

COMPARATIVE STUDY BETWEEN ANULOM VILOM AND MUSIC THERAPY FOR STRESS REDUCTION IN MIDDLE AGED SEDENTARY INDIVIDUALS

A Comparative study among Mumbai Middle Age Sedentary Individuals

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Abstract : Background : Sedentary living has become increasingly common in recent years and is closely linked with rising levels of psychological stress. Sedentary behavior is characterized by minimal physical movement and low expenditure (typically ranging between 1.0 to 1.5 MET) like reduced physical activity, prolonged sitting, and work-related pressures contribute not only to physical health concerns but also to disturbances in mental well-being. Chronic stress activates sympathetic nervous system, which can lead to hypertension, cardiovascular diseases, digestive problems and cognitive decline which impairs social relationship, reduces quality of life, and increase in risk of anxiety and depression. Studies shows that middle-aged adults often face more frequent and different types of daily stress compared to younger or older adults. Regular physical activity in this group is often limited due to time constraints and reduced motivation. Therefore, low-intensity interventions such as Anulom Vilom and Raga-based music therapy are being explored as practical, time-efficient strategies for stress reduction without requiring significant physical exertion.

Objectives : To compare the effectiveness of Anulom Vilom and Raga Therapy (Raga Darbari) in reducing perceived stress among sedentary adults.

Method : Sixty individuals between 25 and 35 years of age were identified as sedentary using the International Physical Activity Questionnaire (IPAQ). Participants reporting moderate to severe stress levels on the Perceived Stress Scale (PSS) were included and divided into two groups of thirty each. Group A practiced Anulom Vilom, while Group B received Raga Therapy sessions. Both interventions were administered four days per week for four weeks.

Results : Pre- and post-intervention stress scores were analyzed using paired t-tests and effect sizes were calculated. Both groups showed statistically significant reductions in stress levels ($p < 0.001$). Although the Raga Therapy group demonstrated a slightly greater mean reduction, Anulom Vilom showed a larger effect size, suggesting stronger and more consistent outcomes.

Conclusion : The findings indicate that both techniques are effective in reducing stress among sedentary adults, with Anulom Vilom showing comparatively greater reliability

IndexTerms - Sedentary lifestyle, Perceived stress, Anulom Vilom, Raga Therapy, Pranayama, Music therapy

INTRODUCTION

In today's fast-paced, technology-driven world, sedentary lifestyles have become increasingly prevalent, especially among middle-aged individuals. This shift is largely due to the convenience of modern technology, which encourages long periods of sitting, such as watching television or using smart phones and computers[1]. Sedentary behavior, characterized by minimal physical movement and low energy expenditure (typically ranging between 1.0 to 1.5 metabolic equivalents), has led to numerous health issues, including cardiovascular diseases, obesity, diabetes, and metabolic disorders[1]. Along with these physical health concerns, sedentary living also exacerbates psychological problems, particularly stress, which is closely linked to physical inactivity[1].

Stress is a natural response to external challenges, but when it becomes chronic, it can have severe consequences for both mental and physical health. Chronic stress activates the sympathetic nervous system, which can lead to hypertension, cardiovascular diseases, digestive problems, and cognitive decline[2]. It also impairs social relationships, reduces quality of life, and increases the risk of anxiety and depression[2]. Studies conducted in India have indicated that sedentary individuals are 3.018 times more likely to report elevated stress levels compared to their physically active peers[2]. This creates a vicious cycle where stress and inactivity reinforce each other, making it difficult to break free from the negative impact on health.

Physical activity is widely recognized as an effective means of reducing stress. Exercise triggers the release of endorphins, which improve mood, and helps regulate the body's stress response by lowering cortisol levels. However, many middle-aged individuals find it challenging to engage in regular physical activity due to time constraints or lack of motivation[3]. As a result interventions, such as Anulom Vilom (Alternate Nostril Breathing) and Raga therapy, have gained attention for their potential to reduce stress and improve overall health without requiring intense physical effort[4].

Anulom Vilom, a form of controlled breathing from yoga, helps balance the autonomic nervous system, which controls vital functions such as heart rate and blood pressure[5]. By activating the parasympathetic nervous system, Anulom Vilom promotes relaxation and reduces the physiological symptoms of stress, such as elevated heart rate and shallow breathing[5]. This technique can be performed easily at home, making it a convenient, low-cost, and non-invasive solution for managing stress. Studies show that it can improve mental clarity, emotional regulation, and overall well-being.

Raga therapy (Raga Darbari), particularly raga-based music, has also proven effective in reducing stress[10]. Raga music, rooted in Indian classical traditions, has a unique melodic structure that evokes specific emotional responses, fostering a sense of calm and relaxation[10]. Research indicates that listening to or engaging with raga music can lower heart rates, reduce sympathetic nervous system activity, and improve mood[5]. This emotional engagement with music provides a psychological release, helping individuals process and cope with stress more effectively.

Both Anulom Vilom and music therapy have unique benefits for stress reduction. While Anulom Vilom focuses on regulating the nervous system through controlled breathing, music therapy uses emotional and psychological engagement with sound to induce relaxation. With the rise of digital platforms, both interventions are now more accessible than ever. Tele-yoga allows individuals to practice Anulom Vilom from home or any other places, while music therapy can be delivered through music streaming services or apps, making it easy to incorporate into daily routines[13].

In conclusion, sedentary lifestyles contribute to both physical and psychological health problems, particularly stress. As these challenges grow, non-pharmacological interventions like Anulom Vilom and Raga Therapy (Raga Darbari) offer promising solutions for middle-aged individuals looking to reduce stress and improve overall health. With the added convenience of digital platforms, these interventions provide accessible, cost-effective options for managing stress and promoting well-being.

NEED OF THE STUDY.

Sedentary life style are becoming more prevalent worldwide due to several factors.[2] The sedentary population likely to have 3.018 times more elevated perceived stress compared to their physically active peers in India.[2]

Sedentary lifestyle causes increase in sympathetic nervous activity which leads to increase in stress. Due to which individual is prone to many different types of health issues such as like metabolic disorders, cognitive issues, and even certain cancers. It also increases the risk of serious health events like heart attacks or strokes. [2]

However, the negative effects of physical inactivity are significantly exacerbated by high levels of perceived stress, so the current study is planned to assess the stress level by comparing two stress reduction techniques (i.e Anulom- Vilom & Raga Therapy) in sedentary individuals .

RESEARCH METHODOLOGY

3.1 Population and Sample

This experimental comparative study was conducted in the Mumbai Metropolitan Region over a period of six months, with the intervention lasting four weeks. A total of 60 participants aged between 25 and 35 years were selected through convenient sampling. Sedentary status was confirmed using the International Physical Activity Questionnaire (IPAQ). Individuals reporting moderate to severe stress levels on the Perceived Stress Scale (PSS) were included in the study.

Individuals with hypertension, diabetes, cardiopulmonary disorders, neurological conditions, psychiatric illnesses, or those already practicing yoga or meditation were excluded. Pre- and post-intervention stress levels were assessed using the Perceived Stress Scale. Statistical analysis was performed using paired t-tests, and effect sizes were calculated using Cohen's d. The level of significance was set at $p < 0.05$.

3.2 Data and Sources of Data

Sedentary status was confirmed using the International Physical Activity Questionnaire (IPAQ). Individuals reporting moderate to severe stress levels on the Perceived Stress Scale (PSS) were included in the study.

Participants were divided into two groups of equal size. Group A practiced Anulom Vilom pranayama in a comfortable cross-legged sitting position. Each session consisted of ten repetitions and was conducted four days per week for four weeks. Group B underwent Raga Therapy, during which participants listened to Raga Darbari for ten minutes per session, four days per week for four weeks.

A. Inclusion Criteria

- Sedentary individuals willing to participate
- Sedentary individuals according to (IPAQ)
- Individuals of both the genders
- Individuals having stress at moderate to severe level (PSS)
- Individuals between age group of 25 to 35 years old

B. Exclusion Criteria

- Individuals having co-morbidities like hypertension, diabetes, or any other cardio-pulmonary or respiratory conditions.
- Individuals involved in any Physical activities like yoga, gym, rehabilitation
- Individuals involved in any other kind of stress relieving activity like meditation
- Individuals having any neurological conditions like autism, cerebral palsy, and psychological conditions like schizophrenia, delusional psychosis.

PROCEDURE –

Individuals of age group 25 to 35 years of age were screened according to the inclusion and exclusion criteria and a prior explanation was given about the procedure.

A written consent through google form was taken from the participants.

The International Physical Activity Questionnaire (short form – comprising of 7 questions) was explained to the individuals. After filling IPAQ in google form, MET minutes was calculated and classified as low, moderate and high physically active. Based on that individuals were selected who falls under sedentary lifestyle.

Then (pre) Perceived Stress Scale was explained to the selected individuals and the scale was filled through google form. According to the score of (pre) Perceived Stress Scale, participants were selected who were having moderate or severe stress. These participants were divided in 2 groups having 30 participants in each group and were named as:

Group A: Anulom Vilom

Group B: Music (Raga Therapy)

After 4 weeks (post) Perceived Stress Scale was taken.

Pre and Post score was calculated and Data was analysed by paired t-test

Group A - Participants were made to sit on a yoga mat in a crossed-leg sitting position with their backs straight. (In front of their screen with camera-on during video assisted intervention). Participants have to use their thumb and little finger and have to place them on both the nostrils. Participants have to take in breath through the left nostril and block right nostril with the finger and, have to retained it according to his capacity, and then they have exhale through the right nostril and block left nostrils. They had to again fill in the thoracic cavity by taking in breath through the right nostril and exhaling through the left nostril. This was one round of Anulom vilom. 10 times a day, for 4 days a week for 4 weeks.

Group B - Participants were made to sit (In front of their screen with camera-on during video assisted intervention). A raga (raga

IV. RESULTS AND DISCUSSION

GROUP A - ANULOM VILOM

Paired Samples Statistics

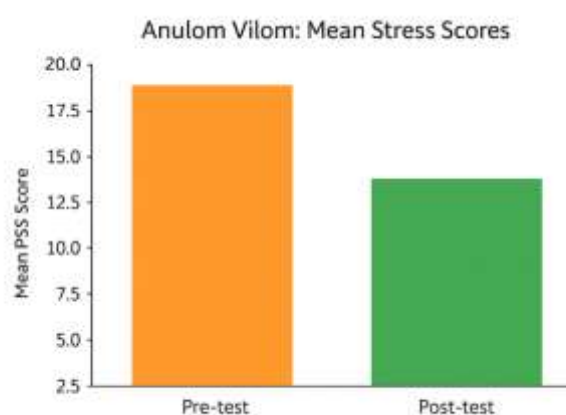
		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Pre PSS SCORE	20.50	30	2.776	.507
	Post PSS SCORE	14.17	30	3.445	.629

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	Pre PSS SCORE & Post PSS SCORE	30	.838	.000

Paired Samples Test

		Paired Differences				t	Df	Sig. (2-tailed)	
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower				Upper
Pair 1	Pre PSS SCORE - Post PSS SCORE	6.333	1.882	.344	5.631	7.036	18.436	29	.000



A **paired samples t-test** was conducted to evaluate the effect of the anulom vilom intervention on perceived stress scores. There was a **significant decrease** in scores from pre-test ($M = 20.50$, $SD = 2.78$) to post-test ($M = 14.17$, $SD = 3.45$), indicating a reduction in perceived stress following the intervention.

The difference between scores was statistically significant, $t(29) = 18.44$, $p < .001$, with a mean decrease of 6.33 points (95% CI [5.63, 7.04]). This suggests a strong effect of the intervention on reducing stress levels.

Additionally, the pre- and post-test scores were highly correlated, $r(28) = .84, p < .001$, indicating that participants' relative stress levels were consistent across time points, despite the overall reduction.

Cohen's $d = 3.36$ which shows that the effect size is very large indicating that the intervention had a **strong** impact.

GROUP B - RAGA THERAPY

Paired Samples Statistics

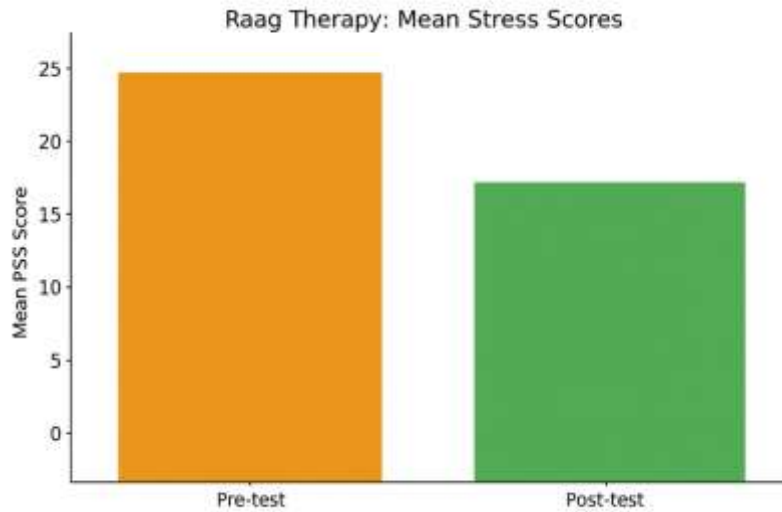
		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Pre PSS SCORE	22.67	30	3.546	.647
	Post PSS SCORE	15.73	30	3.648	.666

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	Pre PSS SCORE & Post PSS SCORE	30	.721	.000

Paired Samples Test

	Paired Differences	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference		t	df	Sig. (2-tailed)
					Lower	Upper			
					Pair 1	Pre PSS SCORE – Post PSS SCORE			



A **paired samples t-test** was conducted to examine the effectiveness of the Raga therapy intervention in reducing perceived stress levels. Results showed a statistically significant reduction in stress scores from pre-test ($M = 22.67, SD = 3.55$) to post-test ($M = 15.73, SD = 3.65$), $t(29) = 14.12, p < .001$. The mean decrease was 6.93 points (95% CI [5.93, 7.94]), indicating a substantial improvement in stress levels following the intervention.

Additionally, the pre- and post-test scores were significantly correlated, $r(28) = .72, p < .001$, suggesting that participants who had higher stress at baseline also tended to report higher stress after the intervention, though overall stress was reduced.

Cohen's $d = 2.58$ which shows that the effect size is large indicating that the intervention had a **strong** impact on reducing perceived stress.

Metric	Intervention 1	Intervention 2
Pre-test Mean	20.50	22.67
Post-test Mean	26	15.73
Mean Difference	6.33	6.93
SD of Differences	1.88	2.69
<i>t</i> -value	18.44	14.12
<i>p</i> -value	< .001	< .001
Cohen's <i>d</i>	3.36	2.58
Correlation (pre-post)	.84	.72

To compare the effectiveness of two stress-reduction interventions, paired samples t-tests were conducted for each group. Both interventions led to statistically significant reductions in perceived stress scores.

For **Intervention 1**, stress scores decreased from a pre-test mean of 20.50 ($SD = 2.78$) to a post-test mean of 14.17 ($SD = 3.45$), $t(29) = 18.44, p < .001$, with a mean reduction of 6.33 points and a large effect size ($d = 3.36$). For **Intervention 2**, scores

dropped from 22.67 (SD = 3.55) to 15.73 (SD = 3.65), $t(29) = 14.12$, $p < .001$, with a mean reduction of 6.93 points and an effect size of $d = 2.58$.

While **Intervention 2** resulted in a slightly larger average reduction in stress, **Intervention 1 demonstrated a stronger effect size and more consistent outcomes**, suggesting it may be the more effective and reliable method overall. Additionally, the correlation between pre- and post-test scores was stronger in Intervention 1 ($r = .84$) compared to Intervention 2 ($r = .72$), indicating greater consistency in individual responses.

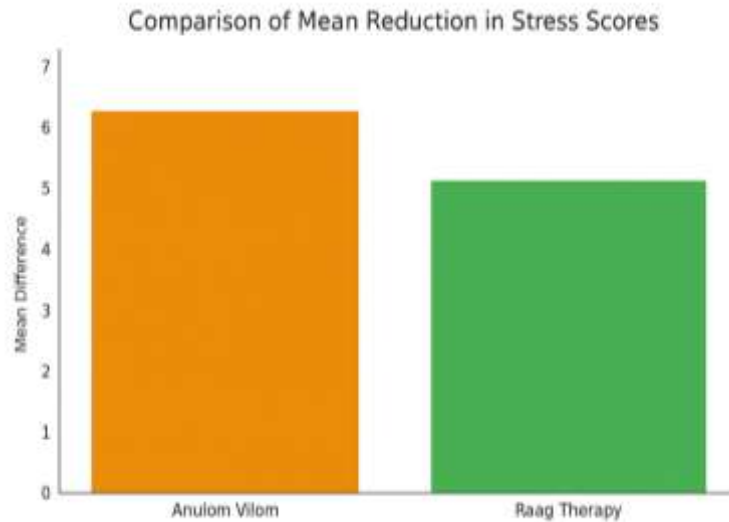


Figure 3: Comparison of Mean Reduction in Stress Scores

DISCUSSION –

The present study aimed to compare the effectiveness of *Anulom Vilom Pranayama* and *Raga Therapy* (Raga Darbari) in reducing perceived stress among middle-aged sedentary individuals. The findings revealed that both interventions produced a significant decrease in stress levels ($p < .001$), confirming the positive influence of mind–body and music-based relaxation practices on mental health. While *Raga Therapy* showed a slightly higher mean reduction, *Anulom Vilom* demonstrated a greater effect size, indicating stronger reliability and consistency in reducing stress responses.

The results align with previous studies suggesting that pranayama practices, particularly *Anulom Vilom*, regulate autonomic balance and enhance parasympathetic activity, thereby promoting relaxation and emotional stability. According to Singh et al. (2020), alternate nostril breathing activates both hemispheres of the brain and optimizes oxygen exchange, leading to physiological calmness and reduced sympathetic arousal. Similarly, Joshi and Telles (2019) found that pranayama practices lower heart rate and cortisol levels, supporting the present study’s observation that controlled breathing contributes to measurable stress reduction.

The underlying mechanism of *Anulom Vilom* can be explained through its influence on the autonomic nervous system and the subtle energy channels, *ida* and *pingala nadis*, as described in yogic literature. By alternately controlling inhalation and exhalation through each nostril, the practice promotes equilibrium between the two hemispheres of the brain and improves vagal tone (Sivakumar et al., 2021). This balance triggers a relaxation response, reduces the physiological manifestations of stress, and enhances overall mental clarity. The high effect size ($d = 3.36$) in the present study reflects the depth of these psychophysiological changes.

Raga Therapy (Raga Darbari), on the other hand, also demonstrated a significant reduction in perceived stress levels, consistent with the findings of Sharma and Gupta (2021), who reported that listening to specific Indian classical ragas induces alpha brain wave activity, resulting in relaxation and emotional regulation. Music, especially classical compositions such as Raga Darbari, influences the limbic system and hypothalamus, areas responsible for emotional processing and hormonal balance. In the current study, participants listening to raga therapy likely experienced a similar neurophysiological calming effect, which contributed to stress reduction (Desai et al., 2019).

Although both interventions proved effective, the slightly stronger consistency of *Anulom Vilom* may be attributed to its active engagement of breath awareness and voluntary nervous system regulation, compared to the relatively passive nature of music listening. Active breath control allows participants to consciously influence their physiological state, fostering a sense of internal control and mindfulness (Singh et al., 2020). In contrast, Raga Therapy provides relaxation primarily through sensory stimulation, which, while effective, may depend more on individual emotional receptivity and musical preference.

The present study also supports previous evidence linking sedentary lifestyle to higher stress levels (Patel et al., 2018). By introducing either yogic or music-based relaxation into daily routine, participants experienced improved emotional balance, suggesting that even brief, low-effort interventions can yield significant psychological benefits for sedentary adults. This finding carries practical implications for stress management in modern urban populations, where inactivity and mental fatigue are increasingly prevalent.

In summary, both *Anulom Vilom Pranayama* and *Raga Therapy* emerged as effective, low-cost, and accessible tools for stress reduction among sedentary middle-aged adults. While *Raga Therapy* offered emotional comfort through auditory relaxation, *Anulom Vilom* produced deeper and more consistent physiological calmness, reflecting its integrative effect on the mind-body system. These findings underscore the value of incorporating traditional yogic breathing and music-based interventions into preventive mental health programs and lifestyle modification practices.

CONCLUSION -

Both *Anulom Vilom* and *Raga Therapy* (*Raga Darbari*) interventions were found to be effective in significantly reducing perceived stress levels among participants. The findings indicate that while both techniques contribute to stress reduction, *Anulom Vilom* demonstrated greater consistency and a stronger overall impact compared to *Raga Therapy*. Therefore, it can be concluded that *Anulom Vilom* may serve as a more reliable and effective method for managing and reducing stress.

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