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Effectiveness of Square Breathing Exercise on Stress, Fatigue and Quality of Sleep among Elderly People in Koravallimedu at Puducherry

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ABSTRACT:

Background: Stress, fatigue, and reduced sleep quality are common concerns among elderly populations, significantly affecting their health and overall quality of life. As non-pharmacological interventions gain prominence, square breathing, a structured breathing technique, has been proposed as a straightforward method with the potential to mitigate these challenges in the elderly.

Objectives: To evaluate the effectiveness of square breathing exercises in reducing stress and fatigue, and improving sleep quality among elderly individuals in Koravallimedu, Puducherry.

Methods: A pre-experimental one-group pre-test–post-test design were utilized, enrolling 220 elderly participants through random sampling. Demographic data was collected, and validated scales were used to assess stress (Cohen Perceived Stress Scale), fatigue (Fatigue Assessment Scale), and sleep quality (Pittsburgh Sleep Quality Index) before and after 4 weeks of intervention.

Results: The intervention produced significant improvements in 220 participants. Stress scores decreased from 29.90±4.82 to 13.36±4.22 ($t(219)=36.85$, $p<0.001$), and fatigue from 38.18±4.76 to 18.56±4.12 ($t(219)=42.16$, $p<0.001$). PSQI scores improved from 13.16±2.96 to 4.50±2.21 ($t(219)=42.87$, $p<0.001$). These results indicate substantial reductions in stress and fatigue and marked enhancement in sleep quality post-intervention.

Conclusion: Square breathing exercises represent an effective, straightforward, and safe

non-pharmacological approach to mitigating stress and fatigue while enhancing sleep quality among the elderly. Integrating such interventions into daily routines and elderly care programs can substantially improve the well-being and quality of life in ageing populations.

INTRODUCTION

Ageing is associated with a variety of physiological, psychological, and social changes that frequently heighten susceptibility to stress, fatigue, and sleep disturbances[1]. India has been undergoing a gradual increase in both the size and proportion of the elderly population over recent decades. The elderly population has risen from 24.71 million in 1961 to 104 million in 2011, increasing from 5.6% of the total population in 1961 to 8.6% in 2011[2].The elderly population in India is growing at a rate three times the overall growth rate[3]. The elderly population in India is projected to reach 158.7 million by 2025, surpassing the number of children under 14[4].

Stress, fatigue, and poor sleep quality are increasingly recognised as significant global health concerns, including in India[5]. The empirical evidence shows they are important causes of morbidity and mortality, thus requiring more attention in the community. India is also experiencing a rapid demographic shift; the elderly population currently accounts for about 10% of the overall population[6]. It is projected that this population will almost quadruple by 2050, thus escalating the number of chronic diseases, mental and sleep disorders that hinder healthy ageing[7].

Community and hospital-based studies conducted across various Indian states indicate that between one-third and two-thirds of the elderly experience poor quality of sleep or significant symptoms of insomnia[8]. These disturbances are closely associated with a reduced quality of life, depressive symptoms, and functional decline[9]. Poor sleep among older adults seldom occurs in isolation and is frequently associated with depression, anxiety, bodily pain, chronic medical conditions, and reduced quality of life, suggesting a multidimensional burden that extends beyond nocturnal symptoms[10].

Sleep disturbances in the elderly are also influenced by psychosocial stressors, including perceived discrimination, bereavement, financial insecurity, and caregiving responsibilities, which can perpetuate stress and fatigue throughout the life course[11]. Despite this burden, treatment-seeking among the elderly remains inadequate, with many individuals relying on self-management or unproven remedies rather than structured, low-risk interventions[12].

Square breathing is a method that is developed to calm the sympathetic nervous system and relieve psychological stress. The breathing plan involves four diaphragmatic counts during the inspiratory phase, a corresponding breath hold, an expiratory phase, and another equal breath hold, thus creating a regular rhythmical program, which overlaps with restorative breathing sessions[13]. This technique allows the slowing down of the heart rate, the strengthening of the activity of the present moment, as well as the increase in emotional control, and it is a fast and easy method of grounding oneself in the moment of anxiety or excessive excitement. On a physiological perspective, the matched and timed strategies of inhalation, apnea, and exhalation create respiratory sinus arrhythmia, enhances vagal activity, and reduces hyperarousal conditions related to chronic stress and insomnia. These physiological consequences can only cause a decrease in perceived stress and daytime fatigue, and at the same time, increase sleep onset latency and continuity[14]. Square breathing is a simple intervention strategy can be easily embraced by the elderly to calm the autonomic nervous system, decrease muscular tension, ease fatigue, and improve the quality of sleep. It is prescribed to those with an anxiety disorder or post-traumatic stress disorder but its consistency in routine practice is beneficial in the stress management of persons of all ages including the elderly[15].

The study hypothesises that elderly participants who practice square breathing exercise regularly will demonstrate significantly reduced stress and fatigue levels and significantly improved sleep quality compared to their baseline measures. The present study aims to evaluate the effectiveness of a structured square-breathing exercise program on stress, fatigue, and sleep quality among the elderly in Pondicherry.

METHODOLOGY

Study Design

The study used a quantitative, pre- experimental one- group, pre-test, post-test to evaluate the effectiveness of the square breathing exercises in reducing stress, fatigue and the quality of sleep among the elderly. The choice of this design was to enable

comparisons of outcomes before and after the structured intervention within the participants.

Study Setting and Sampling:

The research case was conducted in a field practice area of Sri Balaji Vidyapeeth University, Koravallimedu, Puducherry, a rural community with a large elderly population. A simple random sampling technique was used to select participants for the study. Initially, a comprehensive listing of all elderly individuals aged 60 years and above residing in Koravallimedu, Puducherry, was compiled with the assistance of local health workers and community leaders. Each eligible individual on the list was assigned a unique identification number. Utilising this sampling frame, the researchers employed a computer-generated random number table to select a sample of 220 elderly participants. The chosen individuals were subsequently approached at their residences, informed about the study's purpose, and screened to confirm their eligibility based on the inclusion criteria, which included the ability to perform breathing exercises, absence of major illness, and willingness to participate. Individuals who declined to participate or were deemed medically unfit were replaced by the following randomly generated number from the sampling list to maintain randomness. The one months were spent on data collection and intervention activities.

Sample size

The sample size for this study was calculated using the standard formula for comparing two mean values:

$$n = \frac{2\left(Z_{\frac{\alpha}{2}} + Z_{\beta}\right)^2 \sigma^2}{d^2}$$

The minimum required sample size is approximately 183 participants. To increase statistical power, account for potential non-response, and ensure adequate representation of the elderly population, the sample size was rounded up to 220 participants.

Inclusion and Exclusion criteria:

Participants in the study were elderly individuals aged 60 years and above who demonstrated both physical and cognitive capability to engage in square breathing exercises. Enrollment was contingent upon the participants' willingness to participate and the provision of written informed consent. Exclusion criteria included the presence of major concurrent medical conditions that could potentially interfere with the intervention, such as acute cardiac or respiratory illnesses, recent hospitalization, severe psychiatric disorders, or significant physical limitations. Individuals who refused to participate, those who could not perform breathing exercises, or those who were not interested in completing the entire intervention and the post-test evaluation were also excluded.

Intervention: Square Breathing Exercise

The participants were trained to do the Square Breathing, which is a 4-step cycle of breathing that consisted of:

- Inhale for 4 seconds
- Hold for 4 seconds
- Exhale for 4 seconds
- Hold for 4 seconds

The four weeks intervention was administered for about 3 to 5 days per week with a duration of 10 to 15 minutes twice day. Each day, seven to eight participants were supervised to ensure proper technique and compliance. Post-test assessments were carried out at the end of the fourth week . (Fig:1)

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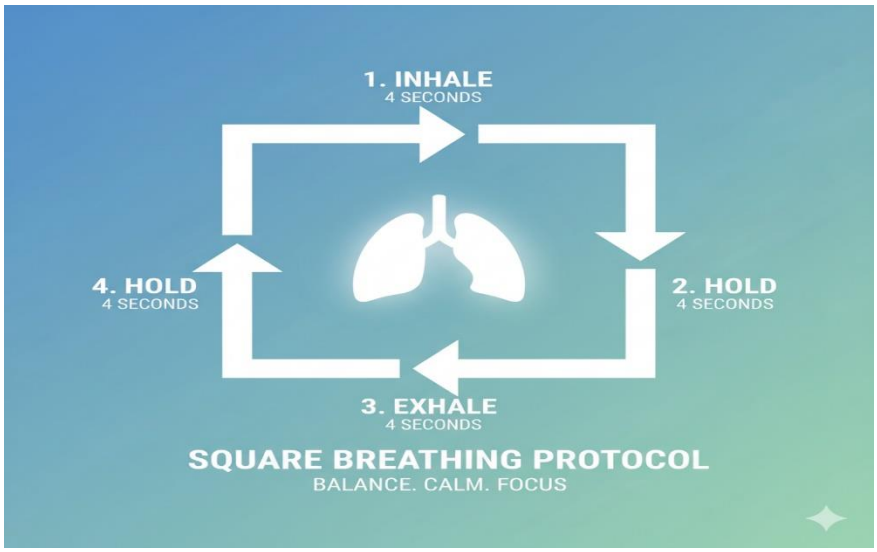

Figure 1: Square Breathing Exercise Protocol

Data collection procedure

Data collection methods utilised demographic variables, along with the Cohen Perceived Stress Scale (PSS)[16], Fatigue Assessment Scale (FAS)[17] and Pittsburgh Sleep Quality Index(PSQI)[18] to evaluate stress, fatigue, and sleep quality among the elderly. The authors studied demographic aspects and pre- and post-tests of the results in the elderly. The participants were asked to do a square-breathing exercise twice-a-day for 10-15 minutes, and this lasted one month. A total of seven to eight elderly people were selected each day. The study participants will be tested at the end of the fourth week with a post-test.

Statistical Analysis

Data were entered in Microsoft Excel and analysed using IBM SPSS (Version 25.0). Descriptive statistics (frequency, percentage, mean, and standard deviation) were used to summarise demographic characteristics and outcome variables. The Wilcoxon Signed Rank Test was used to compare pre- and post-intervention scores. A p-value <0.05 was considered statistically significant.

RESULTS

In this study, there was a total of 220 elderly participants, The average age of the participants was 63.22 years. Women constituted 59% of the study cohort. Most of the participants, 92%, identified as Hindus. Regarding educational attainment, 46% had no formal education. Regarding occupational status, 42% were self-employed. Regarding the nature of work, 54% were engaged in sedentary occupations. The family income of 46% of the participants was below Rs 4000. Furthermore, 70% had no prior medical history, and 80% had not undergone any surgical procedures. Notably, none of the participants had prior experience with square breathing exercises.

Table 1: Distribution of Elderly People According to Pre-test Levels of Stress, Fatigue and Quality of Sleep

(N=220)

Variables	Categories	Frequency (n)	Percentage (%)
Stress	Low stress (0–13)	0	0.0
	Moderate stress (14–26)	90	40.9
	High stress (27–40)	130	59.1
Fatigue	No fatigue (10–21)	0	0.0

	Mild-to-moderate fatigue (22–34)	0	0.0
	Extreme fatigue (≥35)	220	100.0
Quality of Sleep	Good sleep quality (PSQI ≤5)	0	0.0
	Poor sleep quality (PSQI >5)	220	100.0
Total		**220**	**100.0**

The results showed that 40.9% of elderly participants had moderate stress and 59.1% had high stress during the pre-test evaluation. There was no low stress among the subjects.

Prior to the intervention, all 220 senior individuals (100.0%) had significant weariness. According to their pre-test PSQI values, all subjects (100.0%) experienced poor sleep quality.

These results show that prior to the square breathing exercise program, the individuals had significant levels of stress, fatigue, and poor sleep quality.

Table 2: Mean and Standard Deviation of Pre-test Stress, Fatigue and Sleep Quality Scores among Elderly People **(N=220)**

Outcome Variable	Mean	SD	Median	Minimum	Maximum
Perceived Stress Score	29.90	4.82	30	20	40
Fatigue Assessment Score	38.18	4.76	39	26	50
Global PSQI Score	13.16	2.96	13	7	21

The elder participants had a high level of perceived stress, as indicated by their pre-test mean perceived stress score of 29.90 ± 4.82. Extreme Fatigue was indicated by the mean fatigue score of 38.18 ± 4.76. At baseline, the participants' mean global PSQI score was 13.16 ± 2.96, indicating poor sleep quality. Overall, the pre-test results show that before to the square breathing exercise intervention, the elder participants had significant levels of stress, exhaustion, and poor sleep quality .

Table 3: Distribution of Elderly People According to Post-test Levels of Stress, Fatigue and Quality of Sleep **(N=220)**

Variables	Categories	Frequency (n)	Percentage (%)
Stress	Low stress (0–13)	123	55.9
	Moderate stress (14–26)	97	44.1
	High stress (27–40)	0	0.0
Fatigue	No fatigue (10–21)	123	55.9
	Mild-to-moderate fatigue (22–34)	97	44.1
	Extreme fatigue (≥35)	0	0.0
Quality of Sleep	Good sleep quality (PSQI ≤5)	180	81.8
	Poor sleep quality (PSQI >5)	40	18.2
Total		220	100.0

According to the post-test results, 97 (44.1%) of the elderly participants had moderate stress and 123 (55.9%) had low stress. Following the square breathing intervention, none of the individuals were categorized as having high levels of stress. In terms of fatigue, 97 participants (44.1%) reported mild-to-moderate fatigue, while 123 participants (55.9%) reported no fatigue. During the post-test evaluation, none of the subjects had severe fatigue. After the intervention, 40 (18.2%) elderly participants continued to have poor-quality sleep, whereas 180 (81.8%) had good-quality sleep. Overall, the results of the post-test show that the 7-day square breathing exercise program significantly improved the elderly participants levels of stress, fatigue, and sleep quality.

Table 4: Mean and Standard Deviation of Post-test Stress, Fatigue and Sleep Quality Scores among Elderly People **(N=220)**

Outcome Variable	Mean	SD	Median	Minimum	Maximum
Perceived Stress Score	13.36	4.21	13	5	25
Fatigue Assessment Score	18.56	4.12	18	10	32
Global PSQI Score	4.50	2.21	4	1	12

A significant decrease in stress was indicated by the post-test mean perceived stress score of 13.36 ± 4.21. The average fatigue score dropped to 18.56 ± 4.12, indicating that the majority of participants either had mild-to-moderate weariness or no fatigue at all. The overall increase in sleep quality was indicated by the mean global PSQI score of 4.50 ± 2.21, which was below the generally accepted cut-off for poor sleep quality.

These results show that after the square breathing exercise intervention, the older individuals showed enhanced psychological well-being, decreased weariness, and increased sleep quality.

Table 5: Effectiveness of Square Breathing Exercise on Stress, Fatigue and sleep quality among Elderly People **(N=220)**

Outcome Variable	Test	Mean	SD	Mean Difference	Paired t-value	df	p-value	Significance
Stress	Pre-test	29.90	4.82	16.54	36.85	219	<0.001	Significant
	Post-test	13.36	4.21					
Fatigue	Pre-test	38.18	4.76	19.62	42.16	219	<0.001	Significant
	Post-test	18.56	4.12					
Sleep Quality (PSQI)	Pre-test	13.16	2.96	8.66	42.87	219	<0.001	Significant
	Post-test	4.50	2.21					

The paired *t*-test was performed to compare the pre-test and post-test scores of stress, fatigue, and sleep quality among the study participants following the intervention. The findings revealed statistically significant improvements in all three outcome variables.

The mean stress score decreased from 29.90 ± 4.82 during the pre-test to 13.36 ± 4.21 during the post-test, with a mean difference of 16.54. The obtained paired t-value was 36.85 ($df = 219$, $p < 0.001$), indicating a highly significant reduction in stress levels after the intervention.

Similarly, the mean fatigue score decreased from 38.18 ± 4.76 in the pre-test to 18.56 ± 4.12 in the post-test, with a mean difference of 19.62. The paired t-value of 42.16 (df = 219, $p < 0.001$) demonstrated a statistically significant reduction in fatigue among the participants.

Regarding sleep quality (PSQI), the mean score reduced from 13.16 ± 2.96 at pre-test to 4.50 ± 2.21 at post-test, with a mean difference of 8.66. The paired t-value was 42.87 (df = 219, $p < 0.001$), indicating a highly significant improvement in sleep quality following the intervention.

Since the p-value for all three outcome variables was less than 0.001, the differences between the pre-test and post-test scores were highly statistically significant. These findings demonstrate that the intervention was effective in reducing stress and fatigue while significantly improving the quality of sleep among the study participants.

Table 6 : Correlation between Stress, Fatigue and Quality of Sleep among Elderly People (N=220)

Variables	Correlation coefficient (r)	p-value	Interpretation
Stress and Fatigue	**0.68**	**<0.001**	Significant positive correlation
Stress and PSQI	**0.61**	**<0.001**	Significant positive correlation
Fatigue and PSQI	**0.57**	**<0.001**	Significant positive correlation

The findings revealed a Stress and fatigue were found to be strongly positively correlated ($r = 0.68$, $p < 0.001$), suggesting that older people who experienced higher levels of stress also tended to be more fatigued. Stress and PSQI scores showed a moderate-to-strong positive connection ($r = 0.61$, $p < 0.001$). This result suggests that more stress was linked to lower sleep quality since a higher PSQI score denotes lower sleep quality. Fatigue and PSQI scores also showed a moderately positive correlation ($r = 0.57$, $p < 0.001$), suggesting that higher levels of exhaustion were linked to lower sleep quality.

The study showed that post-test stress levels were significantly associated with age, gender, educational status, occupation, type of work, monthly family income, present medication history, and prior exposure to square breathing exercises. These results imply that the efficacy of square breathing exercises in lowering stress in elderly people may be influenced by personal, socioeconomic, and health-related factors. Furthermore, post-test stress levels were not associated with religion, marital status, or prior surgical history, suggesting that these factors had no significant effect on the intervention results in this investigation.

The present study showed that post-test fatigue levels were strongly influenced by age, gender, educational status, occupation, type of work, monthly family income, present medication history, and prior exposure to square breathing exercises. These results suggest that the efficacy of square breathing exercises in lowering fatigue in elderly people may be influenced by personal health and socioeconomic factors

The results showed that post-test sleep quality was significantly associated with age, gender, educational status, occupation, type of work, monthly family income, present medication history, and prior exposure to square breathing exercises. These findings indicate that characteristics related to health, socioeconomic status, and demographics may have an impact on determining whether square breathing exercises help elderly people sleep better. (Table 9)

Following the 4 weeks, square breathing intervention, the paired analysis revealed statistically significant improvements in stress, fatigue, and sleep quality ($p < 0.001$). The global PSQI, stress, and fatigue mean scores dropped by 8.66, 19.62, and 16.54 points, respectively. All three outcomes showed significant and clinically significant improvements as a result of the intervention, according to large Cohen's d effect sizes (stress = 2.55, fatigue = 2.91, sleep quality = 2.13).

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Table 7: Improvement in Stress, Fatigue and Sleep Quality According to Selected Demographic Variables **(N=220)**

A. Stress Improvement

Demographic Variable	Test Statistic	*p*-value	Effect Size	Significance
Age	F = 4.26	0.015	$\eta^2 = 0.038$	Significant
Gender	t = 2.18	0.030	d = 0.30	Significant
Religion	F = 0.84	0.434	$\eta^2 = 0.008$	Not significant
Marital status	F = 3.42	0.034	$\eta^2 = 0.031$	Significant
Education	F = 5.11	0.007	$\eta^2 = 0.045$	Significant
Occupation	F = 6.28	0.001	$\eta^2 = 0.080$	Significant
Type of work	F = 3.87	0.022	$\eta^2 = 0.035$	Significant
Family income	F = 4.72	0.004	$\eta^2 = 0.062$	Significant
Medication history	t = 2.64	0.009	d = 0.36	Significant
Past surgery	t = 1.18	0.240	d = 0.16	Not significant
Previous square breathing exposure	t = 2.31	0.022	d = 0.31	Significant

B. Fatigue Improvement

Demographic Variable	Test Statistic	*p*-value	Significance
Age	F = 3.94	0.021	Significant
Gender	t = 2.06	0.041	Significant
Religion	F = 0.72	0.488	Not significant
Marital status	F = 3.66	0.027	Significant
Education	F = 2.84	0.061	Not significant
Occupation	F = 5.42	0.002	Significant
Type of work	F = 3.18	0.044	Significant
Family income	F = 4.15	0.007	Significant
Medication history	t = 2.71	0.007	Significant
Past surgery	t = 0.94	0.349	Not significant
Previous square breathing exposure	t = 2.43	0.016	Significant

C. Sleep Quality Improvement

Demographic Variable	Test Statistic	*p*-value	Significance
Age	F = 4.48	0.012	Significant
Gender	t = 2.32	0.021	Significant

Religion	F = 0.91	0.404	Not significant
Marital status	F = 3.28	0.039	Significant
Education	F = 3.76	0.025	Significant
Occupation	F = 5.86	0.001	Significant
Type of work	F = 3.44	0.034	Significant
Family income	F = 4.36	0.005	Significant
Medication history	t = 2.58	0.011	Significant
Past surgery	t = 1.07	0.286	Not significant
Previous square breathing exposure	t = 2.18	0.031	Significant

The analysis showed that improvement in stress was significantly associated with age, gender, marital status, education, occupation, type of work, family income, medication history, and previous exposure to square breathing exercise ($p < 0.05$). Similarly, improvement in fatigue was significantly associated with age, gender, marital status, occupation, type of work, family income, medication history, and previous exposure to square breathing exercise, while education was not significantly associated. Furthermore, improvement in sleep quality was significantly associated with age, gender, marital status, education, occupation, type of work, family income, medication history, and previous exposure to square breathing exercise ($p < 0.05$). However, religion and past history of surgery showed no significant association with improvements in stress, fatigue, or sleep quality ($p > 0.05$). These findings indicate that demographic, socioeconomic, and health-related characteristics influenced the effectiveness of the square breathing exercise intervention among elderly people.

DISCUSSION

The present study examined the effectiveness of square breathing exercises on stress, fatigue, and sleep quality among elderly individuals in Koravallimedu, Puducherry. The findings demonstrated a significant improvement across all three outcomes following the intervention, suggesting that square breathing is a simple, safe, and effective non-pharmacological technique for promoting psychological and physiological well-being among older adults.

In our study, nearly 74% of participants reported high stress, and 26% reported moderate stress. All participants experienced fatigue and reported poor sleep quality. A cross-sectional study from Varanasi, Uttar Pradesh, used the Cohen PSS-10 and found that 77% of participants had moderate stress and 7% had high stress, which contrasts with our study findings19. Minz et al. (2024)20 conducted a large-scale study involving 1,992 elderly individuals (>60 years) in rural Odisha and found that 30.5% of participants had poor sleep quality. Muhammad et al. (2024)8 examined sleep quality and duration among older adults in India using data from the WHO-SAGE, which included 7118 individuals aged 50 and above. They found that 36.1% of participants experienced short sleep (less than 7 hours), with poor sleep quality being closely associated with pain, chronic illnesses, low educational levels, and inadequate diets. Agarwal et al. (2020)21 conducted a cross-sectional study on palliative care at a tertiary care hospital, involving 110 elderly patients. The study found that all participants experienced fatigue, with 88% suffering from severe fatigue. Hu et al. (2025)22 conducted a systematic review of 21 studies involving 17,843 older adults from various regions. The overall prevalence of fatigue was 42.6%. Physical fatigability was reported at 58.2%, while mental fatigability was 24%.

Marchant et al. (2025)23 found that square breathing supports autonomic balance and calmness, though slower-paced rhythmic breathing may yield higher HRV gains. Zare et al. (2025)24 found that breathing-based techniques, such as square breathing, are effective in enhancing oxygenation and reducing perceived breathlessness. A study performed by Andas et al. (2023)25 at the Tresna Werdha Social Institution found that box breathing is effective for improving sleep quality among elderly individuals with dementia. The intervention demonstrated statistically significant improvements in sleep quality compared to the control group. Morgan et al. (2024)26 systematic review found that breathing exercises reduced anxiety and stress across adult populations, which includes elderly adults. These reviews note no adverse effects and highlight the holistic benefits of breathing exercises as a safe, nurse-led intervention. Fincham et al. (2023)27 conducted a meta-analysis that demonstrated breathwork

interventions are significantly associated with reductions in self-reported and subjective stress among older adults, which is similar to our study findings.

STRENGTHS AND LIMITATIONS

A key strength of this study is its focus on three interrelated geriatric concerns: stress, fatigue, and sleep, allowing a holistic evaluation of the intervention. The findings offer practical implications for nursing practice, community health programs, and elderly wellness initiatives. Nurses and caregivers can easily incorporate breathing exercises into relaxation training and lifestyle modification counselling. The absence of a control group limits the ability to attribute outcomes exclusively to the intervention. The short duration of the intervention also restricts understanding of long-term benefits. Moreover, self-reported measures may be subject to response biases.

RECOMMENDATIONS FOR FUTURE RESEARCH

Future studies may employ randomized controlled designs, larger sample sizes, and longer follow-up durations to strengthen causal inferences. Research exploring biochemical or physiological markers (e.g., heart rate variability, cortisol levels) may further validate the mechanisms underlying the benefits of square breathing.

CONCLUSION

The findings revealed that before the intervention, many elderly individuals experienced moderate to high levels of stress and fatigue, with poor sleep quality. After implementing square breathing exercises, there was a significant reduction in stress and fatigue levels, accompanied by improved sleep quality. This indicates that square-breathing exercises are an effective, non-pharmacological intervention for promoting mental relaxation and improving sleep quality among the elderly. These findings emphasise the need to integrate such breathing exercises into daily routines and elderly care programs to promote better health and quality of life in ageing populations.

REFERENCES

[1] Åkerstedt, Torbjörn, et al. "Aging and the change in fatigue and sleep–a longitudinal study across 8 years in three age groups." *Frontiers in psychology* 9 (2018): 234.

[2] "Census Tables." Government of India Census, Government of India, https://censusindia.gov.in/census.website/data/census-tables . Accessed 24 Nov. 2025.

[3] Giridhar, Garimella, et al., eds. *Population ageing in India*. Cambridge University Press, 2014.

[4] Debnath, Abantika, et al. "Prevalence of anemia among elderly population residing in an Urban Area of West Bengal: a community-based cross-sectional analytical study." *Indian Journal of Community Medicine* 47.4 (2022): 604-608.

[5] Chattu, Vijay Kumar, et al. "The global problem of insufficient sleep and its serious public health implications." *Healthcare*. Vol. 7. No. 1. MDPI, 2018.

[6] Nigar, Kashfi, and Praveen Kumar Pathak. "Exploring the intersectional dynamics of co-morbidities and risk factors among the older population in India." *Archives of Public Health* 83.1 (2025): 208.

[7] Sharma, Palak, Priya Maurya, and T. Muhammad. "Number of chronic conditions and associated functional limitations among older adults: cross-sectional findings from the longitudinal aging study in India." *BMC geriatrics* 21.1 (2021): 664.

[8] Muhammad, T., et al. "Demographic, socioeconomic, and health correlates of sleep quality and sleep duration among community-dwelling older adults in India." *BMC psychiatry* 24.1 (2024): 665.

[9] Zhou, Jia, et al. "The associations between depressive symptoms, functional impairment, and quality of life, in patients with major depression: undirected and Bayesian network analyses." *Psychological Medicine* 53.14 (2023): 6446-6458.

[10] Turk, Dennis C., et al. "Assessment of psychosocial and functional impact of chronic pain." *The Journal of Pain* 17.9 (2016): T21-T49.

[11] Brandt, Lasse, et al. "The effects of social isolation stress and discrimination on mental health." *Translational psychiatry* 12.1 (2022): 398.

[12] Rahman, Mohammad Ishtiaque, Jahangir Alam, and Forhan Bin Emdad. "Challenges of elderly caregiving in the Indian subcontinent: a scoping review." *Public Health Challenges* 4.3 (2025): e70085.

[13] Lawless, Trinity. "The Impact of Mindfulness Strategies in an Elementary Classroom." (2026).

[14] Myerholtz, Linda. **"**Take a Deep Breath**."** *Family Medicine*, vol. 55, no. 4, Apr. 2023, pp. 284–285. PubMed Central, https://pmc.ncbi.nlm.nih.gov/articles/PMC10622034/. Accessed 25 Nov. 2025

[15] Saini, Michael, et al. "VOLUME 26 Summer 2025 NUMBER 3." *Cardozo Journal of Conflict Resolution* 26.3 (2025).
[16] Harris, Kristie M., et al. "The perceived stress scale as a measure of stress: decomposing score variance in longitudinal behavioral medicine studies." *Annals of Behavioral Medicine* 57.10 (2023): 846-854.
[17] De Vries, Jolanda, et al. "Measuring fatigue in sarcoidosis: the Fatigue Assessment Scale (FAS)." *British journal of health psychology* 9.3 (2004): 279-291.
[18] Buysse, Daniel J., et al. "The Pittsburgh Sleep Quality Index: a new instrument for psychiatric practice and research." *Psychiatry research* 28.2 (1989): 193-213.
[19] Prakash, Shiv, and Saurav Kumar. "Perceived stress and quality of life of elderly living separately from their adult children-a cross-sectional comparative study." *International Journal of Health Sciences and Research* 9.4 (2019): 7-13.
[20] Minz, Sarojini, et al. "Subjective sleep quality and sleep habits of elderly inhabiting rural areas of Sambalpur district of Odisha, India." *PloS one* 19.12 (2024): e0314770.
[21] Agarwal, Shilpi, et al. "To assess the prevalence and predictors of cancer-related fatigue and its impact on quality of life in advanced cancer patients receiving palliative care in a tertiary care hospital: A cross-sectional descriptive study." *Indian journal of palliative care* 26.4 (2020): 523.
[22] Hu, Ting, et al. "Prevalence of fatigue and perceived fatigability in older adults: a systematic review and meta-analysis." *Scientific Reports* 15.1 (2025): 4818.
[23] Marchant, Joshua, et al. "Comparing the Effects of Square, 4–7-8, and 6 Breaths-per-Minute Breathing Conditions on Heart Rate Variability, CO2 Levels, and Mood." *Applied Psychophysiology and Biofeedback* 50.2 (2025): 261-276.
[24] Zare, Fatemeh, et al. "Comparing effects of breathing exercises alone and combined with breathing-stretching exercises on respiratory indices, disease severity and exercise capacity in COPD." *Scientific Reports* 15.1 (2025): 5068.
[25] Andas, Amzal Mortin, et al. "The Effect of Box Breathing on Sleep Disorders in Elderly at Tresna Werdha Social Institution." *Malaysian Journal of Medicine & Health Sciences* 19 (2023).
[26] Morgan, Sandra P., Cecile A. Lengacher, and Yaewon Seo. "A systematic review of breathing exercise interventions: An integrative complementary approach for anxiety and stress in adult populations." *Journal of Holistic Nursing* 43.4 (2025): 354-376.
[27] Fincham, Guy William, et al. "Effect of breathwork on stress and mental health: A meta-analysis of randomised-controlled trials." *Scientific reports* 13.1 (2023): 432.