



An Apparatus for Anulom –Vilom Pranayama

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ABSTRACT

It is unfortunate enough that many people cannot enjoy normal living in this world due to one or more physical disabilities. At the same time, ethically they have equal rights to live independently with dignity. In order to assist them with respect to their type of disability, several electronic gadgets have been developed. The objective of this invention is to develop a device that enables individuals to practice Anulom-Vilom breathing exercises independently, without manual support, while preserving the traditional technique. This innovation aims to make the benefits of Anulom-Vilom accessible to a wider audience. This paper presents the development of an automated Anulom Vilom Pranayama apparatus, designed to make this beneficial yoga practice accessible and affordable for all, including people with disabilities. The equipment will be made with portable parts for better handling. It is designed for easy adaptation and programming is not necessary. The equipment is particularly useful for handicapped persons, showing significant efficacy. The device incorporates a one-way valve with an in-built electronic switch, allowing for automated switching between inhalation and exhalation. The electronic switch controls airflow, simulating the traditional Anulom Vilom Pranayama technique. The equipment categorized in three levels. First will decide the flow of air in one direction Second part of the system will switch the air flow from inhale to exhale and vice-versa. It also generates the pulses while inhaling and exhaling. The third part of the unit will decide the switching of air flow. The apparatus has potential to reduce stress, promote relaxation, improve overall well-being, enabling this a valuable tool for public health and quality of life.

KEYWORDS

Electromagnetic device, one-way valve, four-way electromagnetically operated pneumatic valve, Anulom-Vilom pranayama: Yoga

1. Introduction

Anulom-Vilom Pranayama is breathing exercise which comprises inhaling through one nostril and exhaling through other. This technique is also referred to as alternate nostril breathing, where breath is channeled through each nostril alternately [1]. Pranayama is a yogic breathing practice, Prana means breath and Ayama means stretching or expansion. Pranayama consists of three phases: First phase is of inhalation (puraka), second one involves retention of air within (kumbhaka) and third phase is of exhalation (rechaka) which can be either fast or slow. It includes different breathing patterns and each pattern has specific effect on stimulating afferent pathways [3] [4]. Modern physicists have approved pranayama as beneficial breathing method for treatment of patients with depression, back pain, arthritis, cardiac disorders, other conditions. One of the exercises included is Anulom Vilom i.e Alternate nostril breathing, which is simple and easy for practice at home [5]. Katriya et al.2024 explained the procedure for Anulom- Vilom (Alternate nostril breathing) where subjects or persons are asked to sit erect with closed eyes and mouth, relax for 5 minutes. After that, they are instructed to use their right thumb to close their right nostril, inhale through their left, and later use their middle and ring fingers to close it. They are instructed to take their thumb out of their right nostril and exhale through this, simultaneously. Later procedure is repeated for inhalation through right nostril closing left nostril and exhaling from left nostril. This is the protocol for one full round which is asked to repeat continuously for duration of 10 minutes [2]. It's an ancient method believed to balance the flow of energy through the body, to improve respiration, reduce stress, and restore overall health, strengthening the respiratory system, enhancing mental focus and concentration, boosting immune function and well-being[3][4]. Traditionally, it is performed by manually blocking airflow between the nostrils using the fingers. It, however, makes it difficult for handicapped people, those who have limited hand movements and those who want a consistent and friendly method of practising. To overcome the aforementioned limitations, we can prepare quality equipment for Anulom-Vilom pranayama which will be very easily accessible with low cost for all the people in society including handicapped people.

So, equipment for Anulom-Vilom apparatus has been designed to provide a contemporary and novel way of executing this ancient technique. The apparatus equipment utilizes electromechanical elements, including one-way valves, a four-channel air distribution system, and counter mechanism to facilitate the alternating airflow between nostrils. The mechanism ensures proper and accurate performance of the breathing pattern, while prioritizing user comfort and accessibility. The main advantage of this hands-free system is for people who cannot use their hands during the practice, therefore facilitating inclusive participation in this exercise therapy. This system will significantly improve respiratory function and reduce stress in individuals with physical limitations. Also, this hands-free device will increase adherence to regular Anulom-Vilom pranayama practice among individuals with physical limitations. Furthermore, the breathing duration and intensity may be monitored in real time with this apparatus. Thus, users belonging to various age groups and health conditions will find it effective. Prepare quality of equipment for Anulom-Vilom pranayama that is safe, effective and user-friendly. To compare the outcomes of practising Anulom-Vilom pranayama with the hands-free device versus traditional manual practice. This paper focuses on how we can prepare, working operation, and applications of the Anulom-Vilom apparatus, bringing traditional yoga into practice with high technology for better access and user comfort.

2. Literature Review

In 2025, author Tushar M. Patil stated that, the invention aims to develop a device for Anulom-Vilom Pranayama, a breathing exercise. It is suitable for paralyzed or handicapped individuals, yielding effective results [1]. Katriya et al.2024 explained the procedure for Anulom- Vilom (Alternate nostril breathing) pranayama [2]. In Journal of Ayurveda and Integrative Medicine 2023, author has mentioned that, a quasi-randomized clinical trial conducted in 2020 at five COVID-19 hospitals in India explored the effectiveness of Pranayama in preventing COVID-19 infection among frontline healthcare professionals (HCPs). The study involved 250 HCPs who had been exposed to COVID-19 patients and tested negative for antibodies. [3]. Karunasri et al. 2022 state that, Pranayama is a yogic breathing practice, Prana means breath and *Ayama* means stretching or expansion. Pranayama consists of three phases: First phase is of inhalation (*puraka*), second one involves retention of air within (*kumbhaka*) and third phase is of exhalation (*rechaka*) which can be either fast or slow. It includes different breathing patterns and each pattern has specific effect on stimulating afferent pathways [4]. According to the authors of this study, Wenzhi WU, COVID-19 has significant impact on public health and induces complications for medical staff who are exposed to and have direct contact with patients. Psychological stress status and the different analyses of the questionnaire. Front-line medical staff's emotional, cognitive, physical, mental responses demonstrated exposure effect, necessitating a potentially beneficial psychological crisis intervention approach [5]. According to Dinesh Gaur (2015), modern physicists have recognized pranayama as an efficient breathing practice that can be used to treat patients with back pain, cardiac disorders, depression, arthritis, other conditions. One of the exercises included is Anulom Vilom i.e Alternate nostril breathing, which is simple and easy for practice at home [6]. The novel coronavirus disease (Covid-19) has spread quickly in China, Macau, Hong Kong, other Asian and European countries, according to study published in 2020 by authors Wen Li. Expert groups and mental health professionals are assigned to particular isolation hospitals to offer on-site services to patients. The rapid transmission of COVID-19 in China has become important concern for country's mental health service [7]. Gurangdi Li (2020) reported that 2019 novel coronavirus (2019-nCoV, SARS-CoV-2) has transmitted quickly since its emergence in Wuhan, China, causing severe pneumonia. Covid time, there is no approved drug or vaccine for treating coronaviruses. Several options have been proposed to control or prevent 2019-nCoV infections. Like SARS and MERS, authors expect that outbreak will end in a few months. But this emphasizes how critical it is to create broad-spectrum antiviral agents to use against coronaviruses [8]. In 2017, Nobuhiko eda state that, influence of yoga on mucosal immune function and mental stress. Yoga stretching could eliminate stress and improve mucosal immune function in elderly women [9]. Naveen K Viswewarejah (2017) conducted a randomized trial to evaluate effectiveness of anti-tuberculosis treatment (ATT) with yoga as well as breath awareness programs on lung capacities and bacteriological status in pulmonary tuberculosis patients. According to study, yoga group significantly improved their weight gain, forced vital capacity (FVC), radiographic picture, level of infection, symptom reduction. According to study, yoga can help manage pulmonary tuberculosis in addition to other treatments, as seen by significant reductions seen after 2 months [10]. In 2017, author Rosy Naoroibam has put in his research that study, impact of 1-month integrated yoga (IY) intervention on CD4 counts, anxiety, depression in HIV-1 patients. According to authors, a month of IY practice may help HIV-1-positive individuals feel less depressed and have improved immunity [11]. Jaideep Mahendra (2017) studied the impact of pranayama on

periodontitis, focusing on NF- κ B expressions, PPAR- γ , Red Complex Microorganisms. The study involved 60 subjects with chronic periodontitis, divided into control (SRP) and pranayama groups. Author concluded that, Pranayama as an adjunct to SRP may enhance treatment outcomes in chronic periodontitis patients [12]. Firdaus S. Dhabhar mentioned in 2009, in their study, that stress weakens the immune system and makes people more susceptible to infections and cancer. Depending on the type (immune-pathological) of immune response that is impacted, stress may have a positive or negative impact. The author's understanding of physiological pathways would aid in creation of biomedical treatment intended to use individual's physiology to specifically boost immune response based on patient's best interests [13]. In 2004, author Suzanne C. Segerstrom put in his research that both humoral and cellular measures have been suppressed in response to long-term stress. Depending on type of occurrence, different sequences of events had different effects. In general, immunological change was not linked to stress. In certain instances, physical susceptibility brought on by aging or disease also raised vulnerability to immunological changes during stressful situations [14]. In 2020, author Bremner J has put in this research that the Journal of Personalized Medicine reports that Vagus Nerve Stimulation (VNS) is effective for treating depression, but traditional VNS devices require surgical implantation, limiting widespread use. Authors concluded that, nVNS is a promising approach for preventing and treating stress-related psychiatric disorders, with potential for widespread implementation [15]. In 2017, Chau H. examined effect of 12-week yoga program on heart rate variability (HRV) and depressive symptoms in depressed women [16]. In 2024 Sharadendu Bali professor showed that regular practice of Anulom-Vilom (AV) pranayama can lead to significant improvements in cardiovascular and respiratory function, including stabilization of heart rate, improved pulmonary function, and increased vital capacity. Authors found that, to enhance parasympathetic activity, resulting in reduced anxiety levels, improved digestion, and increased energy levels [17]. William Wilson mentioned in 2020 in their study that, for determining prevalence as well as predictors of stress, depressive as well as anxiety, symptoms amid HCPs of India. Authors concluded that, during pandemic, prevalence of stress, depression, anxiety.

3. Problem Statement:-

As per the references studied it is observed that, the apparatus for Anulom-Vilom pranayama can be developed, which will be very easily accessible with low cost for the society.

Challenges: -

- 1) To develop one way valve with inbuilt switch.
- 2) Switching circuit for change of inhalation from one nostril to another and back.

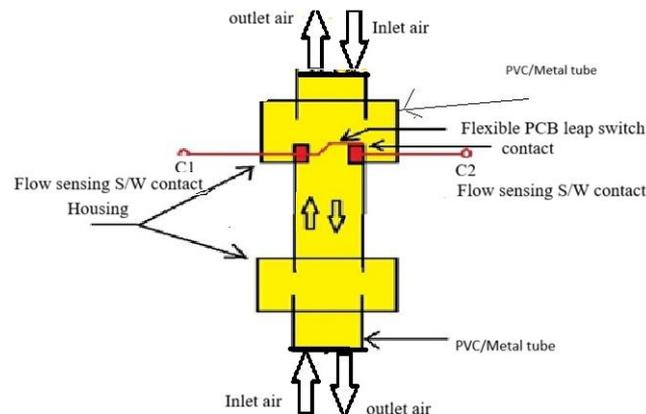


Fig. 1 One way valve in-built switch

4. Methodology and model specifications

To prepare the prototype, there are total 3 phases

- 1) Phase 1:- In phase 1, one-way valve with micro switch is to be prepared. The duration to take this phase will be nearly three months including collection and refining of raw material. Here we have to prepare 2-4 valves as per requirement.
- 2) Phase 2:- This phase includes electronic circuit for operation and tube for air flow, which is to be prepared for making the equipment.
- 3) Phase 3:- Testing and modifications for desired result.
- 4) Phase 4:- Publications and thesis submission.

5. Conclusion

We hope that the creation of this device will increase Anulom Vilom Pranayama's usefulness and accessibility for a larger group of users, including those with physical restrictions. We anticipate that the equipment will be of high quality and offer a dependable and effective means of doing Anulom Vilom Pranayama. Its small size will make it simple to hold and operate, enabling users to exercise whenever and wherever they choose. Because of its portability, the device is ideal for travel or use in various settings. We are trying to develop a gadget that will improve respiration, lower stress levels, and increase general well-being. There is no need to move your fingers: Using this device, Anulom Vilom Pranayama will now become more inclusive and advantageous. Its characteristics make the Anulom Vilom Pranayama equipment a useful tool for people looking to enhance their general health and breathing. Programming is not required because apparatus design and design are adaptable, emphasizing adaptability and making it unique.

References

- [1] Dr. Tushar Patil, Dr. Jui Patil, Prof. Dhanesh Patil (2025) Design and development of a hands-free apparatus for anulom-vilom pranayama Published by International conference on digital transformation for advanced manufacturing and urban development. CRC press/India. Taylor and Francis group.
- [2] Katriya, S. J., Mathur, A., Parmar, D., & Sojitra, D. (2024). Immediate effect of Anulom-Vilom Pranayama on cardiovascular parameters in medical students. *National Journal of Physiology, Pharmacy & Pharmacology*, 14(10). <https://doi.org/10.5455/njppp.2024.14.06251202421062024> Augue interdum velit euismod in pellentesque massa placerat duis ultricies. Metus aliquam eleifend mi in nulla posuere sollicitudin aliquam ultrices.
- [3] Sarwal, R., Dhamija, R. K., Jain, K., & Basavaraddi, I. V. (2023). Efficacy of pranayama in preventing COVID-19 in exposed healthcare professionals: A quasi-randomized clinical trial. *Journal of Ayurveda and Integrative Medicine*, 14, 100586.
- [4] Karunasri; Santa Kumari A., Sumanth V.(2022). Study of immediate effect of AnulomVilom pranayama on cognition in OsmaniaMedical College Students. *International JournalDental and Medical Sciences Research* 4(1):177- 81. <https://doi.org/10.35629/5252-0401177181>
- [5] Wu, W., Zhang, Y., Wang, P., Zhang, L., Wang, G., Lei, G., et al. (2020). Psychological stress of medical staff during outbreak of COVID-19 and adjustment strategy. *Journal of Medical Virology*, 92, 1 962–1970. <https://doi.org/10.1002/jmv.25914>
- [6] Dinesh, T., Gaur, G. S., Sharma, V. K., Madanmohan, T., Kumar, K. H., & Bhavanani, B(2015), Bhavanani, A. B. (2015) Comparative effect of 12 ,weeks of slow and fast pranayama training on pulmonary function in young, healthy volunteer randomized controlled trial. *International journal of yoga*, 8(1), 22-26.<https://doi.org/10.4103/0973-6131.146051>.
- [7] W., Yang, Y., Liu, Z.-H., Zhao, Y.-J., Zhang, Q., Zhang, L., et al. (2020). P rogression of mental health services during the COVID-19 outbreak in China. *International Journal of Biological Sciences*, 16, 1732–1738. <https://doi.org/10.7150/ijbs.45120>
- [8] Li, G., & De Clercq, E. (2020). Therapeutic options for the 2019 novel coronavirus (2019-nCoV) *Nature Reviews Drug Discovery*,19,149–150. <https://doi.org/10.1038/d41573-020-00016-0>
- [9] Eda, N., Ito, H., Shimizu, K., Suzuki, S., Lee, E., & Akama, T. (2017). Yoga stretching for improving salivary immune function and mental stress in middle-aged and older adults. *Journal of Women & Aging*, 30, 227–241.<https://doi.org/10.1080/08952841.2017.1295689>
- [10] Visweswaraiyah, N. K., & Telles, S. (2004). Randomized trial of yoga as a complementary therapy for pulmonary tuberculosis. *Respirology*, 9, 96–101. <https://doi.org/10.1111/j.1440-1843.2003.00528.x>
- [11] Metri, K., Naoroibam, R., Bhargav, H., Nagaratna, R., & Nagendra, H. (2016). Effect of Integrated Yoga (IY) on psychological states and CD4 counts of HIV-1 infected patients: A randomized controlled pilot study. *International Journal of Yoga*, 9, 57. <https://doi.org/10.4103/0973-6131.171723>
- [12] Mahendra, J. (2017). Effect of pranayama on Ppar-g, Nf-kB expressions and red complex micro-organisms in patients with chronic periodontitis: A clinical trial. *Journal of Clinical*

- and Diagnostic Research. <https://doi.org/10.7860/JCDR/2017/27846.10108>
- [13] Dhabhar, F. S. (2009). Enhancing versus suppressive effects of stress on immune function: Implications for immune-protection and immunopathology. *Neuro-immunomodulation*, 16, 300–317. <https://doi.org/10.1159/000216188>
- [14] Segerstrom, S. C., & Miller, G. E. (2004). Psychological stress and the human immune system: A meta-analytic study of 30 years of inquiry. *Psychological Bulletin*, 130, 601–630. <https://doi.org/10.1037/0033-2909.130.4.601>
- [15] Bremner, J. D., Gurel, N. Z., Wittbrodt, M. T., Shandhi, M. H., Rapaport, M. H., Nye, J. A., et al. (2020). Application of noninvasive vagal nerve stimulation to stress-related psychiatric disorders. *Journal of Personalized Medicine*, 10, 119. <https://doi.org/10.3390/jpm10030119>
- [16] Chu, I.-H., Wu, W.-L., Lin, I.-M., Chang, Y.-K., Lin, Y.-J., & Yang, P.-C. (2017). Effects of yoga on heart rate variability and depressive symptoms in women: A randomized controlled trial. *Journal of Alternative and Complementary Medicine*, 23, 310–316. <https://doi.org/10.1089/acm.2016.0135>
- [17] Rationale of Anulom Vilom, the Practice of Alternate Nostril Breathing Sharadendu Bali Professor General Surgery, TMMC, TMU, Moradabad, U.P., India *Corresponding Author: Sharadendu Bali, Professor General Surgery, TMMC, TMU, Moradabad, U.P., India. DOI: 10.31080/ASMS.2024.08.1858
- [18] Wiliam Wilson¹, Jeffrey Pradeep Raj², Seema Rao ³, Murtuza Ghiya⁴, Nisanth Menon Nedungal aparambil ⁵, Harshit Mundra⁶, Roshan Mathew⁷ Prevalence and Predictors of Stress, anxiety, and Depression among Healthcare Workers Managing COVID-19 Pandemic in India: a Nationwide Observational Stud *Indian Journal of Psychological Medicine | Volume 42 | Issue 4 | July 2020*
- [19] Alternate Nostril Breathing and Autonomic Function in Healthy Young Adults Anupkumar Dadarao Dhanvijay¹, Angesh Harish Bagade², Arbind Kumar Choudhary^{3*}, Sadawarte Sahebrao Kishanrao⁴ and Nitin dhokne *OSR Journal of Dental and Medical Sciences (IOSR-JDMS) e- ISSN: 2279-0853, p-ISSN: 2279-0861. Volume 14, Issue 3 Ver. VI (Mar. 2015), PP 62-65*
- [20] Bhardwaj, A., Sharma, M. K., & Gupta, M. (2013). Endoscopic evaluation of therapeutic effects of “Anuloma-Viloma Pranayama” in Pratishtyaya wsr to mucociliary clearance mechanism and Bernoulli's principle. *AYU (An International Quarterly Journal of Research in Ayurveda)*, 34(4), 361-367 <https://doi.org/10.4103/0974-8520.127714>
- [21] Nobuhiko Eda, Hironaga Ito and Takao Akama `Beneficial Effects of Yoga Stretching on Salivary Stress Hormones and Parasympathetic Nerve Activity ©*Journal of Sports Science and Medicine* (2020) 19, 695-702
- [22] Effects of yogic breath regulation: A narrative review of scientific Evidence Apar Avinash Saoji*, B.R. Raghavendra, N.K. Manjunath A.A. Saoji et al. / *Journal of Ayurveda and Integrative Medicine* 10 (2019) 50e58.
- [23] Dhadse, M., & Fadia, A. (2016). Effect of Anulom Vilom Pranayam on auditory reaction time in Indian population aged 18-22 years. *Int J Res Med Sci*, 4(3), 891-895 <https://doi.org/10.18203/23206012.ijrms20160538>.
- [24] Shukla, M., Chauhan, D., & Raj, R. (2020). Breathing exercises and pranayamas to decrease perceived exertion during breath-holding while locked-down due to COVID-19 online randomized study. *Complementary therapies in clinical practice*, 41, 101248. <https://doi.org/10.1016/j.ctcp.2020.101248>
- [25] Dhanaradja, U., Rajasegaran, R., Aghoram, R., Pal, P., Basu, S., Mukherjee, M. P., & Harichandrakumar, K. T. (2025). Effect of 12-week Practice of Anulom Vilom Pranayama as Adjunctive Therapy on the Cardiac Autonomic Balance, Cognition, Psychological Status, and Quality of Life in Individuals with Mild-to-Moderate Parkinson's Disease: A Randomized Controlled Trial *International Journal of Yoga*, 10-4103. https://doi.org/110.4103/ijoy.ijoy_176_24.