

Review Article

Volume 9 Issue 3

July-Sept 2020

ROLE OF YOGIC AND DIET MANAGEMENT IN MYOPIA

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ABSTRACT:

Increased prevalence of myopia has become a worldwide health problem. Progressivity of myopia is increased by digital eye strain. Digital eye strain is a repetitive strain injury and occurs among 70% computer user. Usually it has strain on the extraocular muscle and a decreased of visual acuity. Digital eye strain should be reduced to improve visual acuity. Yoga and eye exercises can improve visual acuity. Goal of this review paper is to know the effect of yoga eye exercise on visual acuity ¹. Myopia is the most frequent cause of distance impairment in the world and is creating an alarming global epidemic with deleterious ramifications for the quality of life and economic health of individuals and nations as a whole. In addition to being immediately disadvantageous, myopia increases the risk of serious disorders such as myopic macular degeneration, retinal detachment, glaucoma, and cataract and is a leading cause of visual impairment and blindness across many countries. The reduction in age of onset of myopia is of great concern since the earlier the onset, the more myopic the individual will become, with all the attendant increased risks of accompanying debilitating eye conditions². The economic burden is great; both in consequences of uncorrected refractive error and also in the provision of devices for correcting visual acuity. Earlier onset of myopia increases the lifetime economic burden related to loss of productivity and independence, leading to a reduced quality of life. Recent data suggest addressing accommodation per se has little direct amelioration of myopia progression ³. Pharmacological interventions that effect changes in the sclera show promising efficacy, whereas optical interventions based on a myopic shift in the retinal image are proving to effect up to 55% reduction in the rate of progression of myopia. Early contact lens and spectacle interventions that reduce the rate of progression of myopia are able to significantly reduce the burden of myopia. These non-pharmacological interventions show profound promise in reducing the overall associated morbidity of myopia ⁴.

Keywords: Myopia, Yoga, Diet & Lifestyle Measures

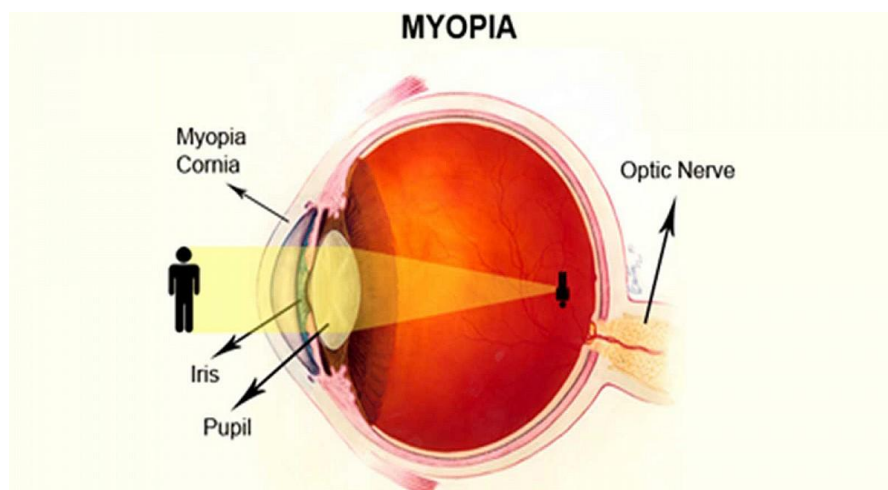
INTRODUCTION:

Myopia is the refractive anomaly of the eye in which the conjugate focus of the retina is at some finite point in front of the eye, when the eye is not accommodating. It can also be described as the refractive condition in which parallel light rays from an object at optical infinity are focused by the eye in front of the retina, with accommodation relaxed. Myopia is derived from the term "myopia" which, in Greek, means to close the eyes. It manifests itself as blurred distance vision, hence, the popular term "nearsightedness⁵." Clear distance vision can be restored by the application of the proper minus power (concave) spectacle or contact lenses or corneal modification procedures in which corneal refractive power is decreased. In some cases of pseudomyopia, unaided distance vision can be improved with vision therapy. Myopia is a highly significant problem, not only because of its high prevalence, but also because it can contribute to visual morbidity and increase the risk for vision-threatening conditions (e.g., retinal breaks and detachment, glaucoma). Because myopia is associated with reduced distance vision without optical correction, it can be a limiting factor in occupational choices. Uncorrected myopia prevents the individual from seeing distant objects clearly. In addition, the posterior segment changes in the myopic eye place it at risk for the development of other ocular conditions ⁶.

Types of myopia:

There are two types of myopia. The first one is simple myopia (which is not considered a visual disease) which is less than 6 diopters. The second one is high myopia, when the patient exceeds 6 diopters, it is then an eye disease.

- Pathologic myopia: Caused by abnormal and extreme elongation of the axial length of the eye that doesn't change (before 6 years old)
- School-age myopia: Occurs between 6-18 years of age. ...
- Adult onset: Early adult is considered 20 to 40 years old; late adult is over 40 years old.⁽⁷⁾



Causes of myopia:

Myopia occurs when the eyeball is too long or the cornea is abnormally shaped and has too much curvature. The cornea is the clear outer covering of the eyeball. Because of these morphological differences, light does not focus correctly when it enters the eye, thus making objects that are distant look blurry. Instead of light focusing on the retina itself, light focuses in front of the retina, and this causes the myopic symptoms. There is a debate whether myopia is hereditary or caused by excessive eye strain, though it is likely due to a combination of the two. Individuals who spend a great deal of time on the computer or reading are more likely to develop myopia ⁸.

What specifically causes the eyeball to grow longer is currently unknown, however we are aware of other factors which can cause myopia. For instance, myopia commonly runs in families so you are more likely to develop it if both sides of your family are short-sighted.

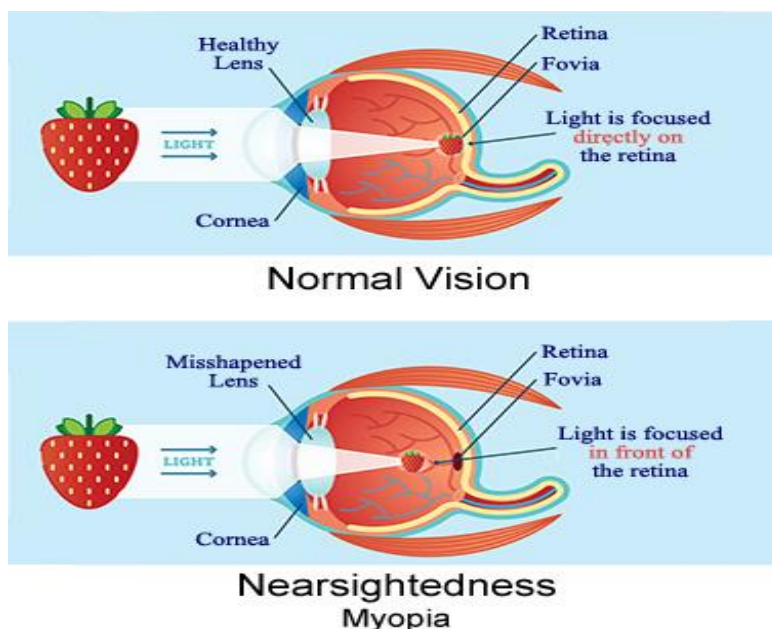
How much time you spend outside and indoors can also affect your eye sight. Spending a disproportionate amount of your time reading, writing, or at a computer can trigger myopia.

Although the contrasts between outdoor and indoor lighting can also increase the degree of myopia during the development stage, so ensuring you have a balance of sunlight and artificial light will help to reduce the strain on your eyes and the degree of myopia ⁹.

The eye condition is also more common in some demographics. For instance, myopia is more common in people with Asian roots. Short-sightedness in older people can actually be an early indication of cataracts. Myopia typically develops around puberty, but its onset can be at any age. As myopia is caused by the eye growing longer, it usually becomes worse as a child progresses into adulthood ¹⁰.

Symptoms of myopia:

- Blurry vision when looking at distant objects.
- The need to squint or partially close the eyelids to see clearly.
- Headaches caused by eyestrain.
- Difficulty seeing while driving a vehicle, especially at night (night myopia) ⁽¹¹⁾



How to diagnose:

Eye doctor can diagnose myopia as part of a comprehensive eye examination. He or she will use a standard vision test and ask you to read letters on a chart placed at the other end of the room.

- A retinoscope shines a special light into your eyes that reflects off your retina. Retinoscopy can show whether a person is nearsighted or farsighted.
- A phoropter measures the amount of refractive error you have. It also helps determine the proper prescription to correct your vision.⁽¹²⁾

Treatment in medicine:

There is no best method for correcting myopia. The most appropriate correction for you depends on your eyes and your lifestyle.

Eyeglasses and contact lenses:

Eyeglasses or contact lenses are the most common methods of correcting myopia symptoms. They work by refocusing light rays on the retina, compensating for the shape of your eye. Eyeglasses can also help protect your eyes from harmful ultraviolet (UV) light rays. A special lens coating that screens out UV light is available.

Refractive surgery:

In many cases, people may choose to correct myopia with LASIK or another form of refractive surgery. These surgical procedures improve your vision by reshaping the cornea. The reshaped cornea focuses light properly onto the retina.

Refractive surgeries for myopia include:

- LASIK,
- Epi-LASIK,
- PRK,
- SMILE, and
- Refractive lens exchange.

Orthokeratology:

You may have heard of a process called orthokeratology to treat myopia. It uses a series of hard contact lenses to slowly flatten the cornea and reduce myopia. It involves sleeping in hard contact lenses every night. This has been associated with an elevated risk of serious, vision-threatening eye infections. Vision improvement is temporary. After you stop using the lenses, your cornea goes back to its original shape and myopia returns.

Low-dose atropine:

Low-dose atropine (0.01%) has emerged as an effective approach to slow the progression of myopia in children and adolescents. You use it daily and recent studies appear promising. It also appears to be safer as it avoids the complications of orthokeratology. Low-dose atropine has been adopted by many pediatric ophthalmologists recently.

There is no scientific evidence to suggest that eye exercises, vitamins or pills can prevent or cure myopia.

Review of literature:

Yoga is a technique of exercise which derived from ancient Indian. This includes changes in diet and mental behavior. It trained body posture (yoga asana), regular breathing exercises (pranayama), joint and visual cleansing exercise, relaxation and meditation ^{13, 14}. Yoga has been known can improve physical and mental health by influencing hypothalamic-pituitary-adrenal axis and sympathetic nervous system ¹³. Some yoga technique like Pranayama, Trataka, and Jala Neti has been suggested to improve vision ¹⁴. Kapalbhathi Pranayama enhances fine motor skill and visual discrimination ¹⁵. Hathayoga method teaches harmonization between body and mind through physic and mental cleansing method. Combination of yoga and relaxation technique can reduce the symptoms of stress and extraocular strain so it can increase visual acuity, eye perception, and blink frequency. Yoga strengthens and prevents the strain of all the extraocular muscles ¹⁶. Extraocular muscles need to be adjusted, strengthened, stretched and rested in order to maintain focus accurately and clearly. When the body relaxed, muscles became soften and relax so it can return to its normal position and move freely. Vision is an important body function same as mind since eye was brain expansion. As the result of body and mind connection, eye will be relaxed when the mind relaxed. Mind relaxed when it only focus on one thing at a time ¹³.

Yogic management for Myopia:

Shirshasana can be the best remedy for all such issues of eyes. It has such a tremendous value that it can't be replaced for the treatment of the eyes. We can say that it's peerless practice for better eyes. It helps to rejuvenate the nerves of the eyes. Shirshasana is good asana for people with short-sight.

The practice of eye rotation, direction, and various movements helps to strengthen the eyes and its vision. It's regarded highly important to apply the practices of directed gaze. Especially, yogic science approaches three types of directed gazes; Trataka, Nasagra, Bhramadhya.

For therapeutic purpose, the asanas can be practiced for four times in a day not exceeding more than ten minutes. Palming and blinking can be very helpful for the eyes. For the quality of the eye-sight, the point situated at the bottom of the index and thumb of both hands can be pressed for five minutes in a day.

Jala Neti also is a good practice to perform for the better vision of the eyes as it takes out the infection from throat, sinuses and nasal tract reducing the strain and congestion in the eyes.

Dhanurasana, Tadasana, Paschimottanasana, Halasana, Sarvangasana, Shirshasana, Padmasana, Shavasana, Nadi-shudhi pranayama, Kapalbhati kriya these all yoga practices effective in myopia.

Trataka kriya:

- Sit in meditation pose in front of a candle. Place the candle about an arm's length away from you with the wick of the candle at the same height as your chest. If the candle is placed too high, it can create tension at the eyebrow centre, or produce a burning sensation in the eyes. The flame should be still and not moving in a draft. Close your eyes. Mentally repeat your Mantra as in meditation.
- Open the eyes and look at the flame without blinking. The flame has three zones of colour. At the base of the wick is a reddish colour, in the middle it is bright white and at the tip it is slightly smoky. Concentrate on the upper part of the flame where it is brightest.
- Close the eyes again. If the image of the flame appears within, gently concentrate on that image without creating any tension. Try not to pursue or hold onto the image, otherwise it will fade and disappear.
- Repeat the practice 3 times.
- The practice time should gradually build. In the initial stages, look at the flame only for about 10-15 seconds. Slowly increase this time, so that after about one

100

year you can look at the flame for 1 minute and then concentrate on the inner image with closed eyes for about 4 minutes. Under no circumstances should this recommended length of time be exceeded.

- One may also practice Trataka while looking at a white point on black paper, or at a black point on white paper. When one concentrates on a white point, one sees this as a black image when the eyes are closed and vice versa with a black point.

Benefits:

Purifies the eyes, strengthens the eye muscles and improves vision and memory. Helps with sleeping difficulties and bedwetting. Strengthens the ability to concentrate and is therefore recommended for school children. Develops intuition, the ability to visualise and willpower.

Caution:

This exercise is not suitable for people with psychic problems. Those who have a tendency towards Schizophrenia or hallucinations should not practice Trataka.

NECK EXERCISE:

- Sit with the back straight. Turn the tongue inside towards the throat and touch it against the upper palate.
- Bend the head downwards, and press the chin to the chest, then head up looking backwards. Inhale when the head moves upwards, and exhale when the head moves downwards. Do it four to five times.
- Very slowly rotate the head first on the right side, and then on the left side. Inhale deeply when the neck moves on the right side and comes in the line of right shoulder, and exhale when it returns to front side position. Inhale when it moves on the left side, and exhale when it returns to front side gradually. Repeat this exercise eight to ten times; that is, four to five times each side. Now, relax the neck.
- Thereafter, bring the right ear up to the right shoulder, and then the left ear to the left shoulder. Repeat this exercise eight to ten times, in total; that is, four to five times each side. Now, relax the neck.

- Now, rotate the head and neck from right side. In this – tilt the head first on the right side, then on the back side, then on the left side, and in front last. This would complete one rotation. Repeat four to five times very gently and without any stress. Do it in the reverse direction; also that is; starting it from the left side. Repeat four to five times without hurrying.
- Rub the hands and massage the neck, with warm hands, nicely.

You can do shoulder rotation and arm rotation exercises, also, to remove stress from the shoulders and arms. Do clockwise for eight to ten times, and then anti clockwise for eight to ten times.

YOGA-NIDRA AND MEDITATION:

For better eye care, include deep relaxation (Yoga-nidra) in the practice routine. Practice of Yoga-nidra and Meditation, gives rest to the eyes and increases their working capacity.

MEDITATION AND VISUALIZATION:

Slowly, concentrate your awareness on your eyeball, and create its mental picture. If you are myopic, tell your eyes to contract enough to allow the image to coincide on the retina. If you are long-sighted, tell your eyes to elongate enough to allow the image to coincide on the retina. Supplement your visualization with some catchy affirmation, such as: “My eyes perform better than the best automatic cameras I have ever known.” Practice this visualization; meditate at least for 15-20 minutes twice a day.

PRANA MUDRA FOR INCREASING EYE SIGHT:

Touch the tips of the little finger, and ring finger, by the tip of the thumb. Rest two fingers; that is, the index and middle finger should be straight. Perform Prana Mudra for at least 15 to 30 minutes. Practice regularly for better vision.

BLINKING:

- Practice deliberate blinking for five full minutes any time of the day.
- Squeeze gently under the eyes before going to sleep.
- Roll the eyes in the socket clockwise and anti-clockwise.

PALMING:

- Rub both palms together, quickly, for 10 seconds. This friction creates mild heat. Close the eyes, and gently place the left palm over the left eye and right palm over the right eye. Do not apply pressure with the palms, but just let them gently rest. Breathe in and out slowly to release stress. Repeat this 2-3 times.
- Sit comfortably in a chair, in front of a table, and stay relaxed. Close your eyes. Cup your right palm and shield the right eye with it. Cup your left palm and cover the left eye with it. Let the fingers of both hands meet on the forehead. Rest the elbows on the table and keep yourself completely relaxed. Look only at the darkness without opening the eyes. Let your mind also relax for some time. Sit like this for five minutes at a time, at least thrice a day.

Management through diet:

People suffering from myopia should include calcium, fluoride, selenium, magnesium, chromium, vitamin D and vitamin C in their diet ¹⁷.

Yogurt, milk, baked beans; cottage cheese should be included in the regular diet.

Fluoride:

Eating a diet rich in green leafy vegetables, fresh fruits can help improve overall health. Fresh fruits and vegetables contains fluoride.

Magnesium:

Almonds, avocados, brown rice, cashew, lentils, peanuts, spinach and whole wheat bread provide magnesium which is excellent for nearsightedness.

Selenium:

Barley, Brazil nuts, Broccoli, Brown rice, Chia seeds, Flax seeds, Mushrooms.

Chromium:

Chromium preserves balanced intraocular eye pressure. Sources of chromium are onions and tomatoes, wholegrains (wholemeal and rye bread and oats), black pepper, cabbage, broccoli, romaine lettuce, peaches, celery, bananas and apples (especially the peel)

Vitamin D:

Vitamin D provides and improves overall corneal health. Vitamin D is easy to obtain by eating plenty of tuna, fortified milk, fortified orange juice, yogurt cheese etc.

Vitamin C:

Fruits and vegetables are rich in Vitamin C. Vitamin C in packed fruits, vegetables ,strawberries , broccoli, sweet green and red peppers and tomatoes.

Multivitamin supplements are also good for eye health.

Diet plan:

Morning – lemon water (lukewarm) with two teaspoons honey.

Breakfast – Have munacca (Dry fruit) (10-15 no.) and figs (2-4 no.); they should be soaked overnight in water in a glass container after being cleaned thoroughly. They should be taken along with the water, in which they were soaked. Chew well. If you are still feeling hungry, then after half an hour gap, take seasonal fruit, such as mangoes, banana, apple, apricot, and papaya – all red and yellow colored fruit. Eating one variety of fruit each time is very beneficial.

Lunch – Chapattis of wheat flour with extra bran + seasonal vegetables (lauki, broccoli, cabbage, carrot, drumsticks, cauliflower, spinach, salad) and curd.

Evening – Carrot juice, vegetable soup, lemon water honey

Dinner – Same as lunch or Dalia (Broken Wheat)

Inflammatory foods to avoid that may worsen existing health conditions and damage your eyes include:

- Any food allergies you have (such as gluten, dairy or nuts)
- Processed grains
- Refined vegetables oils
- Foods sprayed with lots of pesticides (non-organic crops)
- Fast food
- Processed meats

- Foods with added sugar
- Too much caffeine and alcohol

Sun bath or exposure to sun:

Natural sunlight may also provide important cues for eye development. Too little sunlight can interfere with sleep, moods, energy and vitamin D levels, all of which can take a toll on overall health.

Try to spend some time each day outdoors where you don't need to focus your eyes so much. Take a 20 minute walk; play with your kids, garden or do lawn work, or find another way to de-stress outdoors. While spending some time in the sun is important for preventing vitamin D deficiency, too much direct sunlight reaching your eyes can worsen eye strain. If you spend many hours outside in the sun, protect your eyes by wearing sunglasses that block UV radiation and/or a hat. You should also wear protective eyewear while working with chemicals, playing contact sports, doing yard work that can cause chemicals to get into your eyes, or when working with metal shavings or wood.

Limit Eye Strain:

Limiting your daily exposure to computers, phones, and other devices that give off blue light and force your eyes to focus. While working and reading, increase the amount of light so your eyes have an easier time making out objects. Take a break from near-vision tasks at least every 20 minutes and spend time looking at far away distances. You can also relax your eyes by closing them, doing eye exercises, walking outdoors, napping, or doing something relaxing like yoga or stretching.

Quit Smoking & Reduce Inflammation:

Inflammation is the root cause of many diseases, including those that negatively impact eye health. Decreasing alcohol consumption, quitting smoking and not taking any unnecessary medications, eating a healthy diet and exercising are the lifestyle choices that can greatly decrease your cataract risk.

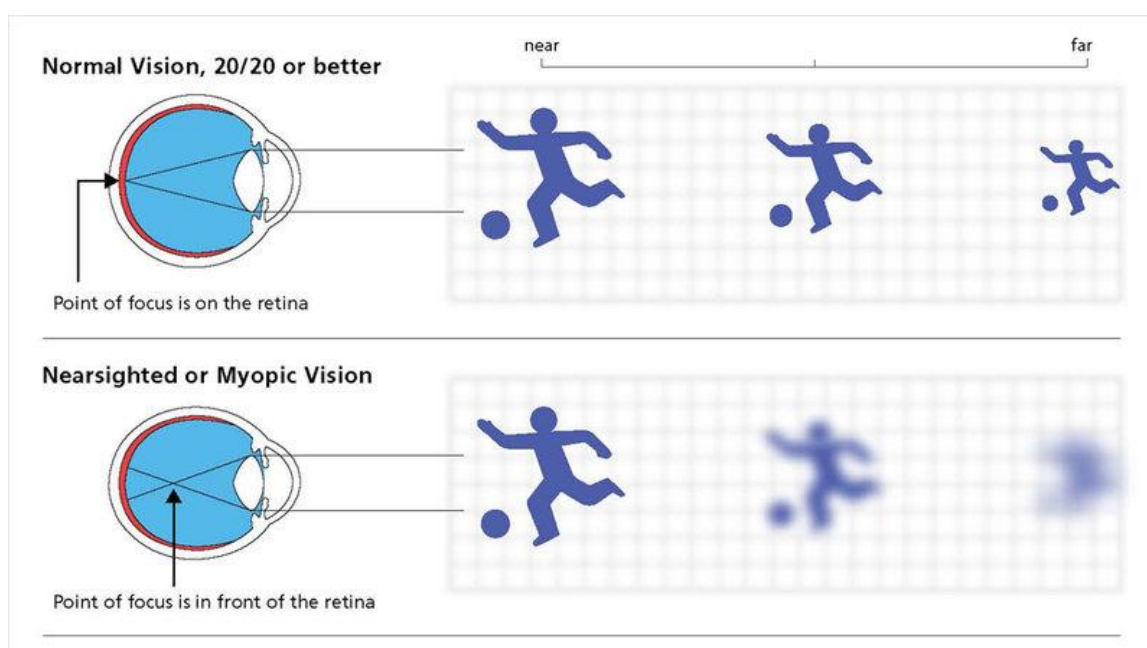
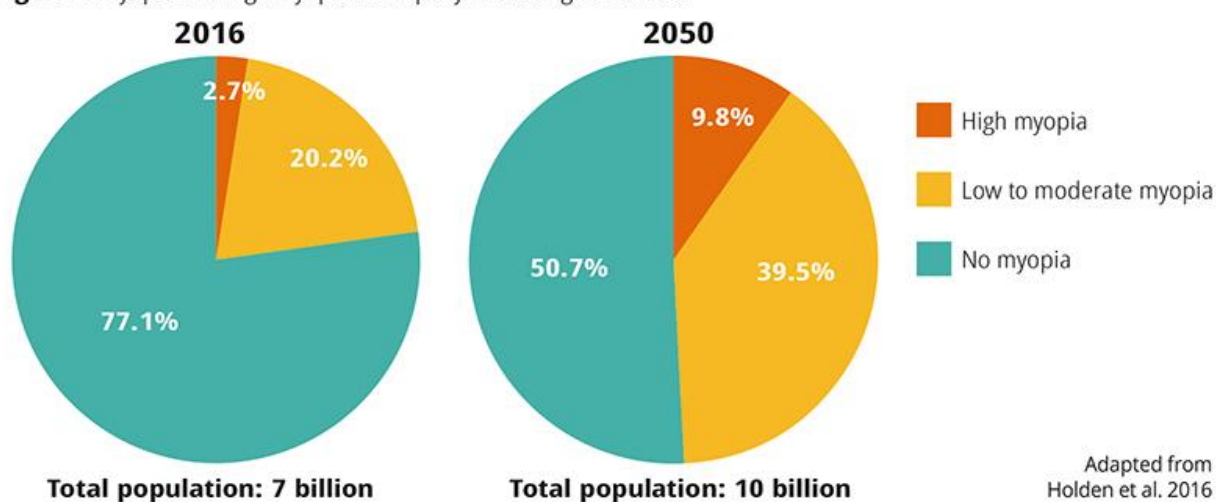
Treat Dry Eyes, Discomfort & Headaches Naturally:

Myopia might be accompanied by symptoms like dry eyes, pain due to squinting, redness and discomfort. Drink plenty of water, make sure to cleanse your contact lenses properly each day, wash your hands before touching your eyes and take breaks from focusing on close-up images.

Exercise & Stay Physically Active:

Exercise is one of the best ways to naturally boost blood flow and control inflammation. This can include walking, cycling, gardening, dancing, listening to podcasts or audio books, or even cooking and cleaning your home.

Figure 1 Myopia and high myopia are rapidly increasing worldwide



Preventive measures of myopia:

- Have your eyes checked. Do this regularly even if you see well.
- Control chronic health conditions.
- Protect your eyes from the sun.
- Prevent eye injuries.
- Eat healthy foods.
- Don't smoke.
- Use the right corrective lenses.
- Use good lighting.

Precautions:

Myopia is usually not a dangerous or very serious condition to treat. Normally it won't result in serious complications and can be treated effectively with corrective eyeglasses, contact lenses or surgery. If you have any disease that puts your vision at risk, visit your doctor if you notice symptoms worsening. Always report to your doctor any vision related problems, including astigmatism, hyperopia, cloudy vision, burning, headaches and floating spots.

Research findings:

Yoga has been proven to improve the symptoms which occur due to the use of the computer for hours. Yoga practiced for 60 days will reduce uncomfortable feeling of the eyes on 291 computer users. Yoga practiced for 6 weeks is effective to overcome emotion and stress among workers. It increased blood circulation and nutrition to both eyes so improve the health of the eyes. This will relax the extraocular muscle and return the original shape of the eyeball that is important for normal vision. According to research conducted by Kim, to undergraduate nurses that practiced yoga for 8 weeks, two times daily showed a reduction in extraocular fatigue ¹⁸. Bansal conducted a clinical trial research on 60 myopia patient (-6.00 D) aged between 8 to 30 years old. Each patients had accompanying symptoms as blur distance vision, difficult to change focus from far to near and vice versa, headache, eye pain, watery, strain and heavy eye. They were divided into two groups. The first group was given Saptamrita Lauha meanwhile yoga was for the other group. Bansal did not find any enhancement in visual acuity

although there was a reduction of accompanying symptoms, especially on yoga group. Yoga can relax the mind and mental, increase blood circulation and oxygen supply, brain function and strengthen the extraocular muscles ¹⁹. Mohammed SAAR, found an increase in visual acuity of 15 female students in Saudi, aged 12-15 years old which suffered myopia. They were given eye exercises program for six weeks, which was conducted at school and home. Palming, swinging and central fixation techniques were performed at school while looking into the forehead, nose, right shoulder and left shoulder with fixed head were done at home. Palming and swinging techniques were performed with glasses. Each exercises technique at school done for one minute and repeated three times with break interval 30 seconds between each. Total time required was 13-15 minutes. Technical exercises at school carried out twice a week, on Sunday and Tuesday. At home, technical exercises done for half a minute followed with half a minute break. Break interval conducted with closed eyes then warmed them by rubbing the palm and put them in front of the closed eyes. Home exercises were done twice a day, before learn and sleep, without glasses. Each technique carried out for one minute, repeated three times with 30 seconds break interval ²⁰. Insignificant improvement of visual acuity, accommodation and convergence reserve has been found on research done by Ciumbaite et al., on 15 children age 9 to 18 years old with myopia or pseudomyopia. Those children were given eye exercises for two weeks (ten days) ²¹. The extraocular muscles trained by stretching the eyes (move eyes as far as possible with fixed head). There are six steps to stretch the extraocular muscles, that is: moved the eyes from right to left, top to bottom, upper right to lower left, upper left to lower right, make a circle clockwise and counterclockwise until eyes are a little bit tired. On the sixth step, tightly closed the eyes then opened them again. Next, moved the eyes and look at the base of the nose. Then on the final step, moved the focus of the eyes from near to distance object and so on. Each step is repeated for 10 times, three times a day in four weeks without using glasses ²². Kang MT has been reported an increase in visual acuity due to the exercise of the extraocular muscle. He concluded that good quality practice of the extraocular muscles in children will delay myopia progressivity ²³. Yoga Eye Exercise According to researched by Gosewade et al., there is a significant increase of visual acuity on patient who was doing Pranayama Kapalbhathi together with eyes relaxation exercises ²⁴. The following is yoga eye exercise with Pranayama Kapalbhathi

techniques: ^{24, 25} Palming and visualizing with Kapalbhathi, blinking, near and far focusing with Kapalbhathi, shifting with Kapalbhathi, splashing. Researched conducted by Harnookar and rukmani on 30 subjects aged 15-25 years old who suffered low-grade myopia (-0.25 D to 2.00 D). They were divided into three groups. Ayurvedic is for the first group while the second group is practiced the extraocular muscles in 15 minutes along with yoga and Ayurvedic and extraocular muscles practiced in 15 minutes along with yoga are for the last group. The therapy gave for eight weeks to each group. The results obtained an enhancement in visual acuity and reduced of other visual symptoms especially in the last group. Yoga and eye exercises practiced can improve extraocular muscles tone ²⁶. Practiced of extraocular muscles has been done on 177 myopia patients aged between 4 to 56 years old. These include stretching, stimulating and relaxing with yoga and meditation. This method requires concentration and relaxation. Things that are trained such: eye focus, imagination, eye movement and relaxation (splashing, palming, vapor and cold pack). The practiced include sunning, swaying, swinging, shifting and palming. Practiced should be done for one hour, twice daily (morning and evening). On relaxation phase, the patient asked to focus on counting to ensure the mind was calm. Lekshmi concluded that early detection and relaxation practiced of the extraocular muscle should increase visual acuity in both eyes significantly so it is very effective for myopia patient ²⁷.

CONCLUSIONS: In this literature, we found some critical analyses of the effects of eye yoga exercises on eyesight. Some studies deny every form of improvement in this field. However, the results of our study and the evidence found in literature testify the effectiveness of improvements. Some more studies would be useful to determine the efficacy of yoga training – both short- and long-term – on visual abilities, on refractive errors, on presbyopia, and on most serious eye pathologies. Further research is needed to know the magnitude increase of the visual acuity after yoga eye exercises. It is an encouraging finding that a non-pharmacological, low cost, relaxation technique can improve the quality of vision, by which it indirectly checks the progression of the disease condition. Hence one should adopt pharmacological interventions (medical management), life style, yoga and diet modifications to get a better result.

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