Effect of *jala neti* (nasal irrigation) on refraction in myopic adolescents - A study protocol for a randomized controlled trial

BOOSHNASANDIRACALA[1], GAYATHRI ANNAMALAI[2], KUMARESAN POORNACHANDRAN[3], RADHIKA HEMACHANDRAN[4], SUBASH STALIN THOTHATHIRI NATHAN[5], MAHAALEXSANDER RAMANATHAN[6], NAVEENA ARUMUGAM[7]

[1, 5]*MD scholar, Department of Yoga, International Institute of Yoga and Naturopathy Medical Sciences, Chengalpattu, Tamilnadu*

[2, 3]*Faculty, Department of Yoga, International Institute of Yoga and Naturopathy Medical Sciences, Chengalpattu, Tamilnadu*

[4]*Faculty, Department of Bio-chemistry, Government Yoga and Naturopathy Medical College, Arumbakkam, Chennai*

[6]*Naturopathy Physician, Yani Nature Cure and Yoga Hospital, Tamilnadu*

[7]*Yoga and Naturopathy Consultant, Southern Railway Headquarters Hospital, Perambur, Chennai*

Abstract— Background: Myopia, a growing public health concern among school-age children, can lead to uncorrectable visual impairment and increased risk of serious ocular conditions like posterior staphyloma, retinal degeneration, and glaucoma. This present study was planned to evaluate the impact of a Jala neti practice on Refraction in Myopic Adolescents.

Methods: A total of 80 adolescents, aged 10-19 years, diagnosed with myopia [spherical equivalent (SE) less than -4.00 diopters] using photo refractor and autorefractor devices, will be enrolled in this randomized controlled trial. Participants will be randomly assigned into two groups. An intervention group subjects will practice jala neti for 5 sessions per week for 8 weeks. and there will be no jala neti practice in control group subjects. Baseline and post assessments of myopia severity (SE, axial length) will be assessed for all participants using the photo refractor and autorefractor and ocular discomforts using Ocular Discomfort Analog Scale (ODAS).

Results: Data will be analyzed using Statistical Package for Social Sciences (SPSS), version 16. In this study, we will consider p (probability) value of < 0.05 is statistically significant. Data will be represented in bar diagram using mean value of dependent variable.

Conclusion: The present randomized controlled trail may have significant changes in spherical equivalent and cylinder power in adolescents with myopia. Hence, jalaneti could be a beneficial adjunct therapy to current myopia management strategies.

Index Terms- Yoga, Kriya, Jale neti, Nasal irrigation, Myopia, Refractive errors

I. INTRODUCTION

Myopia, or near-sightedness, occurs when the accommodation of the eye is in relaxed state, causing light from distant objects to focus in front of the retina. This can be caused by a lengthy eyeball or high refractive power [1]. Myopia affects 27% of the world's population and it can be 30% by 2050 [2]. Hot spots include East and South East Asia, with the USA reporting a 42% prevalence, doubling in three decades [3].

Myopic disc tilt is an anatomical alteration seen in individuals with high myopia, where the optic disc appears obliquely inserted, typically with a vertically oval shape [4]. Myopic astigmatism is a refractive condition where the eye exhibits both near-sightedness (myopia) and an irregular curvature of the cornea or lens (astigmatism), leading to multiple focal points in front of the retina and resulting in blurred or distorted vision [5].

Myopia patients can use eyeglasses, contact lenses, corneal refractive therapy and orthokeratology treatment, LASIK procedures, and vision therapy [6]. *Jala Neti* is a traditional *yoga* method that entails nasal irrigation with warm saline water. It comes from ancient Indian yogic practices and helps cleanse nasal passages and sinuses, hence improving respiratory

function and general wellness [7]. This comprehensive technique not only improves respiratory function, but it also benefits eye health and cognitive clarity [8,9].

The procedure improves blood circulation and nerve activity in the face area, which can result in sharper vision and relief from typical eye problems including dryness and discomfort [7,9]. By increased circulation, it nourishes ocular tissues, thereby reducing strain and enhancing vision and maintain their health [7]. It reduces sinus pressure, which can cause eye strain and discomfort, and stimulates nerve endings in the nasal passages, which are connected to the ocular region [7]. Allergies and sinusitis can exacerbate eye conditions, but *Jala Neti* helps alleviate these effects. It also detoxifies the nasal passages, reducing the overall inflammatory response [10]. The practice promotes relaxation and stress relief, which can positively affect eye health [8]. In yogic philosophy, *Jala Neti* is believed to enhance the flow of prana, which is associated with overall health, including eye health [7]. The study aims to evaluate the effectiveness of *Jalaneti* and to determine if regular practice can enhance participants' visual acuity. Currently, there are no specific studies indicating that Jalaneti might help improve myopia. Additionally, the study will measure changes in the spherical equivalent (SE) and investigate any other potential benefits of Jalaneti for overall ocular health.

II. MATERIALS AND METHODS

The present study will be a randomized controlled trial, Participants will be recruited from private school Chengalpattu, Tamil Nadu. The study is planned to start from August 2024 and completed by September 2025. Institutional ethical committee (IEC) approval from the institute has been taken, vide letter numbers Ref.N0.446/ME-II/2023. The clinical trial registration CTRI/2023/11/059787.

Sample size

The sample size calculation will be done on the feasibility and availabilities of the patients.

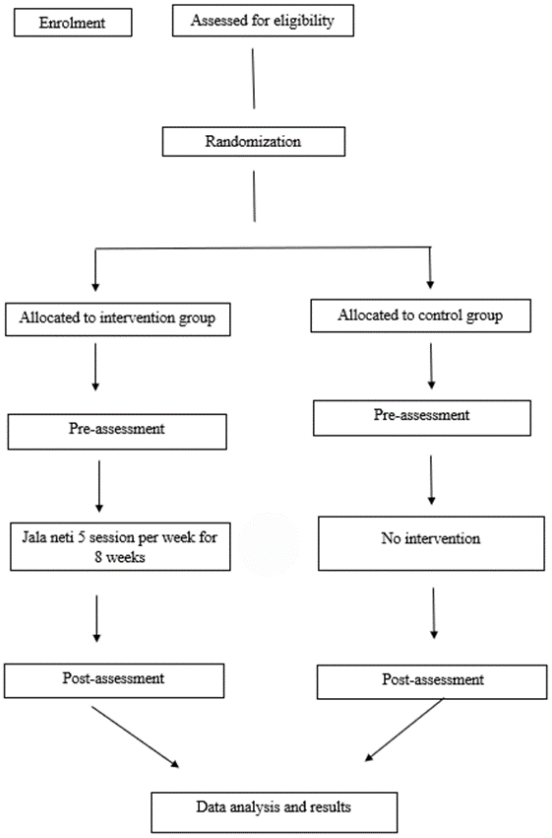

Figure 1: Illustration of the Trail Profile

Randomization and blinding

All the subjects will be randomly allocated to either a subject or a control group (1:1 ratio) using computerized randomization. Random concealment will be done using SNOSE (Sequentially numbered, opaque, sealed envelope) technique. The participants will not be blinded to the study and control group.

Selection of participants

Inclusion criteria

Subjects diagnosed with Myopia with Refractive Error with both spherical and cylindrical power up to -4 (Dioptric Power), 10-19-year age group both male and female student with Blurring of vision will be included.

Exclusion criteria

Participants with Epistaxis, Nasal polyps, underwent recent Nasal Surgery, Congenital Myopia and Pathological Myopia will be excluded [7].

Intervention

Study Session

Before the trial, the study participants will attend one-day orientation programme. *Jalaneti* requires a special *neti lota* with a nozzle designed to fit into the nostril, filled with warm saline water. Stand with legs apart, lean forward, tilt head to right side, place lota's nostril in left nostril, open mouth slightly, and let water pass out through right nostril. Repeat it on the other side. Post practise, *kapalabahti* (frontal brain cleansing) should be done for the clearance of the nasal passage to drain any stagnated water. The study group will practice *jalaneti* 5 days per week for a period of 8 weeks [7,9].

Control session

Control group will be given no intervention. Control group will be asked to rest in supine posture. After the waiting period, the yoga (*jalaneti*) will be provided [7].

Outcome Variables

Primary outcome variables

Refraction is measured using 2 methods, namely phoropter – subjective method, auto refractor – objective method

Phoropter

Phoropter is a device that measures refractive errors and it can be used for myopia assessment. The phoropter aids in determining "refraction," or how uniquely curved and shaped a lens must be to correct your vision to as near to 20/20 as feasible [11].

Auto refractor

An auto-refractor is an instrument that helps in the automated assessment of refraction. It is a computer-controlled machine used during an eye examination to provide an objective measurement of a person's refractive error and prescription for glasses or contact lenses [12].

Secondary outcome variables

Ocular Discomforts is measured using Ocular Discomfort Analog Scale (ODAS). It includes seven questions about the following symptoms: photophobia, eye dryness, foreign body sensation, burning or stinging, blurred vision, and ocular fatigue. Symptom severity was measured on a scale of zero to 70, with scores of 0-10 for each category [13].

Statistical Analysis

Data will be analyzed using Statistical Package for Social Sciences (SPSS), version 16. In this study, we will consider *p* (probability) value of < 0.05 is statistically significant. Data will be represented in bar diagram using mean value of dependent variable.

DISCUSSION

Myopia therapies like Corneal Refractive Therapy and Orthokeratology treatment, LASIK procedures have adverse effects, prompting many patients to seek alternate solutions [14]. Traditional yogic text like *Gheranda Samhita* and *Hatha Yoga Pradipika* describes *shatkarmas* (six cleansing procedure procedure), which are: *Dhauti*(internal cleansing), *Basti*(yogic enema), *Neti*(nasal cleansing), *Trataka* (concentrated gazing) , *Nauli* (abdominal massaging) , and *Kapalabhati* (frontal brain cleansing) [15]. Among other *shatkarmas,* neti (*jala* and *sutra*) would be the initial cleansing procedure to clear the upper respiratory tract [7,15]. Recent study shows that *neti* can improve eye-sight/vision and eliminate excess mucus in the sinus cavities [16]. Another research study concluded that *jala neti* can improve the optic nerve conduction [17]. They have hypothesized that *neti kriyā* alleviates sinus congestion and stimulates nerves from the ethmoid bone to the olfactory bulb by flushing the nasal canal with water [16,17]. This process activates the autonomic nervous system, influencing the optic nerves and associated organs such as the eyes and post-retinal nerves. It may also can restore normal optic nerve conduction velocity, stimulate optic nerve endings in the eyes [17]. Regular practice of *jala neti* can rectify uneven curvature and axial length of the eye, particularly in adolescents. Earlier study shows that *jala neti* can improve optic nerve conduction velocity. This stimulation of optic nerve can improve the optic disc tilt. If this current study shows improvement in refractive errors means, that can be mainly due to changes in the optic disc tilt and eye ball length or curvature of eye. However, previous research has not explained the particular mechanism by which *jalaneti* enhances refractive power. There is no specific study that suggests *Jala Neti* can aid with axial or refractive myopia. However, the exact mechanism of *jalaneti* affecting myopic eye is not known and to ruled out by further studies.

REFERENCES

[1] Mutti DO, Sinnott LT, Mitchell GL, Jones-Jordan LA, Moeschberger ML, Cotter SA, et al., Relative peripheral refractive error and the risk of onset and progression of myopia in children. *Investigative ophthalmology & visual science*. 2011;52(1):199-205.

[2] Holden BA, Fricke TR, Wilson DA, Jong M, Naidoo KS, Sankaridurg P, et al. Global prevalence of myopia and high myopia and temporal trends from 2000 through 2050. *Ophthalmology*. 2016;123(5):1036-42.

[3] Grzybowski A, Kanclerz P, Tsubota K, Lanca C, Saw SM. A review on the epidemiology of myopia in school children worldwide. *BMC ophthalmology*. 2020; 20:1-1.

[4] Jonas JB, Jonas RA, Bikbov MM, Wang YX, Panda-Jonas S. Myopia: histology, clinical features, and potential implications for the etiology of axial elongation. *Progress in retinal and eye research*. 2023; 96:101156.

[5] Gwiazda J, Grice K, Held R, McLellan J, Thorn F. Astigmatism and the development of myopia in children. *Vision research*. 2000;40(8):1019-26.

[6] Lipson MJ, Boland B, McAlinden C. Vision-related quality of life with myopia management: a review. *Contact Lens and Anterior Eye*. 2022;45(3):101538.

[7] Saraswati SN. *Gheranda samhita*. *Yoga Publication Trust*, Munger, Bihar, India. 2012;32:81., chapter.1, page:135 - 140

[8] Meera S, Rani MV, Sreedhar C, Robin DT. A review on the therapeutic effects of Neti Kriya with special reference to Jala Neti. *Journal of Ayurveda and integrative medicine*. 2020;11(2):185-9.

[9] Muktibodhananda S. Hatha yoga pradipika. Shatkarma and pranayama: chapter 2, verse 30. Page: 206 & 207

[10] Gusain VS. Physiological Effects of Selected Shatkarma. *National Journal of Hindi and Sanskrit Research*. 2019;1(24):53-5.

[11] Alvarez M, Benedi-Garcia C, Concepcion-Grande P, Dotor P, Gonzalez A, Chamorro E, Cleva JM. Early Detection of Refractive Errors by Photorefraction at School Age. *International Journal of Environmental Research and Public Health*. 2022;19(23):15880.

[12] Pandey R, Samuel AJ, Aranha VP, Pandey A, Narkeesh K. Non-pharmacological therapies for primary open angle glaucoma: A quasi-experimental pilot study. *Saudi Journal of Ophthalmology*. 2017;31(2):95-8.

[13] Kang JW, Chun YS, Moon NJ. A comparison of accommodation and ocular discomfort change according to display size of smart devices. *BMC ophthalmology*. 2021; 21:1-9.

[14] Brennan NA, Toubouti YM, Cheng X, Bullimore MA. Efficacy in myopia control. Progress in retinal and eye research. 2021;83:100923.

[15] Gaglani N, Dave N. A comparative study of shatkarma acording to gheranda samhita and hatha yoga pradipika. *Vidya-a journal of gujarat university*. 2023 25;2(1):216-23.

[16] Wang YH, Yang CP, Ku MS, Sun HL, Lue KH. Efficacy of nasal irrigation in the treatment of acute sinusitis in children. *International journal of pediatric otorhinolaryngology*. 2009;73(12):1696-701.

[17] Kumar K, Sharma C, Kumar A. Effect of "*Jala Neti*" on Optic Nerve Conduction Velocity. *Yoga Mimansa*. 2010;42(1):34-9.