

# Effect of Pranayama and Eye Exercises on Visual Acuity of Medical Students: A Case Control Study

Nitin Gosewade<sup>1</sup>, Amol Drugkar<sup>2</sup>, Vinod Shende<sup>3</sup>

## ABSTRACT

**Introduction:** In current century of information technology, use of electronic gadgets has increased and also the no of ocular complaints also increased. Regular practice of relaxation techniques like pranayama and certain eye exercises are found to be useful in relieving these systems and also improving the visual acuity as such. Aim to study the effect of pranayama and eye exercises on visual acuity.

**Material and Methods:** This study was done on 60 medical students, divided into study and control groups equally. Study group subjects performed kapalabhati pranayama and eye exercises regularly for eight weeks while control group participants did not participate in any kind of exercise. Snellen's chart was used to test the visual acuity to test the effect of pranayama and eye exercises.

**Results:** There was significant improvement in visual acuity in subjects practicing pranayama and eye exercises. Visual acuity values in study group in right eye before and after intervention were  $34.30 \pm 20.28$  and  $30.70 \pm 21.89$  respectively. Values in left eye were  $34.60 \pm 20.08$  and  $30.46 \pm 21.62$  respectively. In control group the values were  $32.60 \pm 20.37$  and  $32.30 \pm 20.44$  for right eye respectively and  $31.10 \pm 19.22$  and  $30.90 \pm 19.15$  for left eye respectively.

**Conclusion:** The present study suggests that pranayama along with eye exercises can be used as potential non-pharmacological measure for visual acuity improvement.

**Keywords:** Visual acuity, pranayama, eye exercises, Snellen's chart

## INTRODUCTION

In the current century, information technology has become the boon for the overall development of a person. But it has got certain disadvantages also if used excessively. Excessive television watching, spending lot of time on social networking sites on mobile and computer has increased the eye complaints. Most of the people visit ophthalmologist with common ocular complaints like itching, redness, burning, tearing of the eyes, headache, double vision, eye strain and blurred vision.<sup>1,2</sup> In India, the major symptoms related to the computer use reported by the ophthalmologists are headache, eyestrain, tiredness and burning sensation, watering and redness.<sup>3</sup> Depth perception is the function of binocular vision which gives us an idea regarding size and distance of the objects to enable us move around them. Both of our eyes and its connections to brain and extra ocular muscles work in coordination to produce complicated visual images and messages. All of us in our routine activities often need to respond immediately to different simple as well as complex conditions like the simple responses to the doorbell in home to the traffic signals on the road. These muscles can get fatigued. Thus it is necessary for us to do regular exercise in

order to keep these muscles healthy, like any other muscle in the body.<sup>4</sup> Yoga is an ancient Indian technique which includes practice of specific postures, cleansing practices, regulated breathing exercise and meditation. A combination of yoga practices along with other eye relaxation techniques reduced symptoms of visual strain reflecting in betterment of visual acuity. Yogic exercises are supposed to strengthen all the extraocular muscles and help in preventing eye strain. Yoga has been shown to improve ocular symptoms in people who use computers for prolonged hours.<sup>5</sup> Even a short program of yogic exercises of six weeks was found to be effective in enhancing emotional well-being and handling of stress among employees of a workplace.<sup>6</sup> It has been reported that one month yoga training resulted in improvement in mirror tracing tasks.<sup>7</sup> In 1900, Dr. William H. Bates, a New York ophthalmologist noted how much his own eyes ached. It reminded him how often his patient complains of eyestrain and headaches even after they had responded well to medical treatment. In his office, he rested his elbow on his desk and cupped his palms over his eyes. After ten minutes his eyes stopped aching and he felt mentally refreshed. Uncupping his eyes, he found that objects in his room seemed much clearer and brighter. His observation led him to evolve his 'method of eyesight training' described in his bestselling book of 1919, *Better Eyesight without Glasses*. Various websites mentioned simplified eye exercises and their usefulness on eyes including claims like improvement in vision. But definitive studies in this regard are lacking. We planned this study with the objective to study the effect of pranayama along with Bates eye exercises on visual acuity.

## MATERIAL AND METHODS

### Study Design

Present study was carried out in Physiology Department at reputed Medical College of Mumbai. Total 60 healthy subjects (both male and female) who were in the first year MBBS, in the age group of 18–30 years belonging to sim-

<sup>1</sup>Associate Professor, Department of Physiology, <sup>2</sup>Associate Professor, Department of Anatomy, Chandulal Chandrakar Memorial Medical College, Kachandur, Durg, Kachandur, Chhattisgarh, <sup>3</sup>Assistant Professor, Department of Physiology, MGIMS, Sevagram, Wardha, Maharashtra, India

**Corresponding author:** Dr Vinod Shende, Assistant Professor, Department of Physiology, MGIMS, Sevagram, Wardha, Maharashtra, India

**How to cite this article:** Nitin Gosewade, Amol Drugkar, Vinod Shende. Effect of pranayama and eye exercises on visual acuity of medical students: a case control study. *International Journal of Contemporary Medical Research* 2016;3(4):1133-1136.

ilar socio-economic status were recruited in the study. All the study participants were staying in college hostel having similar eating and sleeping patterns. The study subjects were selected according to following preset inclusion and exclusion criteria.

#### Inclusion Criteria

1. Indian subjects with or without refractory error
2. Both male and female subjects.
3. Subjects in 18-30 years of age.

#### Exclusion Criteria

1. Subjects with colour blindness.
2. Subjects with organic diseases like glaucoma, eye infections, eye injury, malignancy, post surgery for refractive errors, squint.
3. Subjects suffering from medical conditions known to impact cognitive functioning like neurological disorders, head injuries, cardiovascular diseases and diabetes.
4. Subjects not willing to give written consent.

All the participants were briefed in detail regarding the nature of study and written informed consent was obtained from each of them. Study was approved by the Institutional ethics committee.

Two groups were created viz: study and control group. Subjects were divided randomly into two groups; containing 30 subjects (18 male and 12 female) each. Visual acuity values were recorded from all the study participants before starting the study. Participants of study group were taught eye exercises and kapalbhathi pranayama. They performed eye exercises and pranayama 2 times a day for (total one hour) 8 weeks regularly under supervision. Participants from control group were busy with their daily activities without exercise. Visual acuity was recorded from all the participants at the end of 8 weeks to see the effect exercises on vision.<sup>8</sup>

#### Study Procedure

Study group participants practiced the following exercise techniques regularly as per protocol for a period of 8 weeks.

**1. Palming and Visualization with Kapalbhathi:** Warm the hands by rubbing palms over each other. Both the eyes should be covered and closed with the palms to allow the fingers to cross on the forehead. The hands should be cupped to prevent any pressure on eye balls. Person should open the eyes and see if any light is getting in or not. The warmth of the hands along with blocking out all external light, relaxes the pair of tensed eyeballs.

**Kapalbhathi:** Along with palming, subjects need to exercise the diaphragm by exhaling suddenly and rapidly through both the nostrils. Inhalation is automatic and passive process. The air should be exhaled from the lungs with a rapid and forceful inward stroke of the abdominal muscles. The abdominal stroke should be complete and the air should be expelled forcefully. During inhalation, no conscious expansion is required and the abdominal muscles should be relaxed. Exercise should be performed in three phases, each consisting of 20 to 30 strokes a minute. A little rest pause can be taken in between. Throughout the exercise, the thoracic muscles should be kept contracted.<sup>9</sup> Subject need to practice it for 5–10 minute sessions, at least twice a day. If this becomes unpleasant, one can shift palming for a period of 15

breaths, up to 20 times a day. Palming may also help when the eyes become tired and blurred.

**2. Blinking:** Subjects are told to make a routine of blinking regularly, once or twice per 10 seconds. It helps in cleaning and lubricating the eyes particularly in glass and contact lens wearers.

**3. Near and far focusing with Kapalbhathi:** Subject should hold index fingers or two pencils, in front of the face—one should be at 7.5 cm away and other at arm's length. Subject need to focus on one with eyes open, then blink and focus on other. It should be repeated several times whenever opportunity arises. Subjects should practice kapalbhathi pranayama along with focusing exercise.

**4. Shifting with Kapalbhathi:** It is necessary to shift the eyes to avoid eye strain. Staring is harmful for our eyes. One should not stare continuously at an object. Subject need to pretend that he/she is looking at the center of a giant clock with face should be straight ahead. Head should be still all the time, subject has to look as far as possible towards the 12 O'clock position, look for 2 seconds, then move the gaze clockwise at 3' O'clock, then 6' O'clock, then 9' O'clock and back to 12' O'clock position. At every position subject has to hold his/her vision for two seconds and should expire in three bouts with contraction of abdominal muscles. i.e., Kapalbhathi. This cycle should be repeated anticlockwise. Subject has to practice this three times clockwise and three times anticlockwise, alternately.

**5. Splashing:** Every morning subjects have to splash close eyes 20 times first with warm water and then 20 times with cold water. Repeat the procedure in the night by splashing the closed eyes 20 times first with cold water and then 20 times with warm water. This stimulates the circulation of blood.<sup>8</sup>

#### Outcome Measures

##### Acuity of vision

It is the degree to which the details and contours of objects are perceived. We have measured the acuity of vision of all the subjects using Snellen's chart.

**Snellen's chart** – in 1875 Snellen created a new set of chart that used six meters as the standard measurement distance. It is a chart used for testing distant vision which is tested by the ability of the subject to recognize test letters on the chart. The test Block letters which are black on white background are of different sizes. Each line of letters has a figure of 60, 36, 24, 18, 12, 9, 6 and 5 meters noted beside it. The chart is so designed that each letter a normal individual can read at a required distance, subtends a visual angle of 5 minutes. The width of each stroke of the letter being 1 minute and the lines in the letter are also separated by 1 minute of arc. Thus the 'minimum separable' in a normal individual corresponds to a visual angle of approx. 1 minute. If the subject, who stands at 6 meters (20 feet) distance reads the chart with one eye at a time and can read no further than the '24 meters' line, his visual acuity is 6/24. It means a letter which can be read by a normal individual at 24 meters is being read at a distance of 6 meters only. Normal visual acuity is 6/6 or 6/5.<sup>10,11</sup>

Intervention	Right Eye			Left Eye		
	Mean	Std Dev	SEM	Mean	Std Dev	SEM
Before Exercise	34.30	20.28	2.61	34.60	20.08	3.66
After Exercise	30.70	21.89	2.82	30.46	21.62	3.94
P value=0.00 (S)			P value=0.00 (S)			

**Table-1:** Visual Acuity findings in Study group

Intervention	Right Eye			Left Eye		
	Mean	Std Dev	SEM	Mean	Std Dev	SEM
Before Exercise	32.60	20.37	3.71	31.10	19.22	3.51
After Exercise	32.30	20.44	3.73	30.90	19.15	3.49
P value=0.55 (NS)			P value=0.69 (NS)			

**Table-2:** Visual Acuity findings in Control group

## STATISTICAL ANALYSIS

The statistical analysis was done using Data Analysis tool of Microsoft Excel and Systat 12 (Systat Software, Inc. Chicago). The statistical significance was considered at probability value less than 0.05.

## RESULTS

Thirty subjects were enrolled in both study group and control group. Visual acuity in study group in right eye before and after intervention was  $34.30 \pm 20.28$  and  $30.70 \pm 21.89$  respectively. Whereas visual acuity in left eye were  $34.60 \pm 20.08$  and  $30.46 \pm 21.62$  respectively.

In control group the values were  $32.60 \pm 20.37$  and  $32.30 \pm 20.44$  for right eye respectively and  $31.10 \pm 19.22$  and  $30.90 \pm 19.15$  for left eye respectively. Paired t test was applied for statistical analysis. Result suggested that there was statistically significant improvement in visual acuity score in study group participants whereas the results were statistically non-significant in control group subjects. Findings suggest that practicing pranayama and eye exercises helps to improve vision reflected in visual acuity.

## DISCUSSION

In the present study Snellen's chart was used to check visual acuity in normal healthy subjects and to see the effects of pranayama and eye exercises on visual acuity. Results suggested that there was significant improvement visual acuity in subjects practicing pranayama along with eye relaxation exercises as compared with control group.

Our study results are comparable with that of Shirley Telles et al, they studied the visual discomfort in 291 professional computer users before and after yoga, their results suggested that the yoga practice reduce visual discomfort, while the group who had no yoga intervention showed an increase in discomfort at the end of sixty days.<sup>12</sup>

Rosemary Gaddum Gordon, D.B.O, M.A. published the article in 1995 in which he mentioned that: The extra ocular muscles need to be flexible and energized in order to maintain clear accurate focus. As we relax, muscles soften and rest. This allows them to return to their more natural state and move more freely. Vision is a function of both body and mind. Developmentally the eye is an extension of the brain, and it's the mind that sees. As a result of this body-mind connection the eyes only relax fully when the mind is relaxed. The mind relaxes when it is focused on just one thing

at a time.<sup>13</sup> Study conducted by M Ashok Kumar et al on 30 medical students concluded that yoga eye exercises shown objective as well subjective improvement in ocular health of study participants after 6 weeks of exercise.<sup>14</sup>

The extra ocular muscles need to be flexible and energized to preserve clear and accurate focus. As we relax, muscles relax. This enables them to return to their natural state and move freely. Vision is a function of body as well as mind. Developmentally the eye is an extension of the brain, and it's the mind that sees. As a result of this body-mind coordination the eyes only relax completely when the mind is relaxed. The mind relaxes when it is focused on just one thing at a time.<sup>15</sup> Significant positive results of our study are may be due to improvement in blood supply and nutrients to all the extraocular muscles which controls the movements of the eye. A regular exercise of extraocular muscles restores the normalcy of the eyeball in relation to size and shape which is the most important for normal vision.

## CONCLUSION

The results of the present study suggest that practice of pranayama along with eye exercises for 8 weeks improves the visual acuity. In contrast, the control group subjects who had not practiced pranayama do not show any improvement in the visual acuity. It suggests that pranayama along with eye exercises can be used as potential non-pharmacological measure for visual acuity improvement.

## REFERENCES

1. Salibello C, Nilsen E. Is there a typical VDT patient? A demographic analysis. *J Am Optom Assoc.* 1995;66:479-83.
2. Rey P, Maer JJ. Ocular and visual problem. 2007. [Http://www.ilo.org/safework\\_book shelf/English?Content&nd=857170590](http://www.ilo.org/safework_bookshelf/English?Content&nd=857170590).
3. Bali J, Navin N, Thakur BR. Computer vision syndrome: A study of the knowledge, attitudes and practices in Indian Ophthalmologists. *Indian J Ophthalmol.* 2007;55:289-93.
4. Nitin Gosewade, Vinod Shende, Shriniwas Kashalikar. Effect of various eye exercise techniques along with pranayama on visual reaction time. A case control study. *JCDR* 2013;7:1870-1873.
5. Telles S, Navven K, Dash M, Manjunath N. Effect of yoga on self-rated visual discomfort in computer users. *Head Face Med* 2006;2:46.
6. Kraver A. The effectiveness of yoga for the improve-

- ment of well-being and resilience to stress in the workplace. *Scand J Work Environ Health* 2011;37:70-6
7. Telles S, Praghuraj P, Ghosh A, Nagendra HR. Effect of a one-month yoga training program on performance in a mirror-tracing task. *Indian J Physiol Pharmacol* 2006; 50:187-90
  8. Nitin Gosewade, Vinod Shende, Chhaya Saraf, Amol Drugkar. Effect of pranayama and eye exercises on eye to hand coordination: study by finger dexterity test. *Jebmh* 2015;2:7400-7406.
  9. Singh, S., and Singh, J. P. Impact of Pranayama on Fine Motor Coordination Ability of Children with Intellectual Impairment. *Creative Education* 2014;5:273-278.
  10. John M Evans, Newtown, standards for visual acuity, 15 June 2006.
  11. Peter K. Kaiser. Prospective Evaluation of Visual Acuity Assessment: A Comparison of Snellen Versus ETDRS Charts in Clinical Practice (An AOS Thesis). *Trans Am Ophthalmol Soc.* 2009;107:311–324.
  12. Telles S, Navven K, Dash M, Manjunath N. Effect of yoga on self-rated visual discomfort in computer users. *Head Face Med* 2006;2:46.
  13. Rosemary Gaddum Gordon, D.B.O., M.A., The Bates Method of Vision Improvement.
  14. M. Ashok Kumar, A R Rajalakshmi, Monica Kumbhat. Effect of yoga eye exercise on medical college students with refractory error. *JCTMB* 2104;2:16-19.
  15. Taylor, D. Alternative eye care. *Br J Ophthalmol.* 2001; 85:767–768.

**Source of Support:** Nil; **Conflict of Interest:** None

**Submitted:** 25-02-2016; **Published online:** 26-03-2016