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IMPACT OF AEROBIC EXERCISE ON PULMONARY FUNCTION PARAMETERS IN FEMALES WITH HYPOTHYROIDISM: AN EXPERIMENTAL STUDY

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ABSTRACT

Background: Hypothyroidism is endocrine disorder in which thyroid gland doesn't produce enough thyroid hormones is prevalent globally, particularly in India with prevalence of 10.95%. Hypothyroidism can cause respiratory difficulties. Aerobic exercise are the activities that use oxygen, enhancing blood circulation, cardiovascular and respiratory functions. **Need of Research:** In aerobic exercise walking is a widely practiced and beneficial activity for which further research is needed to optimize walking programs for specific populations and establish the optimal duration and intensity for achieving maximum health benefits. **Methodology:** Study was conducted on 70 Hypothyroidism females aged 25-65 years who selected with Simple random sampling were divided in Group A (Experimental n=35) and Group B (Control n=35). 4 weeks of Aerobic exercise (Brisk walking) with Conventional medical treatment was given in Group A and Regular walking with Conventional medical treatment was given in Group B. FVC, FEV1, FEV1/FVC, PEFR% predicted were assessed. **Results:** Paired and Un-paired t-test were used. In Group A, FVC ($p=0.279$), FEV1 ($p=0.069$), & FEV1/FVC($p=0.255$) shows no significant difference. While PEFR ($p<0.001$) shows significant difference after intervention. In Group B, FVC ($p=0.729$), FEV1 ($p=0.600$), FEV1/FVC ($p=0.064$) and PEFR

(p=0.112) shows no significant difference in within group analysis. While in between group analysis no any significant difference seen. **Conclusion:** The results shows Brisk walking is efficient kind of exercise enhances certain pulmonary functions specifically PEFR in hypothyroid females, suggest that regular aerobic activity positively influences respiratory efficiency and airway flow dynamics.

Keywords: Aerobic exercise, Brisk walking, Pulmonary Function test, Hypothyroidism

INTRODUCTION

Hypothyroidism is an endocrine disorder occurs when the thyroid gland doesn't produce enough thyroid hormones T4 and T3, is prevalent worldwide including India which affects the health significantly **[1-4]**. The prevalence of hypothyroidism in people in India is between 3.9 % to 10.95% in which 3.47% were previously undetected. The prevalence of this condition was higher in women, that is 11.4%, compared to men, with a prevalence of 6.2% **[5]**. The prevalence of hypothyroidism is higher in people aged 46-54 years (13.1 %) compared to people aged 18-35 years (7.5%) **[6]**. Thyroid dysfunction can be classified as primary, which is caused by an anomaly in the thyroid gland itself, or secondary/central, which occurs as a result of hypothalamic or pituitary pathology **[3]**.

The TSH blood test is a straight forward method to determine the amount of T4 hormone that the thyroid gland is being stimulated to produce. An very elevated TSH test result indicates the presence of hypothyroidism.

Patients suffering from evident and persistent hypothyroidism may express symptoms such as difficulty breathing, excessive production of mucus, persistent coughing, wheezing and increased sensitivity of the airways **[1]**. While individuals with hypothyroidism may initially have normal lung volumes and pulmonary function test (PFT) results, these measurements might eventually develop into a restrictive pattern. Hypothyroidism is associated with the development of skeletal muscle myopathy. Patients with hypothyroidism see a decrease in their respiratory muscle strength **[7]**.

Pulmonary function testing is useful for the diagnosis and management of a variety of pulmonary conditions, and the most commonly obtained component is spirometry. Spirometry is most useful and fundamental in the evaluation of obstructive airway disorders but can be a helpful tool in the management of patients with chest restriction or mixed disease and used to measure general respiratory health. It is used to assess various respiratory parameters, such as Forced Vital capacity (FVC), Forced expiratory volume in 1 sec (FEV1), the ratio of forced expiratory volume in 1 second to

forced vital capacity (FEV1/FVC), and peak expiratory flow rate (PEFR) **[7-9]**.

Aerobic exercise are the activities that use oxygen to fuel the muscles, enhancing blood circulation, muscle strength, and cardiovascular and respiratory functions. Research suggests that aerobic exercise can influence metabolic and endocrine processes, affecting hormone levels and blood flow dynamics **[10]**. Brisk walking is a highly recommended form of physical activity, aligning with the World Health Organization's guidelines for achieving at least 150 minutes of moderate-intensity exercise per week. Walking offers numerous health benefits, including reduced mortality risk, improved cardiovascular health, better mental and cognitive health **[11, 12]**.

According to the health-related fitness paradigm, engaging in physical activity can ultimately impact health by influencing wellbeing, mortality, and morbidity. According to Xiaorong Bai et.al., engaging in fast walking as a kind of physical activity might enhance the health-related fitness **[11]**.

Walking has been associated with meeting the aerobic component of the Guidelines. Walking is an easy way for most adults to initiate or increase physical activity in their daily routines. Consequently, walking may present an opportunity for promoting physical activity among those at high risk for CVD, offering a simple way to avoid inactivity and increase physical activity. Understanding which types of walking are more or less prevalent in these populations can help to inform future interventions. Various studies have shown the positive influence of aerobic exercises on fitness and body composition but also asked the question of whether various models of aerobic exercises will have the same influence on various physical parameters. Walking programs can be beneficial for individuals with chronic health conditions. However, further research is needed to tailor walking programs to specific populations. The aim of this research is to determine the effects of an aerobics exercise program with Brisk walking on the Pulmonary functions in hypothyroidism females **[12]**.

MATERIAL AND METHODS

The Study was conducted on 74 Hypothyroidism females aged 25-65 years which were selected by simple random sampling technique (lottery method) which was conducted in different hospitals (Sainath hospital, Laxmi hospital etc.), various OPD and community area of Ahmedabad city. They were divided in two groups. Group A (Experimental n=37) and Group B (Control n=37). 4 weeks of Aerobic exercise was given in Group A and Group B was control group. Pre and post intervention Pulmonary function test (FVC, FEV1, FEV1/FVC, PEFR% predicted) were assessed in both the groups.

Inclusion criteria:

- Age: 25-65 years
- Females diagnosed with Hypothyroidism
- Females having hypothyroidism from at least 1 year
- Females diagnosed with Hypothyroidism (TSH >4.0 µlU/mL)

Exclusion criteria:

- Patients who have chronic pulmonary disease, hypertension, diabetes mellitus and chronic kidney disease, cardiac disease, stroke etc.
- Cigarette smokers
- Any recent surgery
- Patient having any other systemic illness
- Unwillingness to participate

Sample size calculation

G power software was used to determine the sample size. The sample size required for the study was 74, calculated by using the power of 80 and alpha 0.05.

Treatment intervention

Four weeks of aerobic training programme that is brisk walking was given to experimental group according to FITT principle. Brisk walking included warm up, Brisk walk-exercise period and cool down. Intensity was decided based on RPE Scale. In first week RPE was 3 or 4 which was progressed gradually up to 7 or 8 based on patient's level of exertion according to ACSM.[13] While in Group B Regular walking with their own pace and conventional medical treatment was given for 4 weeks.

Aerobic Exercise programme:

Participants were given 5 days of training/week for 4 weeks. They were given an Aerobic exercise program.

According to FITT Principle:

In Group A, four weeks of aerobic exercise program was given with conventional medical treatment.

Frequency:

5 days per week, starting with moderate frequency to avoid excessive fatigue based on RPE scale, after building endurance, frequency can be increased

Intensity:

Intensity is based on the **Rate of Perceived Exertion (RPE),** Modified borg dyspnea scale 0-10 was used. In first week RPE was 3 or 4 which was progressed gradually up to 7 or 8 based on patient's level of exertion.

Time:

Start with 15-20 minutes and increase duration up to 45-60 minutes/day (based on RPE scale)

Type of exercise:

Brisk Walking: 10 min-Warm up, 20-50 min Brisk Walk (based on RPE scale) &10 min- Cool down

Warm up: 10 min

Warm up exercises	Repetitions
March in place	1 Minute
Neck rotations (Clockwise, anticlockwise)	10 reps×1
Shoulder Rolls (Forward & backward)	10 reps×1
Arm swings (across chest and overhead)	10 reps×1
Upper body twist (Trunk rotation)	10 reps×1
Trunk side flexion (both sides)	10 reps×1
Trunk forward flexion & extension	10 reps×1
Shoulder circles (Clockwise, anticlockwise)	10 reps×1
Scapular Retraction	10 reps×1
Knee lifts (both sides)	10 reps×1
Alternate toe touch	10 reps×1
Ankle circles (Clockwise, anticlockwise on both sides)	10 reps×1
Calf raises	10 reps×1

Cool Down: 10 mins

Cool down exercises	Repetitions
Diaphragmatic Breathing	3 reps, 20-30 seconds hold
Static self-stretching of Hamstrings	3 reps, 20-30 seconds hold
Static self-stretching of quadriceps	3 reps, 20-30 seconds hold
Static self-stretching of adductors	3 reps, 20-30 seconds hold
Static self-stretching calf	3 reps, 20-30 seconds hold

Progression: Intensity of exercises will be increased every week on the base of RPE Scale.

Group B: Control group

In this group regular walking 20-50 minutes/day at their own pace along with conventional medical treatment was given.

Outcome measures

All the demographic measurements including age and BMI were taken. PFT measurements were taken at baseline and after four weeks of treatment intervention. Pulmonary functions were examined by Computerized spirometer HELIOS 401 (FEV1%, FVC%, FEV1/FVC%, PEFR% predicted).

Pulmonary Function Tests (PFT) [8, 9, 14]:

Prepare the patient

Confirm patient identification, age, gender, smoking history etc. Measure weight and height without shoes. Ask about activities, medication use, and any relative contraindications, note for any respiratory symptoms.

Perform Manoeuvre

FVC and FEV1 manoeuvre

The FVC manoeuvre has four different phases for spirometers that measure inspiration and expiration: 1) maximal inspiration, 2) a "blast" of expiration, 3) continuous full expiration for up to 15 seconds, and 4) inspiration at maximal flow returning to maximum lung capacity.

Inhale regularly, exhale fully and quickly, expire as hard as you can while keeping your

posture straight until no more air can be released. Put forth your best effort until you are fully inspired. As needed, reiterate directions while providing firm coaching. Do this for at least three moves. Verify the repeatability of FEV1 and FVC and carry out additional manoeuvres as needed.

Statistical Analysis:

Data were analyzed by using the statistical package for social sciences version 27 (SPSS 27) and Microsoft Excel 2013. Calculated Sample size was 74. There were 2 dropouts in each group. So final sample size was 70. Prior to statistical tests, data was screened for normal distribution. Tests of normality was done by Shapiro-Wilk test which shows most of the variables are normally distributed so parametric test was applied. Paired t-test was done for within group analysis. And Unpaired t-test was done for between group analysis. The baseline data were collected and measurements were repeated after 4 weeks of intervention.

RESULTS:

Total of 70 participants were evaluated in which they were divided in two groups. 35 participants in each group. As mentioned in **Table 1** Group A (Experimental n = 35), whose Mean ± SD of age (years) and BMI (kg/m2) were 45.23±8.66 and 27.41 ± 5.05, respectively, and Group B (Control n = 35), whose Mean ± SD of age and BMI were 40.83±9.78 and 24.60 ± 3.54 were taken.

In within group analysis, as mentioned in **Table 2** In Group A pre FVC is 78.31± 18.18 and Post FVC is 81.17±15.83 (p=0.279). Pre FEV1 is 92.06±21.02 and Post FEV1 is 97.20±17.76 (p=0.069). Pre FEV1/FVC is 118.09±10.70 and Post FEV1/FVC is 120.00±8.23 (p=0.255). Pre PEFR is 64.63±18.89 and Post PEFR is 70.80±18.4 (p<0.001). In Group A, FVC, FEV1, & FEV1/FVC shows no significant difference. While PEFR shows significant difference after intervention. As mentioned in **Table 3**. In Group B pre FVC is 79.29±15.71 Post FVC is 78.71±17.71 (p=0.729). Pre FEV1 is 93.49±18.33 and Post FEV1 is 94.51±20.14 (p=0.600). Pre FEV1/FVC is 118.23±7.81 and Post FEV1/FVC is 120.65±6.56 (p=0.064). Pre PEFR is 67.49±23.07 and Post PEFR is 70.20±20.25 (p=0.112). In Group B, FVC, FEV1 (p=0.600), FEV1/FVC and PEFR shows no significant difference.

As mentioned in **Table 4** In between group analysis, In Group A Mean ± SD of FVC, FEV1, FEV1/FVC, PEFR % predicted are 10.80±11.16, 10.80±11.16, 7.25±6.92 and 9.20±7.07 respectively. In Group B Mean ± SD of FVC, FEV1, FEV1/FVC, PEFR % predicted are 6.34 ±7.27, 8.06±8.14, 6.11±4.49 and 6.66±7.66 respectively. There was no significant difference between Group A and B in FVC(p=0.052), FEV1(p=0.271), FEV1/FVC(p=0.417) and PEFR(p=0.153).

Table 1: Baseline Characteristics of Participants

Demographics	Group A (n=35)	Group B (n=35)	P value
Age (years)	45.23±8.66	40.97±9.54	0.055
BMI (kg/m^2)	27.41±5.04	24.59±3.54	0.009
FVC (%predicted)	78.31±18.17	79.28±15.71	0.812
FEV1(%predicted)	92.05±21.01	93.48±18.32	0.763
FEV1/FVC(%predicted)	118.08±10.69	118.25±7.85	0.939
PEFR(%predicted)	64.62±18.89	67.48±23.06	0.573

(BMI- Body Mass Index, FVC- Forced Vital capacity, FEV1- Forced expiratory Volume in 1 second, PEFR- Peak Expiratory Flow Rate)

Statistically no significant difference with P >0.05. Values are expressed as mean ± SD.

Table 2: Mean and Standard Deviation of Age of Group A and Group B

Groups	Age (years) Mean ± SD
Group A	45.23±8.66
Group B	40.83±9.78

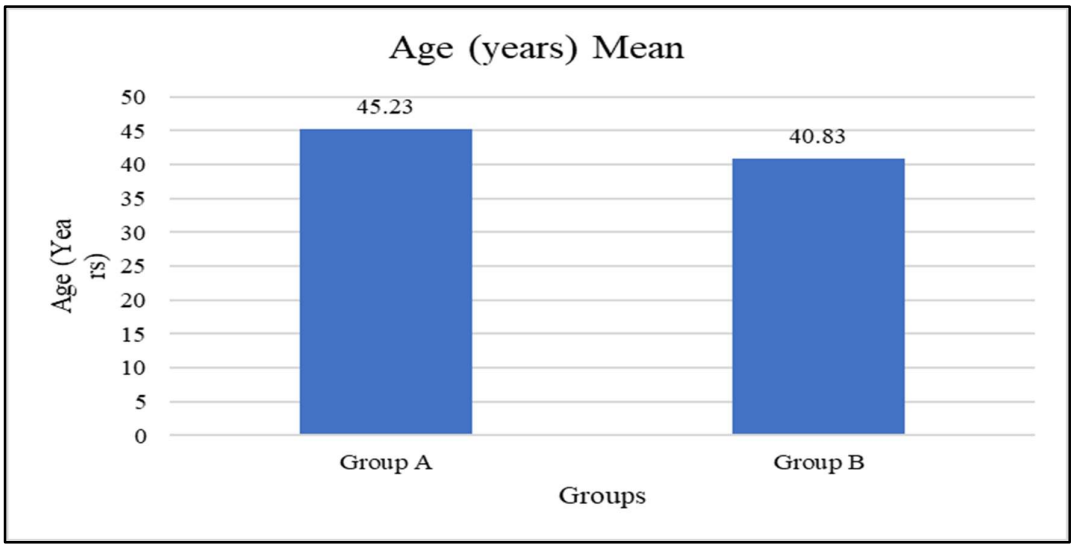

Figure 1: Mean of Age in years of Group A and Group B

Table 3: Pre and post-intervention analysis of PFT parameters with Paired t-test within group analysis of Group A

PFT Parameters	Pre Mean ± SD (% predicted)	Post Mean ± SD (% predicted)	Paired t Test	P value
FVC	78.31±18.18	81.17±15.83	1.100	0.279
FEV1	92.06±21.02	97.20±17.76	1.881	0.069
FEV1/FVC	118.09±10.70	120.00±8.23	1.158	0.255
PEFR	64.63±18.89	70.80±18.4	3.691	<0.001

(FVC- Forced Vital capacity, FEV1- Forced expiratory Volume in 1 second, PEFR- Peak Expiratory Flow Rate)

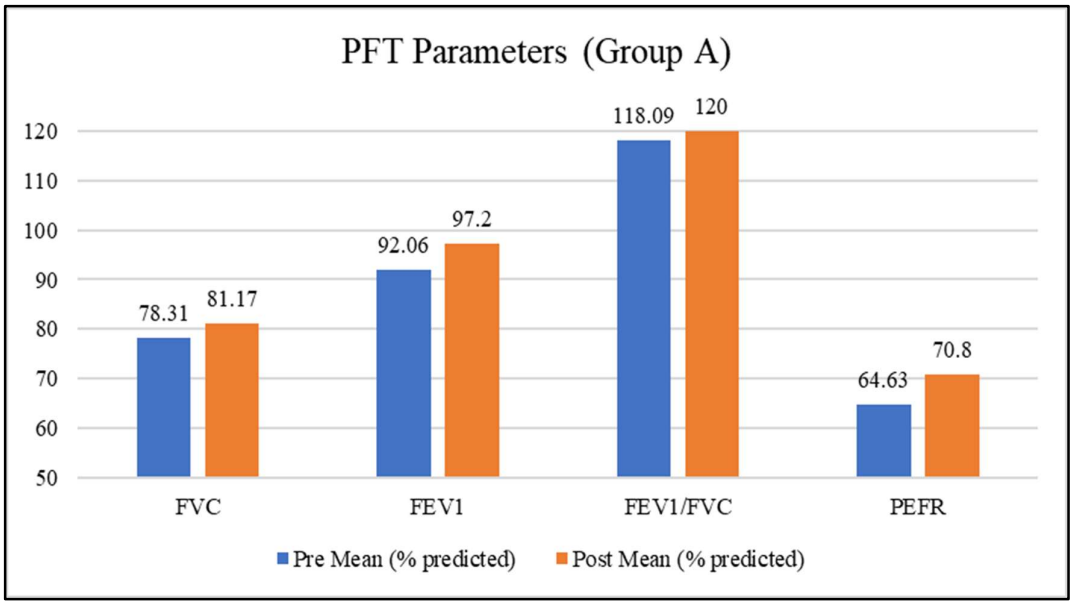

Figure 2: Pre and Post-Intervention analysis of PFT parameters with Paired t-test within group analysis of Group A

Table 4: Pre and post-intervention analysis of PFT parameters with Paired t-test within group analysis of Group B

PFT Parameters	Pre Mean ± SD (% predicted)	Post Mean ± SD (% predicted)	T value	P value
FVC	79.29±15.71	78.71±17.71	0.349	0.729
FEV1	93.49±18.33	94.51±20.14	0.53	0.600
FEV1/FVC	118.23±7.81	120.65±6.56	1.912	0.064
PEFR	67.49±23.07	70.20±20.25	1.633	0.112

(FVC- Forced Vital capacity, FEV1- Forced expiratory Volume in 1 second, PEFR- Peak Expiratory Flow Rate)

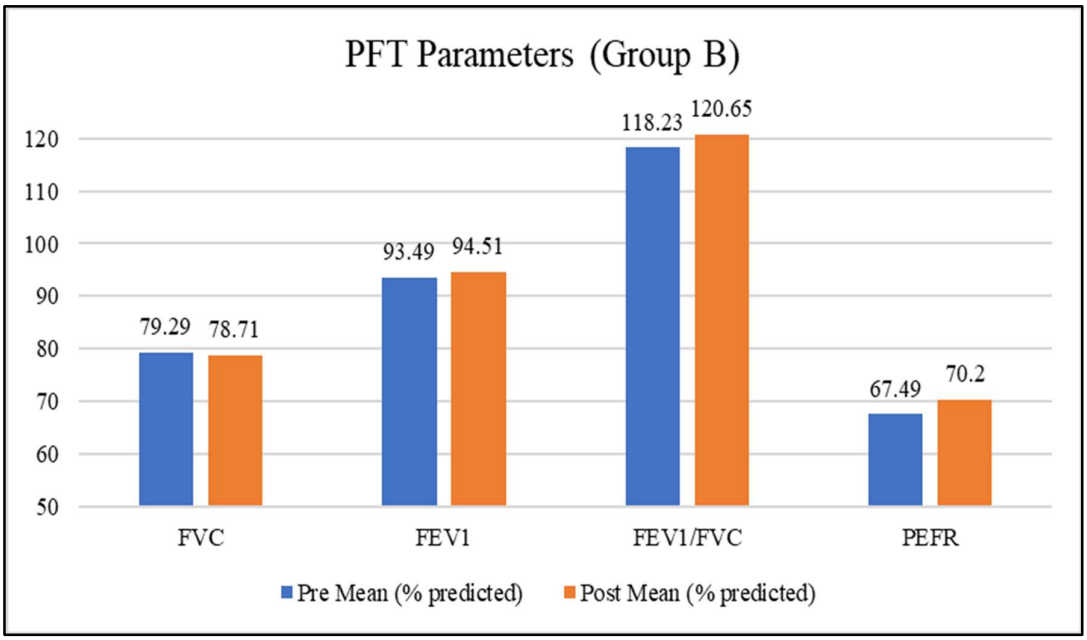

Figure 3: Pre and Post-Intervention analysis of PFT parameters with Paired t-test within group analysis of Group B

Table 5: Pre and post-intervention analysis of PFT parameters with Unpaired t-test between group analysis

PFT Parameters	Group A Mean ± SD (% predicted)	Group B Mean ± SD (% predicted)	Unpaired t Test	P value
FVC	10.80±11.16	6.34 ±7.27	1.98	0.052
FEV1	10.91 ±12.89	8.06±8.14	1.109	0.271
FEV1/FVC	7.25±6.92	6.11±4.49	0.817	0.417
PEFR	9.20±7.07	6.66±7.66	1.444	0.153

(FVC- Forced Vital capacity, FEV1- Forced expiratory Volume in 1 second, PEFR- Peak Expiratory Flow Rate)

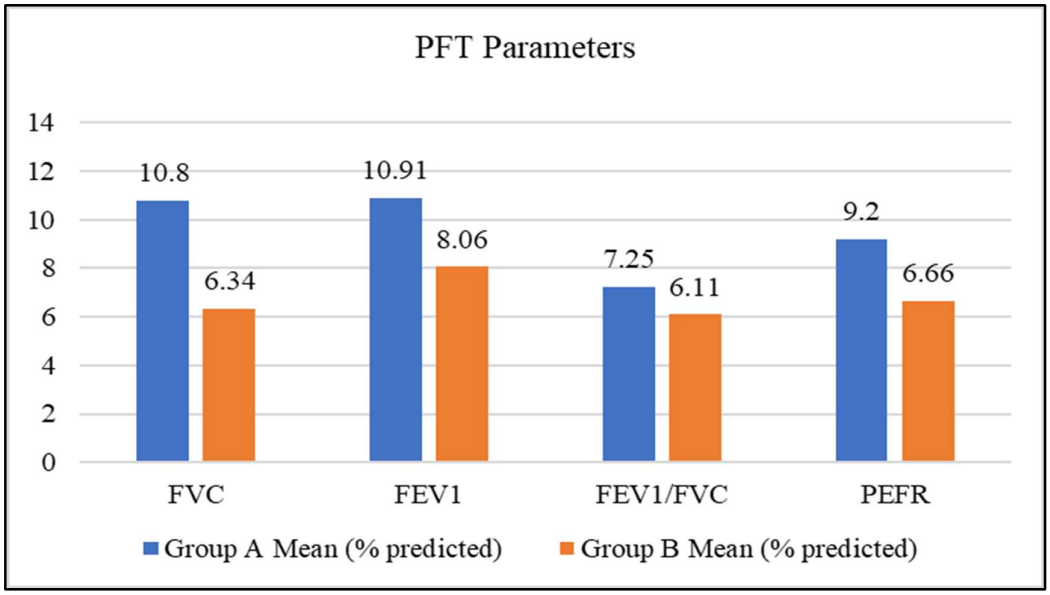

Figure 4: Pre and post-intervention analysis of PFT parameters with Unpaired t-test between group analysis

DISCUSSION:

The findings of the present study indicate that certain pulmonary function parameters exhibited significant improvement in the experimental group following the intervention. Specifically, Peak Expiratory Flow Rate (PEFR) demonstrated a statistically significant increase from pre- to post-intervention, whereas Forced Vital Capacity (FVC), Forced Expiratory Volume in one second (FEV_1), and the FEV_1/FVC ratio did not show significant changes. In contrast, the control group showed no statistically significant differences in any of the pulmonary function test parameters across the study period. In between group analysis of Group A and B there is no any significant difference is seen.

Our findings confirm the benefits of brisk walking in Pulmonary functions among hypothyroid women. The significant increase in Certain PFT parameters observed in the experimental group supports its role as an effective aerobic exercise intervention. Poor pulmonary functions are is a well-established independent predictor of cardiovascular disease and all-cause mortality making its enhancement through regular brisk walking a valuable preventive measure.

Brisk walking offers numerous advantages, including its simplicity, low cost, and minimal risk of injury. It aligns with the World Health Organization's recommendation of 150 minutes of moderate-intensity physical activity per week to reduce mortality risk and improve overall health **[11, 13]**. However, its effects may be less pronounced compared to structured aerobic or resistance training when targeting specific fitness or metabolic outcomes. Incorporating other exercise modalities like aerobics or resistance training may enhance the overall benefits **[15]**.

PEFR was reduced in hypothyroidism females which generally reflects obstruction in the larger airways. **[16]** shows thyroid hormone deficiency centrally suppresses hypoxic and hypercapnic ventilatory drives. Low thyroid hormone causes peripheral myopathy with decreased respiratory muscle strength. This suggests that, in addition to restriction, there may also be an element of airflow limitation, indicating a mixed ventilatory defect. This observation is supported by **[17]** who found that hypothyroidism may lead to both restrictive and obstructive changes, likely due to mucopolysaccharide deposition in airway tissues and diminished ventilatory drive **[17]**.

Together, these findings highlight that hypothyroidism can adversely affect pulmonary function through both restrictive and obstructive mechanisms, which in turn may contribute to reduced exercise tolerance and impaired quality of life.

PEFR significantly improves with brisk walking. In line with our findings, **[18]** also found that physical activity enhanced pulmonary function in healthy sedentary individuals. Aerobic exercises, which are known to improve breathing efficiency and reduce pulmonary resistance while also lowering the fat percentage, may be the reason for the improvement in PEFR values **[18]**.

According to **[20]** 24 weeks of aerobic exercise significantly improves FVC, FEV1, and FEV1/FVC. The results of this investigation are in line with those of a study by **[21]** who discovered that after 8 weeks of aerobic training in adults, FVC and FEV1 increases. They attributed this finding to the greater contractility of the expiratory muscles as a result of endurance training. Although the precise mechanism underlying the improvement in FVC in this study is uncertain, weight loss, fat mass reduction, and respiratory muscle performance may be involved. It is clear that respiratory indices are partially correlated with respiratory muscle power, and repeated exercise may cause respiratory muscle hypertrophy **[20]**.

According to **[21]** any form of aerobic exercise yields beneficial health outcomes

when performed consistently demonstrated improvements in PEFR, BMI, and PFI. These findings align with the broader understanding that individuals who engage in regular physical activity generally exhibit higher levels of physical fitness, and that sustained aerobic activity contributes to enhanced cardiorespiratory function. This literature therefore supports the results of our study.

In present study there was no significant improvement in FVC, FEV1 and FEV1/FVC seems that excessive fat mass and short duration of the exercise training are probable mechanisms for insufficient FVC and FEV1 improvements in the intervention group.

FUTURE RECOMMENDATION:

The structured and progressive brisk walking protocol used in this study effectively improved exercise capacity in hypothyroid women. Future studies should investigate the impact of longer intervention durations, varied intensities, and combined exercise modalities to optimize outcomes.

LIMITATIONS:

Effect of medicine is not taking in consideration. This study was limited by its small sample size, short intervention duration and geographic restriction to Ahmedabad city. These factors may limit the generalizability of the findings. Future research should address these limitations by including a larger and more diverse sample population and extending the intervention period.

CONCLUSION:

The findings of the study indicate that participation in aerobic exercise results in statistically significant improvements in certain pulmonary function test parameters. Brisk walking is a useful and efficient kind of exercise since significantly enhances certain pulmonary functions specifically PEFR in hypothyroid females. These enhancements suggest that regular aerobic activity positively influences respiratory efficiency and airway flow dynamics.

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Data availability statement

Data were collected from different hospitals (Sainath hospital, Laxmi hospital etc.), various OPD and community area of Ahmedabad city.

Authors contribution

Author 1 and 2 conceptualized the study and designed the experiments. Author 1 and 2 developed the theory and performed the computations and verified the analytical methods. Author 1 carried out the experiment and collected data and analyse data. Author 1 and 2 wrote the manuscript. All authors discussed the results and contributed to the final manuscript.

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Conflicts of interest

The authors declare no conflict of interest.

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REFERENCES:

[1] Chiovato L, Mariotti S, Magri F. Classification and Etiopathogenesis of Hypothyroidism. 2018. 301–331 p.

[2] Roberts CGP, Ladenson PW. Hypothyroidism. 2004; 363:793–803.

[3] American Thyroid Association. Hypothyroidism The American Thyroid Association (ATA). American Thyroid Association [Internet]. 2013;6–10. Available from: https://www.thyroid.org/wp-content/uploads/patients/brochures/Hypothyroidism_web_booklet.pdf

[4] Chaitanya PSK, Suresh V, Mohan A, Sachan A. Respiratory dysfunction in hypothyroidism. J Clin Sci Res 2019;8:89-94.

[5] Unnikrishnan A, Kalra S, Sahay R, Bantwal G, John M, Tewari N. Prevalence of hypothyroidism in adults: An epidemiological study in eight cities of India. Indian J Endocrinol Metab. 2013;17(4):647.

[6] Bagcchi S. Hypothyroidism in India: More to be done. Lancet Diabetes Endocrinol [Internet]. 2014;2(10):778. Available from: http://dx.doi.org/10.1016/S2213-8587(14)70208-6.

[7] Ali ER. Assessment of functional lung impairment in patients with

thyroid disorders. Egypt J Bronchol. 2016;10(3):337–47.

[8] Graham BL, Steenbruggen I, Barjaktarevic IZ, Cooper BG, Hall GL, Hallstrand TS, *et al*. Standardization of spirometry 2019 update an official American Thoracic Society and European Respiratory Society technical statement. Am J Respir Crit Care Med. 2019;200(8):E70–88.

[9] Liou TG, Kanner RE. Spirometry. Clin Rev Allergy Immunol. 2009;37(3):137–52.

[10] Fathi M, Mosaferi Ziaaldini M, Khairabadi S, Hejazi K. Effect of Aerobic Exercise on Thyroid Hormones and Quality of Life in Obese Postmenopausal Women. Med Lab J. 2018;12(6):5–11.

[11] Bai X, Soh KG, Omar Dev RD, Talib O, Xiao W, Cai H. Effect of Brisk Walking on Health-Related Physical Fitness Balance and Life Satisfaction Among the Elderly: A Systematic Review. Front Public Heal. 2022;9(January).

[12] Omura JD, Ussery EN, Loustalot F, Fulton JE, Carlson SA. Walking as an opportunity fo1. Omura JD, Ussery EN, Loustalot F, Fulton JE, Carlson SA. Walking as an opportunity for Cardiovascular disease prevention. Prev Chronic Dis. 2019;16(5):1–9. r Cardiovascular disease prevention. Prev Chronic Dis. 2019;16(5):1–9.

[13] Bouchard C. Acsm. Vol. 41, Medicine & Science in Sports & Exercise. 2009. 35 p.

[14] Lei Burton D, LeMay KS, Saini B, Smith L, Bosnic-Anticevich S, Southwell P, *et al*. The reliability and utility of spirometry performed on people with asthma in community pharmacies. J Asthma. 2015;52(9):913–9.

[15] Joshi R, Mishra P, Rathi M. Effect of Brisk Walking and Moderate Resistive Exercises on Physical Fitness Level in Middle-aged Women: A Randomised Clinical Tria. J Clin Diagnostic Res. 2022;11–4.

[16] Ghosh M, Sinha B, Banerjee J, Mukhopadhyay B. Spirometric Evaluation of Pulmonary Expiratory Flow Volume and Flow Rate in Patients with Clinical Hypothyroidism at a Tertiary Care Hospital, West Bengal, India: A Case-control Study. Natl J Lab Med. 2023;167(January 2011):17–21.

[17] Chaitanya PSK, Suresh V, Mohan A, Sachan A. Respiratory dysfunction in hypothyroidism. J Clin Sci Res 2019;8:89-94.

[18] Cheng YJ, Macera CA, Addy CL, Sy FS, Wieland D, Blair SN. Effects of physical activity on exercise tests and respiratory function. Br J Sports Med. 2003;37:521–8.

[19] Azad A, Gharakhanlou R, Niknam A, Ghanbari A. Effects of Aerobic Exercise on Lung Function in Overweight and Obese Students. 2011;10(June):24–31.

[20] Farrell PA. Maximal expiratory flow-volume relationships before and after eight weeks of endurance training. J Sports Med Phys Fitness 1981; 21 (2): 145- 9.

[21] Bassi R, Sharma S, Sharma A, Kaur D, Kaur H. The effect of aerobic exercises on peak expiratory flow rate and physical fitness index in female subjects. Natl J Physiol Pharm Pharmacol. 2015;5(5):376–81.

Figure 5: Subject performing Pulmonary function test

Figure 6: Subject performing brisk walking

Figure legends

Figure 1: Subject performing Pulmonary function test in sitting position with Helios 401 computerized spirometer. FVC & FEV1 Manoeuvre is performed by subject with Nose clip in place.

Figure 2: Subject performing brisk walking in which patient walking briskly for prescribed time and intensity.

Figure 3: Mean age (in years) of participants in Group A and Group B. Group A had a mean age of 45.23 years, whereas Group B had a mean age of 40.83 years.

Figure 4: Comparison of pre-intervention and post-intervention mean values of pulmonary function test (PFT) parameters (FVC, FEV1, FEV1/FVC, and PEFR) in Group A. The graph illustrates an increase in post-intervention mean (% predicted) values across all measured parameters.

Figure 5: Comparison of pre-intervention and post-intervention mean values of pulmonary function test (PFT) parameters (FVC, FEV1, FEV1/FVC, and PEFR) in Group B. The bar graph depicts slight changes in post-intervention mean (% predicted) values across the measured parameters.

Figure 6: Comparison of mean (% predicted) values of pulmonary function test parameters (FVC, FEV1, FEV1/FVC, and PEFR) between Group A and Group B. The graph illustrates higher mean values across all parameters in Group A as compared to Group B.