectional study was undertaken to evaluate the ocular health status of female chikankari workers in rural areas of Lucknow, with particular emphasis on work-related visual symptoms, binocular vision anomalies, and associated occupational hazards. Understanding these factors is essential for developing targeted eye health interventions, improving workplace ergonomics, and formulating occupational health policies aimed at protecting and sustaining the visual well-being of this vulnerable workforce.

METHOD

Study Design and Setting

A community-based cross-sectional study was conducted to assess the impact of occupational hazards on ocular health among female chikankari workers. The study was carried out in two rural villages **Goswa** and **Dilawar Nagar** located in the Lucknow district of Uttar Pradesh, India.

Study Population and Sample Size

The study included a total of **150 female chikankari workers**, comprising **34 adolescent girls and 116 adult women**, aged between **18 and 45 years**. Participants were selected from the study villages using a community-based approach and were actively engaged in chikankari embroidery at the time of the study.

Inclusion Criteria

- Female participants aged **18–45 years.**
- Residents of rural areas of Lucknow district.
- Engaged in handmade chikankari or embroidery work.
- Belonging to low socio-economic backgrounds.
- Willing to participate and provide informed consent.

Exclusion Criteria

- Participants younger than 18 years or older than 45 years.
- Male workers.
- Individuals from high-income backgrounds.
- Workers engaged in occupations other than chikankari embroidery.

- Residents of urban areas.
- Individuals with known ocular pathology unrelated to occupational exposure.

Data Collection Tools

Data were collected using a **structured interview schedule** designed to obtain information on:

- Demographic characteristics (age, education, religion, family type)
- Occupational history (years of work, daily working hours, working environment)
- Ocular and physical health complaints
- Family and medical history

Ophthalmic Examination

All participants underwent a **comprehensive eye examination** conducted under standardized conditions. The examination included the following assessments:

Torch Light Examination

Used to evaluate the adnexa, eyelids, eyelashes, conjunctiva (palpebral and bulbar), cornea, sclera, anterior chamber, iris, pupil, and lens to identify any anterior segment abnormalities.

Distance Visual Acuity

Distance visual acuity was assessed using a **Snellen's chart** at a distance of **6 meters**, ensuring minimal accommodative demand. Each eye was tested separately with appropriate occlusion of the fellow eye. Visual acuity was recorded as 6/6, 6/9, 6/12, 6/18, 6/24, 6/36, or 6/60. For participants unable to read the chart at 6 meters, vision was assessed at progressively shorter distances and documented accordingly. Finger counting, hand movement, and light perception tests were performed when necessary.

Near Visual Acuity

Near visual acuity was assessed using a **Snellen near vision chart** held at a distance of **25–33 cm** under adequate illumination. Near vision was recorded as N6, N8, N10, N12, N18, N24, or N36.

Interpupillary Distance (IPD)

IPD was measured using a millimeter scale by aligning the scale between the centers of both pupils while the participant maintained fixation at a distance of 40 cm.

Ocular Motility Examination

Extraocular muscle function was evaluated by asking participants to follow a fixation target through the **nine cardinal positions of gaze**. Any restriction or deviation was noted.

Confrontation Visual Field Test

Peripheral visual fields were assessed using the confrontation method. Each eye was tested separately, and the participant was asked to identify finger movements in all four quadrants.

Cover–Uncover Test

The cover test was performed at near and distance to detect ocular deviations. Eye movements were observed during occlusion and uncovering to identify orthophoria or any tropia (eso-, exo-, hyper-, or hypotropia).

Near Point of Convergence (NPC)

NPC was measured using both **objective and subjective methods** by moving a pen tip slowly toward the participant's eyes until fusion broke or diplopia was reported. Measurements were recorded in centimeters. An NPC of **6–12 cm** was considered normal, **12–15 cm** suspect, and **>15 cm** abnormal.[5-8]

Operational Definitions

Normal and abnormal values for each screening test were defined prior to data collection to ensure consistency and accuracy in assessment.

Ethical Considerations

The study was conducted in accordance with ethical principles for human research. Participants were informed about the purpose and procedures of the study, and verbal informed consent was obtained prior to examination. Confidentiality of participant information was strictly maintained.

Statistical Analysis

Data were entered into a spreadsheet and analyzed using **descriptive statistics**. Results were expressed as frequencies and percentages to describe demographic characteristics, occupational exposure, and ocular health outcomes.

RESULT

A total of **150 female chikankari workers** from two rural villages of Lucknow district—**Goswa (n = 68; 45.3%)** and **Dilawar Nagar (n = 82; 54.6%)**—participated in the study.

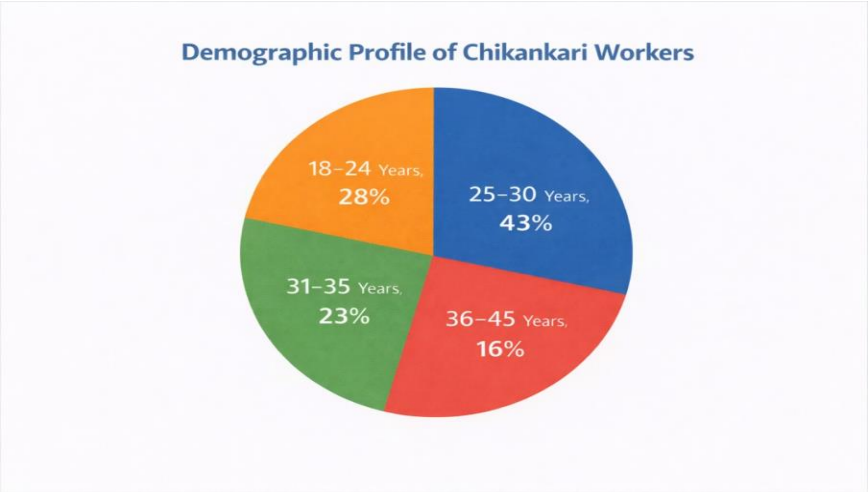

Figure 2: Demographic profile of chikankari workers (n = 150).

Demographic Characteristics

The age distribution of participants showed that the majority belonged to the **25–30 years age group (43.3%)**, followed by **21–24 years (14.6%)** and **18–20 years (13.3%)**. Smaller proportions were observed in the age groups **31–35 years (13.3%)**, **36–40 years (10%)**, and **41–45 years (5.3%)**.

With respect to Educational status revealed a high level of illiteracy, with **78% of workers being illiterate**, while **17.3% had primary education (classes 1–5)** and only **4.7% had education up to classes 6–12**.

Table 1: Distributions of Subjects According To Age Group.

Sr. No.	Age Group	No. Of Subject	Percentage (%)
01.	18-20	20	13.3%
02.	21-24	22	14.6%
03.	25-30	65	43.3%
04.	31-35	20	13.3%
05.	36-40	15	10%
06.	41-45	8	5.3%
	Total	150	100%

Occupational Profile

The duration of employment as chikankari workers showed that **76% had been engaged for 5–10 years**, **17.3% for 11–20 years**, and **6.7% for more than 20 years**.

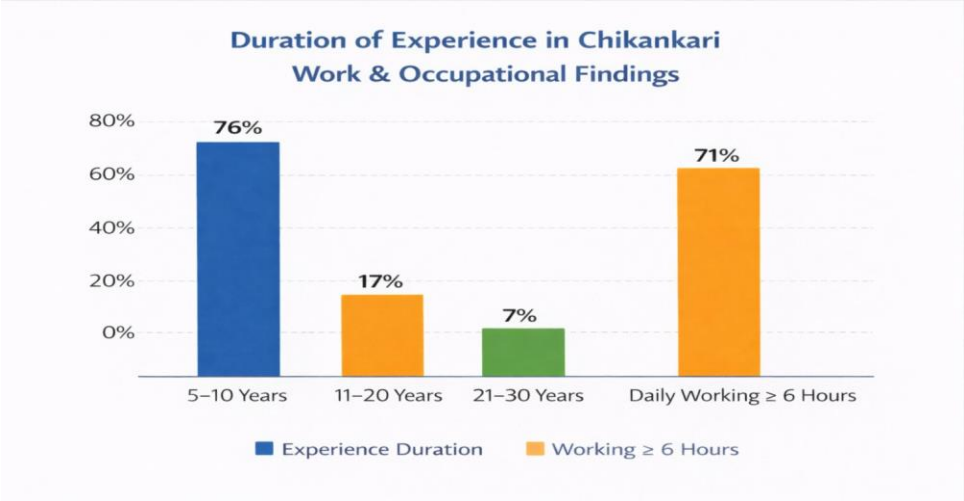

Figure 3: Duration of experience in chikankari work and occupational health findings.

Daily working hours indicated prolonged occupational exposure, with **70.6% working more than 6 hours per day**, **20% working 3–6 hours**, and **9.3% working less than 4 hours daily**.

Assessment of the working environment revealed that **73.3% of workers operated in moderately adequate environments**, while only **26.7% reported good working conditions**. None of the participants reported working in a dusty environment.

Ocular and Physical Health Complaints

A high prevalence of ocular and musculoskeletal complaints was observed among the participants. The most frequently reported ocular symptom was **ocular pain (20%)**, followed by **headache (13.3%)**, **itching (10%)**, **burning sensation (10%)**, **watering of eyes (6.6%)**, **double vision (6.6%)**, and **near vision difficulty (6%)**. **Floaters were reported by 3.3%** of workers.

In addition to ocular complaints, **tingling in fingers was reported by 16.6%**, and **back pain by 7.3%** of participants, indicating associated musculoskeletal strain related to prolonged near work and static posture.

DISCUSSION

The present cross-sectional study evaluated the ocular health status of female chikankari workers in rural areas of Lucknow, Uttar Pradesh, with particular emphasis on occupational exposure, visual symptoms and associated risk factors. The findings reveal a substantial burden of ocular and musculoskeletal complaints among this population, highlighting the occupational hazards inherent in prolonged near work performed under suboptimal working conditions.[1,2,11-13]

The majority of participants belonged to the 25–30 years age group and had been engaged in chikankari embroidery for more than five years, with most working over six hours per day. This prolonged duration of near work is a critical factor contributing to visual fatigue and ocular discomfort. Continuous fixation on fine embroidery details places sustained demand on accommodation and convergence mechanisms, predisposing workers to asthenopic symptoms such as ocular pain, headache, watering, and near vision difficulty. These findings are consistent with earlier reports describing increased visual strain among workers involved in fine manual and near-vision–dependent occupations.

Table 2: Comparison of Present Study Findings with Previous Studies.

Study	Study Population	Key Findings	Similarity with Present Study
Singh & Sharma (2018)	Female chikankari workers	High prevalence of eye strain and musculoskeletal pain	Similar occupational complaints
Gangopadhyay et al. (2015)	Embroidery workers	Tingling, numbness, carpal tunnel syndrome	Supports repetitive strain findings
Kalpana et al. (2016)	Chikankari workers, Lucknow	Eye irritation (73%), back pain	Consistent with ocular & postural issues
Present Study	Rural female chikankari workers	Ocular pain (20%), headache (14%), near vision difficulty (6%)	Confirms occupational ocular risk

Ocular pain emerged as the most frequently reported symptom, followed by headaches and watering of the eyes. These symptoms are commonly associated with accommodative stress and binocular vision dysfunction, particularly convergence insufficiency[5-8]. Repetitive near tasks without adequate visual breaks can disrupt normal accommodative responses and binocular coordination, leading to symptoms such as diplopia and difficulty in sustaining near focus. Similar observations have been documented in previous studies that reported high prevalence of eye strain and convergence-related symptoms among workers engaged in embroidery[1,2,12] and textile-related activities.

The high prevalence of musculoskeletal complaints, including tingling of fingers and back pain, reflects the ergonomic challenges faced by chikankari workers. Prolonged static postures, forward bending of the head and trunk, and repetitive hand movements contribute to cumulative musculoskeletal stress. Earlier ergonomic studies among embroidery and textile workers have similarly documented upper limb discomfort, carpal tunnel syndrome[10-13] and lower back pain, reinforcing the role of poor posture and repetitive tasks in occupational morbidity.[9-11]

Table 3: Association between Occupational Exposure and Ocular Complaints.

Occupational Factor	Exposure Category	Common Ocular Complaints
Daily working hours	>6 hours/day	Ocular pain, headache, watering
Duration of work	>10 years	Near vision difficulty, asthenopia
Working posture	Prolonged bent posture	Eye strain, double vision
Lighting condition	Moderate/poor	Burning sensation, watering

Educational status and socio-economic background appear to play a significant role in occupational health outcomes. A large proportion of participants in this study were illiterate and belonged to low-income households, limiting their awareness of occupational health hazards and access to preventive healthcare services. The predominance of nuclear families further suggests limited social support systems, potentially exacerbating health neglect. These socio-demographic factors have been reported in previous studies as important determinants of health vulnerability among unorganized sector workers.

The working environment assessment revealed that the majority of participants operated in moderately adequate conditions, with only a minority reporting good environmental settings. Inadequate lighting, poor ventilation, and non-ergonomic seating arrangements are likely contributors to both ocular and physical symptoms. Insufficient or excessive illumination can increase glare and reduce contrast sensitivity, thereby intensifying visual strain during prolonged embroidery work.

The findings of this study are in agreement with previous research conducted among chikankari and textile workers in India, which reported a high prevalence of ocular irritation, visual fatigue, and musculoskeletal disorders. Collectively, these results underscore the need for targeted occupational health interventions tailored to the specific visual and ergonomic demands of chikankari work.

However, the study has certain limitations. The cross-sectional design restricts causal inference between occupational exposure and ocular outcomes. Additionally, the study was confined to two rural villages, which may limit the generalizability of the findings. Despite these limitations, the study provides valuable insight into an under-researched occupational group and highlights the pressing need for preventive eye care and ergonomic improvements.

Overall, this study emphasizes that female chikankari workers constitute a vulnerable occupational group facing significant ocular and musculoskeletal health risks. Integrating regular eye screening, ergonomic education, and workplace modifications into community health programs may substantially improve their visual health, productivity, and quality of life.

CONCLUSION

This cross-sectional study highlights the substantial occupational impact of chikankari embroidery on the ocular health of female workers in rural Lucknow, Uttar Pradesh. The findings demonstrate a high prevalence of visual and musculoskeletal complaints, particularly ocular pain, headaches, watering of eyes, double vision, and near vision difficulties, among workers exposed to prolonged near work, repetitive hand movements, and non-ergonomic working conditions. Extended working hours and long-term engagement in chikankari embroidery appear to exacerbate visual strain and binocular vision stress, increasing the risk of asthenopia and convergence-related dysfunctions.

The predominance of low educational status and limited access to healthcare further compounds the vulnerability of these workers, often resulting in delayed diagnosis and inadequate management of occupational eye problems. The study underscores the urgent need for regular vision screening, improved workplace ergonomics, adequate lighting, and targeted eye health education programs tailored to the specific needs of female chikankari workers. Addressing these occupational hazards through community-based interventions and policy-level support is essential to preserve visual health, enhance productivity, and improve overall quality of life among this traditional artisan population.

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Conflict of Interest: The authors declare no conflict of interest.

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