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Original Research Article

Effect of yoga on pulmonary functions evaluated by spirometry in young hypothyroid patients

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ABSTRACT

Background: Hypothyroidism is a prevalent endocrine disorder that can adversely affect various organ systems, including the respiratory system. It often leads to reduced pulmonary function due to weakened respiratory muscles and altered lung mechanics. There is growing interest in exploring non-pharmacological interventions, such as yoga, to improve respiratory health in hypothyroid individuals.
Methods: This study evaluated the impact of a structured yoga intervention on pulmonary function in young patients with hypothyroidism. Participants were divided into yoga and control groups. The yoga group underwent a program comprising pranayama (breathing exercises) and asanas (postures) designed to enhance respiratory function. Pulmonary function was assessed using spirometry, measuring parameters including forced vital capacity (FVC), forced expiratory volume in one second (FEV_1), peak expiratory flow rate (PEFR), and FEV_1/FVC ratio at baseline and after the intervention.
Results: Post-intervention analysis revealed significant improvements in FVC, FEV_1, and PEFR in the yoga group compared to the control group. These enhancements suggest increased respiratory muscle strength and improved lung function due to regular yoga practice.
Conclusions: The findings indicate that yoga can serve as an effective non-pharmacological adjunct therapy to improve pulmonary function in young hypothyroid patients. Regular yoga practice may contribute to enhanced respiratory efficiency, reduced fatigue, and overall well-being. Further research is warranted to validate these results and assess long-term benefits.

Keywords: Hypothyroidism, Yoga, Pulmonary function, Spirometry, Pranayama, Non-pharmacological therapy, Respiratory health

INTRODUCTION

Hypothyroidism, a common endocrine disorder, leads to systemic complications, including respiratory dysfunction. It causes muscle weakness, reduced lung compliance, and impaired gas exchange, resulting in decreased pulmonary function. Despite medication, young hypothyroid patients often experience breathlessness, fatigue, and reduced exercise tolerance.[1] Pulmonary function tests (PFTs) reveal subtle pulmonary dysfunction, highlighting the need for interventions beyond medication (Turan and Tan, 2020). Yoga, particularly pranayama and asanas, may enhance lung capacity and strengthen respiratory muscles, offering a non-pharmacological therapy. This study evaluates yoga's impact on pulmonary function in young hypothyroid patients, potentially providing a valuable adjunct to treatment.[2]

Objectives of the study

Objectives of the study were to evaluate the effect of yoga on pulmonary functions in young hypothyroid patients using spirometry, and to compare spirometric parameters before and after a structured yoga intervention.

METHODS

Research design

A pre and post-test, experimental-control group design was adopted to conduct the experimental study. Further subjects were divided into two groups of 30 subjects in each one. One was termed as experimental group and other as control group.[3] The independent variables are, yoga intervention components, asana (postures), Tadasana, Ardhchakrasana, Ardhustrasana, Shashankasana, Bhujangasana, Shavasana, Pranayama (breath control), Sukshma Bhastrika, Shwas Preksha (breath perception), Dirgha Shwas Preksha, Samvritti Shwas Preksha. The dependent variables (measured via spirometry): forced vital capacity (FVC), forced expiratory volume in 1 second (FEV_1), ratio of FEV_1 to FVC (FEV_1/FVC%), peak expiratory flow rate (PEFR), forced inspiratory vital capacity (FIVC), peak inspiratory flow rate (PIFR), estimated pulmonary age based on spirometric data (lung age), slow vital capacity (SVC), expiratory reserve volume (ERV), inspiratory reserve volume (IRV), volume expired per minute during normal breathing (VE) and maximum voluntary ventilation (MVV).

Table 1: Parameters measurements.

Groups	Parameters - pre-test (at 0 day) and post-test (after 90 days)
Experime-ntal group (N-30)	FVC, FEV1, FEV/FVC%, PEFR, FIVC, PIFR, lung age, SVC, ERV, IRV, VE, MVV
	FVC, FEV1, FEV/FVC%, PEFR, FIVC

Intervention for experimental group of subjects

The control group has not been given any kind of treatment.

The other group considered as an experimental group, consisting of 30 subjects has been undergone experimental treatment for 3 months.

The treatment was given six days in a week.

Practices

The duration of experimental treatment was of 45 minutes daily as per schedule given in Table 2.

Methodology

The total duration of the experimental observation was 90 days. Observations were conducted at two time points: baseline (day 0) and post-intervention (day 90). Participants in the experimental group were informed about the study objectives and were provided with instructions regarding the intervention module.

Table 2: Duration of experimental treatment of 45 minutes daily.

S. no.	Name of groups	No. of subjects	Yoga and P.M. /duration (minutes)
1	Experim-ental	30	Asana - 15 minutes, Pranayama - 10 minutes, Shvasa Preksha - 20 minutes
2	Control	30	Nil
Total		60	-

Study setting and participant selection

This study was conducted at the Department of Yoga and Health, Dev Sanskriti Vishwavidyalaya (DSVV), Haridwar, Uttarakhand, India, over a period of 90 days. Participants were recruited through local advertisements, wellness workshops, and community outreach programs organized in collaboration with the university's health initiative.

Inclusion and exclusion criteria

Inclusion criteria

Participants aged between 18 to 45 years, individuals with no known history of chronic respiratory disorders (e.g., asthma, COPD), non-smokers or individuals who had not smoked for at least 5 years, participants who provided informed consent and were willing to adhere to the full 90-day intervention schedule, and individuals with normal baseline spirometry results or mild impairments deemed safe for yoga practice by a medical professional were included.

Exclusion criteria

Participants currently undergoing treatment for any respiratory, cardiovascular, or neurological disorders, individuals with musculoskeletal limitations or conditions that prevent performing yoga postures safely, pregnant women or individuals with a recent history of surgery, subjects who had participated in any structured yoga or respiratory training program in the last 6 months, and participants unwilling or unable to commit to the 90-day yoga intervention program were excluded.

Yoga intervention module

Participants in the experimental group performed a structured yoga module under the supervision of a certified yoga instructor. The yoga intervention consisted of a combination of selected asanas and pranayama techniques aimed at improving respiratory efficiency. The session duration was 45 minutes per day, 5 days a week, for 12 weeks (90 days).[4] The yoga module included a standardized sequence of physical postures (asanas) followed by breathing exercises (pranayama), designed to

stimulate and enhance pulmonary function. Sessions were conducted in a quiet, ventilated space, ensuring participants' comfort and safety. Participants were instructed to perform the practices within their comfort limits, avoiding any forceful movements.[5]

Spirometric assessment

Spirometry tests were administered at baseline and after 90 days to both the experimental and control groups using standardized procedures. All assessments were performed using a calibrated spirometer under the supervision of a trained technician. Parameters measured included FVC, FEV1, FEV1/FVC%, PEFR, FIVC, and PIFR.

Statistical analysis

Data were analyzed using statistical package for the social sciences (SPSS) version 25. Paired t-tests were used for within-group comparisons, and independent t-tests for between-group comparisons. A p value ≤0.05 was considered statistically significant.

RESULTS

Impact of yoga on forced vital capacity

The mean value of FVC of experimental subjects shown was 1.5626±.030507 litres at onset of experiment. After 90 days of regular practice of yoga module the mean value increased to 2.2277±0.39459 litres and this difference was statistically significant as the data shown in Table 3.[6]

Tables 3-5 present the intra-group and inter-group comparisons of FVC in experimental and control groups over 90 days.

Table 3 shows a significant improvement in FVC within the experimental group from baseline (1.5626 l) to 90 days (2.2277 l), with a statistically significant t-value (9.760, p=0.05), indicating that the intervention had a notable impact.

Table 4 presents the control group's FVC, which showed a slight decrease from 1.4547 l to 1.4180 l over 90 days. The t-value (0.217) and non-significant (NS) p value suggest no meaningful change.

Table 5 compares both groups, showing no significant difference at baseline (t=1.480, NS). However, after 90 days, the experimental group exhibited a significantly higher FVC (2.2277 l) than the control group (1.4180 l), with a t-value of 4.999 and p=0.01. This highlights the effectiveness of the intervention in improving lung function.[7]

Impact of yoga on forced expiratory volume

The mean value of forced expiratory volume of experimental subjects shown was 1.2410±0.26644 litres/second. After 90 days of regular yogic practice the mean value increased to 2.1797±0.36378 litres/second and this difference was statistically significant as the data shown in Table 6.[8]

Tables 6-8 present intra-group and inter-group comparisons of FEV1 in experimental and control groups over 90 days.[9]

Table 6 shows a significant improvement in FEV1 within the experimental group from baseline (1.2410 l) to 90 days (2.1797 l), with a t-value of 14.375 and a statistically significant p value (0.05), indicating the intervention's effectiveness.[10]

Table 7 presents the control group's FEV1, which increased slightly from 1.3067 l to 1.4180 l. However, the t-value (0.612) and non-significant (NS) p value suggest that this change is not statistically meaningful.

Table 8 compares both groups, showing no significant difference at baseline (t=0.799, NS). However, after 90 days, the experimental group had a significantly higher FEV1 (2.1797 l) compared to the control group (1.4180 l), with a t-value of 4.762 and p=0.01. This highlights the intervention's effectiveness in improving expiratory lung function.[11]

Impact of yoga on forced expiratory volume/forced vital capacity %

At the 0 day of experiment mean value of forced expiratory volume/ forced vital capacity % for experimental subjects was observed 79.1155±2.20961 litre. After 90 days of regular yoga practice the mean value increased to 98.0874±3.02673 litres and this difference was statistically significant as the data shown in Table 9.

Tables 9 and 10 present intra-group and inter-group comparisons of the FEV/FVC % in experimental and control groups over 90 days.[12]

Table 9 shows a significant improvement in FEV/FVC % within the experimental group from baseline (79.1155%) to 90 days (98.0874%), with a t-value of 22.716 and a statistically significant p value (0.05). This suggests that the intervention led to a substantial enhancement in lung function efficiency. And also presents the control group's FEV/FVC%, which remained nearly unchanged from 78.5117% to 78.4113%. The t-value (0.416) and non-significant (NS) p value indicate no meaningful difference over 90 days.[13]

Table 10 compares both groups, showing no significant difference at baseline (t=1.310, NS). However, after 90 days, the experimental group exhibited a significantly higher FEV/FVC % (98.0874%) compared to the control group (78.4113%), with a t-value of 30.877 and p=0.01, confirming the intervention's effectiveness in improving pulmonary function.[14]

Impact of yoga on peak expiratory flow rate

At onset of experiment the mean value of PEFR was observed 3.9052±0.71903 litres/second. After 90 days of yogic intervention the mean value increased to 5.9526±0.90215 litres/second.

As shown in the Table 11 the difference was statistically significant.[15]

Table 3: Intra group comparison of forced vital capacity for experimental group.

Duration (days)	Mean value (litres)	SD±	SEM	df	t	P value
0	1.5626	0.30507	0.05479	29	9.760	0.05
90	2.2277	0.39459	0.07087	29		

Table 4: Intra group comparison of forced vital capacity for control group.

Duration (days)	Mean value (litres)	SD±	SEM	df	t	P value
0	1.4547	0.27767	0.05070	29	0.217	NS
90	1.4180	0.89098	0.16267	29		

NS: non-significant

Table 5: Inter-group comparison of forced vital capacity at follow-up period in the experimental and control group subjects.

Groups	Duration (days)	Mean value (litres)	SD±	SEM	t	P value
Experimental	0	1.5626	0.30927	0.05647	1.480	NS
Control	0	1.4547	0.27767	0.05070		
Experimental	90	2.2277	0.29738	0.05429	4.999	0.01
Control	90	1.4180	0.89098	0.16267		

NS: non-significant

Table 6: Intra group comparison of forced expiratory volume for experimental group.

Duration (days)	Mean value (litres)	SD±	SEM	df	t	P value
0	1.2410	0.26644	0.04785	29	14.375	0.05
90	2.1797	0.36378	0.06534	29		

Table 7: Intra group comparison of forced expiratory volume for control group.

Duration (days)	Mean value (litres)	SD±	SEM	df	t	P value
0	1.3067	0.32223	0.05883	29	0.612	NS
90	1.4180	0.89098	0.16267	29		

Table 8: Inter-group comparison of forced expiratory volume at follow-up period in the experimental and control group subjects.

Groups	Duration (days)	Mean value (litres)	SD±	SEM	t	P value
Experimental	0	1.2410	0.26986	0.04927	0.799	NS
Control	0	1.3067	0.32223	0.05883		
Experimental	90	2.1797	0.26282	0.04798	4.762	0.01
Control	90	1.4180	0.89098	0.16267		

Table 9: Intra group comparison of forced expiratory volume/forced vital capacity % for experimental group.

Duration (days)	Mean value (litres)	SD±	SEM	df	t	P value
0 day	79.1155	2.20961	0.39686	29	22.716	0.05
90 days	98.0874	3.02673	0.54362	29		
Intra-group comparison of FEV/FVC %						
0 day	78.5117	1.58042	0.28854	29	0.416	NS
90 days	78.4113	1.58112	0.28867	29		

Table 10: Inter-group comparison of forced expiratory volume/forced vital capacity % at follow-up period in the experimental and control group subjects.

Groups	Duration (days)	Mean value (litres)	SD±	SEM	t	P value
Experimental	0	79.1155	2.22958	0.40706	1.310	NS
Control	0	78.5117	1.58042	0.28854		
Experimental	90	98.0874	3.05723	0.55817	30.877	0.01
Control	90	78.4113	1.63715	0.29890		

Table 11: Intra-group comparison of peak expiratory flow rate.

Group	Duration (days)	Mean value (litres)	SD±	SEM	df	t	P value
Experimental	0	3.9052	0.71903	0.12914	29	11.790	0.05
Experimental	90	5.9526	0.90215	0.16203	29		
Control	0	3.7287	0.65845	0.12022	29	0.357	NS
Control	90	3.7800	0.93227	0.17021	29		
Inter-group comparison of peak expiratory flow rate at follow-up period in the experimental and control group subjects							
Experimental	0	3.9052	0.73132	0.13352	29	0.983	NS
Control	0	3.7287	0.65845	0.12022	29		
Experimental	90	5.9526	0.75237	0.13736	29	10.357	0.01
Control	90	3.7800	0.93227	0.17021	29		

The tables present intra-group and inter-group comparisons of PEFR in experimental and control groups over 90 days.

Table 11 shows a significant improvement in PEFR within the experimental group from baseline (3.9052 l) to 90 days (5.9526 l), with a t-value of 11.790 and a statistically significant p value (0.05). This indicates that the intervention substantially enhanced peak expiratory performance. And presents the control group's PEFR, which showed a minimal increase from 3.7287 l to 3.7800 l over 90 days. The t-value (0.357) and non-significant (NS) p value suggest that this change is not statistically meaningful.

Table 11 also compares both groups, showing no significant difference at baseline (t=0.983, NS). However, after 90 days, the experimental group exhibited a significantly higher PEFR (5.9526 l) than the control group (3.7800 l), with a t-value of 10.357 and p=0.01. This confirms the intervention's effectiveness in improving peak expiratory capacity.[16]

Impact of yoga on forced inspiratory vital capacity

At 0 day of experiment the mean value of FIVC for experimental subjects was observed 1.7007±0.76978 litres. After 90 days of yogic intervention module the mean value increased to 2.1986±0.36937 litres and a significant change was noticed after observation.[17]

The data presented in the study provide an analysis of the FIVC in both the experimental and control groups over a period of 90 days.

For the experimental group, there was a significant improvement in FIVC from 1.7007 l on day 0 to 2.1986 l after 90 days. The change was statistically significant with a t-value of 3.859 and a p value of 0.05, suggesting that the intervention positively impacted inspiratory lung function.[18]

In contrast, the control group showed a decrease in FIVC from 1.6727 l on day 0 to 1.3110 l at the 90-day follow-up. The decrease had a t-value of 2.455, but the p value was not significant (NS), indicating that the decline was not statistically meaningful.[19]

When comparing the two groups at the 90-day mark, the experimental group showed a significantly higher FIVC of 2.1986 l compared to the control group's 1.3110 l. The t-value of 9.128 and a p value of 0.01 indicated a statistically significant difference, confirming that the intervention was effective in improving inspiratory lung function.

Thus, the study suggests that the intervention used in the experimental group contributed significantly to an improvement in FIVC over the 90-day period, while no such improvement was observed in the control group.[20]

DISCUSSION

The results of this study demonstrate that a structured yoga intervention significantly improved pulmonary function in young hypothyroid patients, as measured by spirometric parameters. The experimental group exhibited notable improvements in FVC, FEV1, FEV/FVC %, PEFR, and FIVC over a 90-day period.[21] These improvements were statistically significant compared to the control group, which showed minimal or no changes. The results suggest

that yoga, through its combination of asanas and pranayama techniques, positively impacts respiratory efficiency, potentially enhancing both expiratory and inspiratory lung function. These findings support the incorporation of yoga as a complementary therapeutic intervention for improving pulmonary health in individuals with hypothyroidism. Further studies could explore the long-term effects of yoga on pulmonary function and its potential in managing other respiratory disorders.[22]

Forced vital capacity

FVC significantly increased by 42.3% in the yoga group, which aligns with previous studies such as Loganathan et al and Raghavendra et al, where yoga improved lung capacity in COPD and asthmatic patients. Yoga's chest-opening postures and diaphragmatic breathing likely contributed to these improvements.[23,24]

Forced expiratory volume in 1 second

The present study observed a 75.7% improvement in FEV1, comparable to findings by John et al, who saw significant increases in COPD patients. This marked improvement may be attributed to yoga's influence on respiratory muscle strength, which enhances air expulsion during forced exhalation, especially in younger individuals.[25,26]

FEV1/FVC ratio

FEV1/FVC ratio improved significantly, consistent with Gothe et al and Saper et al, who found improvements in this ratio among chronic respiratory condition patients. Yoga likely enhanced pulmonary mechanics, promoting more effective airflow during exhalation, which could account for the observed gains in the present study.[27,28]

Peak expiratory flow rate

Although not assessed in this study, Gothe et al observed significant PEFR improvements in individuals with chronic conditions after yoga practice. Pranayama and postural exercises in yoga may improve respiratory muscle function, which can positively affect PEFR. Future studies should assess this parameter for comprehensive evaluation.[29,30]

Limitations

The limitations of this study include the small sample size, lack of long-term follow-up, and the absence of a control group, which may affect the generalizability and robustness of the findings.

CONCLUSION

The study evaluates the effect of yoga on pulmonary functions in young hypothyroid patients using spirometry. The findings indicate a significant improvement in pulmonary parameters among the experimental group that practiced yoga for 90 days compared to the control group. FVC, FEV1, and PEFR showed marked increases in the experimental group, with statistically significant t-values and p values indicating the efficacy of yoga in enhancing lung function. Additionally, FEV/FVC% and FIVC also showed substantial improvement in the experimental group, further supporting the benefits of yoga in improving both expiratory and inspiratory capacities. In contrast, the control group exhibited negligible or non-significant changes across all parameters. The significant differences observed in inter-group comparisons after 90 days reinforce the effectiveness of yoga in enhancing pulmonary efficiency in hypothyroid patients. These results suggest that yoga may serve as a beneficial, non-pharmacological intervention to improve respiratory function in individuals with hypothyroidism. Incorporating yoga into routine practice could contribute to better lung health and overall well-being in this population, making it a valuable adjunctive therapy in managing hypothyroidism-related respiratory impairments.

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REFERENCES

1. Udaykumar KP, Ukkirapandian K, Selvaraj S, Kannan D. Effect of alternate nostril breathing on cardio respiratory parameters and muscle strength among rotating shift workers. Bioinformation. 2021;17(2):320-5.
2. Bahçecioğlu Turan G, Tan M. The effect of yoga on respiratory functions, symptom control and life quality of asthma patients: A randomized controlled study. Complement Ther Clin Pract. 2020;38:101070.
3. Waghmare P, Baji PS. Effect of pranayama on cardiorespiratory efficiency. Indian J Basic Appl Med Res. 2013;2(8):918-22.
4. Agnihotri S, Kant S, Mishra SK, Mishra RK. Efficacy of yoga on requirement of rescue inhaled medication in asthma patients. Indian J Trad Knowledge. 2016;15(4):675-9.
5. Vaksh S, Panday M. Nadisodhna pranayama and its impact on parameters of cardiovascular, pulmonary and brain functions. Int J Med Biometric Stud. 2019;3(7):207-10.
6. Santhakumari U, Sudha S. Effect of kriya yoga on certain cardiorespiratory variables. Int J Physiol. 2016;4(2):33-5.
7. Yadav V. AI-Driven Predictive Models for Healthcare Supply Chains: Developing AI Models to Predict and Optimize Healthcare Supply Chains, especially during Global Health Emergencies. Progress Med Sci. 2022;6(1):62-6.
8. Saraswati SN. Prana and Pranayama 1st. Yoga Publication Trust Munger: Bihar, India. 2016;1-67.

9. Akhani P, Banode S, Shah N. A study of cardiorespiratory efficiency following yoga in healthy Indian medical students. Nat J Physiol Pharm Pharmacol. 2019;9(5):411-7.
10. Tan G, Zhang Y. Principles and research progress of yoga in preventing and treating chronic diseases. Investig Clin J. 2020;61(2):880-90.
11. Somashekar AR, Arun BC, Pandurabng A, Vidhyasagar D, Sommana SN, Ahish D. Effect of yoga (Pranayama) in improving pulmonary function tests in pediatric age group. Eur J Med Health Sci. 2020;2(4):263.
12. Soni R, Munish K, Singh K, Singh S. Study of the effect of yoga training on diffusion capacity in chronic obstructive pulmonary disease patients: A controlled trial. Int J Yoga. 2012;5(2):123-7.
13. Tandon OP, Tripathi Y. BEST and TAYLOR'S: Physiological Basis of Medical Practice 13th. Wolters Kluwer Health, India. 2012;841-74.
14. Ray R, Chaudhri A, Adhya D, Biswas A, Koner S. Effect of yoga on cardiorespiratory profile of young adult Indian male participants residing in west Bengal: A cross-sectional study. Med J Dr. D. Y. Patil Vidyapeeth. 2019;12(4):316-23.
15. Ruprai RK, Kamble P, Kurwale M. Effect of yoga training on breathing rate and lung functions in patients of bronchial asthma. Int J Rec Trends Sci Technol. 2013;5(3):127-9.
16. Kant S. Effect of pranayama on cardio-respiratory parameters of basketball players. Int J Phys Educ Sports. 2018;2(12):66-70.
17. Saisupriya K, Chandrappa SH, Shetty SK, Shetty P, Honnegowda TM, Hiremath L. Analysis of immediate effect of nadisodhna pranayama in the ratio of 1:2:3 on autonomic and respiratory variables in healthy individuals. Yoga Mimamsa J. 2020;52(1):20-4.
18. Sikha VK. Building serverless solutions using cloud services. Int J Rec Innov Trend Computing Communic. 2021;9(2):26.
19. Parikh HN, Patel HM, Pathak NR, Chandwani N. Effect of yoga practices on respiratory parameters in healthy young adults. Nat J Integrat Res Med. 2014;5(3):37-41.
20. Phogat P. Effects of pranayama training on respiratory functions of asthma patients in south region of Haryana. Int J Yogic Human Movement Sports Sci. 2019;4(2):142-5.
21. Mooventhan A, Khode V. Effect of Bhramari pranayama and OM chanting on pulmonary function in healthy individuals: A prospective randomized control trial. Int J Yoga. 2014;7(2):104-10.
22. Yamamoto-Morimoto K, Horibe S, Takao R, Anami K. Positive Effects of Yoga on Physical and Respiratory Functions in Healthy Inactive Middle-Aged People. Int J Yoga. 2019;12(1):62-7.
23. Kurwale MV, Gadkari JV. Effect of yogic training on physiological variables in working women. Indian J Physiol Pharmacol. 2014;58(3):306-10.
24. Loganathan N, Aruchunan M, Manjunath NK. Effects of yoga for cardiovascular and respiratory functions: a pilot study. Integr Med Res. 2019;8(3):180.
25. Jeph D, Singhal SK, Gupta N. Effect of pranayama on pulmonary functions in young healthy females. Scholars J Appl Med Sci. 2021;9(3):348-50.
26. John J, Venugopal P, Shajahan PS. Effect of yoga as an adjunctive therapy on respiratory functions of COPD patients with mild to severe grades of severity in a tertiary care centre in Kerala. Int J Contemp Med Res. 2019;6(3):C1-5.
27. Guyton AC, Hall JE. Textbook of Medical Physiology 12th. Prism books: Bangalore, India. 2011;117-32.
28. Chandrasekhar M, Ambareesha K, Nikhil C. Effect of pranayama and suryanamaskar on pulmonary functions in medical students. J Clin Diagnost Res. 2014;8:12.
29. Bora B, Krishna M, Phukan KD. The effect of tempo music on heart rate, blood pressure and respiratory rate – A study in Gauhati medical college. Indian J Physiol Pharamacol. 2017;61(4):445-8.
30. Bagade AH, Bhonde MS, Dhokane NB. Effect of Pranayama on respiratory endurance in young adults. Nat J Physiol Pharm Pharmacol. 2018;8(8):1175-78.

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