



Original Article

Effects of yogic eye exercises on eye fatigue in undergraduate nursing students

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Abstract. [Purpose] This study was performed to investigate the effects of yogic eye exercises on eye fatigue in undergraduate nursing students. [Subjects and Methods] The study used a pretest-posttest design with a non-equivalent control group. Forty undergraduate nursing students were selected by convenience sampling, with 20 assigned to an exercise group and 20 assigned to a control group. The yogic eye exercise intervention was performed for 60 minutes, two days a week for 8 weeks. It consisted of 8 steps: palming, blinking, sideways viewing, front and sideways viewing, rotational viewing, up and down viewing, preliminary nose tip gazing, and near and distant viewing. Eye fatigue was measured using a questionnaire for evaluating ocular fatigue. [Results] The exercise-group measurements revealed a significantly decreased eye-fatigue score compared with that of the control group. [Conclusion] These findings indicate that yogic eye exercises could reduce the eye fatigue score in undergraduate nursing students.

Key words: Eye yoga, Eye fatigue

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INTRODUCTION

Eyes are vital organs in an individual's daily lives. Except during sleep, an immense variety of visual information is perceived by us through eyes both, at work and at home. Most users of visual displays have reported forms of visual discomfort such as tired eyes, dry eyes, eye strain, eye irritation, poor visual acuity, burning sensations, redness, and double vision¹⁻⁴. Nowadays, university students are readily exposed to accelerated environmental eye fatigue as frequent users of computer screens. Eye fatigue is a frequent complaint due to computer usage for academic or recreational purposes or social networking⁵. Generally, eye fatigue can be influenced by factors such as artificial or insufficient lighting, prolonged watching of visual displays, poor diet, eye muscle inefficiency due to prolonged hours of office work and academic studies, psychosocial and emotional tension, and ageing⁶.

Previous studies have suggested that eye disorders are commonly related to functional defects in the ocular muscles exacerbated by pain and tension resulting from computer work^{6, 7}. Therefore, relaxation practices may help to relieve eye fatigue⁸. Yoga practices have been associated with physical as well as mental health benefits via down-regulation of the hypothalamic-pituitary-adrenal axis and the sympathetic nervous system⁹. Previous studies reported that yoga exercises are related to better self-rated relaxation¹⁰⁻¹² and significantly decreased stress levels in nursing students¹³. These practices have been shown to enhance visual perceptual sensitivity and the ability to discriminate a flickering stimulus by increasing the frequency of blinking, which decreases the magnitude of the optical illusion that a flicker is steady¹¹. Nursing students in the yoga exercise group had a significant decrease in stress levels over this 12-week period, while those in the control group had an increase in stress levels. However, few studies have provided evidence that the practice of eye yoga helps to relieve eye fatigue. Hence, the purpose of this study was to assess the effects of yogic eye exercises on eye fatigue in undergraduate nursing students.

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SUBJECTS AND METHODS

This study used a pretest-posttest design with a non-equivalent control group. The subjects of this study were 30 healthy female and 10 healthy male undergraduate nursing students aged 20–23 years with no medical eye diseases, no history of applying eye medications, and no experience with yoga exercises. The participants were recruited through the Internet homepage of nursing department, Kangwon National University. The participants volunteered to participate as members of one of two groups, either the yoga exercise or the control group. All participants received detailed information on the purpose and usefulness of this study and signed an informed consent form. They were recruited to the yoga exercise (n=20) and control groups (n=20). Forty subjects completed the entire study. The Institutional Review Board of Kangwon National University approved the study. Demographic information and eye fatigue scores were measured as pretest data. Eye fatigue scores were also measured as posttest data.

Eye fatigue was measured using a questionnaire for evaluating ocular fatigue^{2, 4)}. This instrument consisted of 12 items scored using a 7-point Likert scale (0=none, 1 or 2=slight, 3 or 4=moderate, 5 or 6=severe), assessing the source of eye fatigue from 12 items: tired eyes, sore/aching eyes, irritated eyes, watery eyes, dry eyes, eyestrain, hot/burning eyes, blurred vision, difficulty focusing, double vision, and visual discomfort²⁾. A higher score indicates a higher level of perceived fatigue. Eye fatigue scale measurements were obtained from the participants both before the commencement of the study and after the completion of the yogic exercise intervention.

Yogic exercises were conducted for about one hour per session, twice a week for 8 weeks. The yoga instructor was certified by Bihar Yoga Bharati in India. The yogic exercises were performed in the Department of Nursing. Eye-yoga exercises were chosen because of the availability of scientific studies on this type of yoga. They consisted of 8 steps: palming, blinking, sideways viewing, front and sideways viewing, rotational viewing, up and down viewing, preliminary nose-tip gazing, near and distant viewing etc. Each step was performed for 5 minutes per cycle. After the eye exercises, the participants practiced the Shavasana (corpse pose) for 20 minutes to relax their eyes. The scientific explanation for yoga eye exercise has been described as follows: palming relaxes and revitalizes the eye muscles and stimulates the circulation of the aqueous humor, the liquid that runs between the cornea and the lens of the eye, aiding the correction of defective vision; the blinking exercise encourages the blinking reflex to become spontaneous, inducing relaxation of the eye muscles; sideways viewing relaxes the tension of muscles strained by constant reading and close work, preventing and correcting squint; front and sideways viewing improves the coordination of medial and lateral muscles; rotational viewing restores balance in the muscles surrounding the eyes and improves the coordinated activity of both eyeballs; up-and-down viewing balances the upper and lower eyeball muscles; preliminary nose-tip gazing improves the accommodating and focusing power of the eye muscles; and the near and distant viewing are similar to the preliminary nose-tip gazing exercise but the range of movements is further increased^{6, 14)}.

Statistical analyses were conducted using the SPSS program (version 18.0) for Windows. All data are presented as number (percentage) or median (range). A χ^2 test with Fisher's exact test or Z test was used to test for homogeneity of demographic and clinical characteristics between the exercise and control group. Significant differences between groups were determined using Wilcoxon rank sum tests due to nonhomogeneous ages in the demographic characteristics. Significant differences within groups were determined using Wilcoxon signed rank tests. Probability values of less than 0.05 were considered statistically significant.

RESULTS

Variables are presented in Tables 1 and 2. Except for the age variable, no significant differences in characteristics were found between the yoga group and the control group. There were no significant differences in the pre-intervention eye fatigue scores between the two groups. After the course of yoga exercises, the eye fatigue scores differed significantly between the 2 groups (yoga group vs. control group, $p<0.001$) and over time (pretest vs. posttest, $p<0.001$).

DISCUSSION

As shown in the study results, after 8 weeks of yogic eye exercises, the eye fatigue scores were significantly decreased compared with those obtained before starting yoga practice. Additionally, nursing students in the yoga exercise group had a significant decrease in their eye-fatigue levels over the 8-week period, while those in the control group had no difference in their eye-fatigue levels. These findings are similar to those of a previous study that reported that yoga practices significantly decreased the visual discomfort score of participants working in a software company^{1, 15)}. A previous study has suggested that a yoga program should include yoga postures, breathing, joint exercises, visual cleansing exercises, and relaxation¹⁾. In contrast to the yoga group in this study, the control group had no differences in their eye fatigue scores. The differences between the two groups, besides the eye-yoga effects, may be influenced by psychological benefits gained by participants in the yoga group from attending frequent meetings with the instructor. This supports the concept that psychological effects could be an additional factor in the yoga group¹⁾. Therefore, these findings confirm that yogic eye exercises can be considered as a non-pharmacological intervention for relieving eye fatigue. However, there have been few studies related to eye-yoga

Table 1. Homogeneity test results for general characteristics and eye fatigue between the experimental and control groups

Variables	n (%) or median (range)	
	Experimental group	Control group
Gender		
Female	12 (60.0)	18 (90.0)
Male	8 (40.0)	2 (10.0)
Age (years)	24 (22–36)	22 (21–25)*
Acuity		
Right acuity	1.0 (0.2–1.5)	0.75 (0.0–1.5)
Left acuity	0.9 (0.1–1.5)	0.6 (0.1–1.5)
Use of visual media per day (hours)	4.0 (2.0–12.0)	5.0 (2.0–12.0)
Sleep duration per day (hours)	7.0 (5.0–8.0)	7.0 (5.0–8.0)
Eye fatigue	19 (3–35)	23 (7–47)

*p<0.01

Table 2. Effects of yogic eye exercise on eye fatigue

Group	Median (range)		Mean differences (95% CI)	
	Pre-test	Post-test	Within group	Between group
Yoga group	19 (3–35)	8 (2–30)	–6 (95% CI [–26, 3])*	
Control group	23 (7–47)	22.5 (5–59)	0 (95% CI [–19, 12])	–14 (95% CI [–52, –3])*

* p<0.001; CI: confidence interval

exercises, implying that follow-up studies are needed to establish rigorous methodological evidence to support the relief of eye fatigue through an eye-yoga program.

The present study has some limitations. The eye fatigue scale was self-rated, with no comparison with objective indicators of eye fatigue. This study was not conducted under strictly controlled research conditions; for example, some participants wore contact lenses, which may lead to higher levels of dry eyes. Despite these limitations, these findings suggest that yogic eye exercise can relieve eye fatigue levels in nursing students.

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