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EFFECT OF HIGH INTENSITY EXERCISE ON SELECTED CARDIORESPIRATORY PARAMETERS AMONG OVERWEIGHT CHILDREN

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ABSTRACT

The increasing number of overweight people has changed how society views lifestyle and health. Beyond appearance, this problem affects mental and physical health and raises the chance of developing chronic illnesses. A comprehensive strategy involving dietary instruction, lifestyle modifications, and mental health assistance is needed to comprehend and treat overweight. High-intensity exercise (HIE) involves short bursts of intense activity paired with rest periods, enhancing strength, endurance, and metabolic efficiency. It promotes fat burning, improves cardiovascular health, and boosts stamina. Beyond physical benefits, HIE elevates mood, reduces stress, and sharpens focus through the release of endorphins. By fostering resilience and discipline, it empowers individuals to overcome physical and mental challenges. Whether through sprints, circuits, or bodyweight exercises, HIE offers a transformative approach to achieving holistic fitness and vitality. ***Objective:*** *The aim of this study was to investigate effect of high intensity exercise on selected cardiorespiratory parameters among overweight children.* ***Methodology:*** *The purpose of the study was to determine the effect on high intensity exercise on selected cardiorespiratory parameters among overweight children. Forty overweight boys were selected from various schools in Coimbatore, Tamil Nadu. Among the 40 subjects were divided into one experimental group and one control group with twenty subjects (N=20) in each group. Experimental group I (HIEG=20) underwent high intensity exercise for a period of twelve weeks, for four days in a week, the workout lasted for 60 minutes approximately and Control group II (CG=20) do not undergo any sort of training except their daily routine. The data analysis was conducted using the dependent 't' test, and a confidence level of 0.05 was used to determine statistical significance.* ***Results:*** *The results indicate that there was a significant difference between the high intensity exercise group compared to the control group, suggesting that the high intensity exercise had an impact on the overweight children. Specifically, the children who underwent the high intensity exercise showed improvements in their selected respiratory parameters.* ***Conclusion:*** *The high intensity exercise can significantly improve cardiorespiratory parameters among overweight children. The findings provide evidence that training programs that are tailored to the demands of the high intensity exercise can be more effective in enhancing their cardiorespiratory performance than control group. This study provides valuable insights into the importance of high intensity exercise for improving selected cardiorespiratory parameters, such as namely slow vital capacity, forced vital capacity, maximum voluntary ventilation and expiratory reserve volume in overweight children.*

KEY WORDS: *High Intensity Exercise, Cardiorespiratory Parameters and Overweight.*

INTRODUCTION

The high number of overweight people has changed how society sees diet, lifestyle, and overall health, which has led to major health issues. Beyond appearances, this problem affects both physical and mental health and raises the chance of developing chronic illnesses like diabetes and cardiovascular disease. Sedentary lifestyles, high-calorie foods, and environmental factors are the main causes of the growth in overweight. Complex interactions between environmental, socioeconomic, and genetic factors call for a thorough knowledge that incorporates reevaluating social norms, dietary education, and mental health care. Nowadays, obesity is not just a problem in affluent cultures but is a global epidemic. The WHO identifies the complex impacts of obesity as a significant public health concern. Significantly contributing factors are modern eating habits that favor processed, high-calorie foods and decreased physical exercise as a result of urbanization and technology improvements. Socioeconomic and environmental issues are also very important, since populations with lower incomes frequently do not have access to safe recreational areas and nutritious food. A comprehensive strategy that takes into accounts both personal habits and larger societal influences are needed to combat obesity.

The level of effort or energy needed to execute an activity, particularly physical activities, where one performs at their peak is referred to as high intensity. It is crucial for improving physical performance, strength, and endurance. By pushing the body beyond its natural limits, high-intensity training aims to make it adapt and become stronger. One of the key benefits of high-intensity exercise

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is its ability to improve cardiovascular health. Vigorous exercise has been shown to increase cardiac efficiency and circulation, lowering the risk of heart disease and stroke **(Weston, Wisløff, & Coombes, 2014)**. Also, by pushing the muscles past their natural limits, high-intensity exercise can increase muscle strength and endurance **(Gillen et al., 2016)**. The effect that high-intensity exercise has on metabolism is an additional benefit. Excess post-exercise oxygen consumption (EPOC) is a phenomena that has been shown to occur when vigorous physical activity raises the rate of calorie burn both during and after the workout. In addition to aiding in fat loss, this impact may also enhance body composition **(Børsheim & Bahr, 2003)**.

METHODOLOGY

Participation: The purpose of the study was to determine the effect on high intensity exercise on selected cardiorespiratory parameters among overweight children. Forty overweight boys were selected from various schools in Coimbatore, Tamil Nadu. Among the 40 subjects were divided into one experimental group and one control group with twenty subjects (N=20) in each group. Experimental group I (HIEG=20) underwent high intensity exercise for a period of twelve weeks, for four days in a week, the workout lasted for 60 minutes approximately and Control group II (CG=20) do not undergo any sort of training except their daily routine. The data analysis was conducted using the dependent 't' test, and a confidence level of 0.05 was used to determine statistical significance. ***Criterion Measures***: It is evaluated the cardiorespiratory variables where chosen as the criterion measures to this study for testing.

TABLE - 1
CRITERION MEASURES

S.No	PARAMETERS	TESTS	UNIT OF MEASUREMENT
RESPIRATORY PARAMETERS			
1.	Slow Vital Capacity	Digital Spiro Meter	Measure In Litres
2.	Forced Vital Capacity		
3.	Maximum Voluntary Ventilation		
4.	Expiratory Reserve Volume		

Statistical Methods; The collected data before and after training period of twelve weeks on the above said parameters due to the high intensity exercise for overweight children was statistically analyzed with 't' test to find out the significant improvement between pre and post-test. In all cases the criterion for statistical significance was set at 0.05 level of confidence. (P<0.05).

TABLE – II
The 't'- ratio for high intensity exercise group for overweight children and control group on respiratory parameters

Variables	Group	Test	Mean	SD	SEM	t-ratio
Slow Vital Capacity	HIEG	Pre Test	1.47	0.11	0.02	4.89*
		Post Test	1.58			
	CG	Pre Test	1.47	0.05	0.01	1.73
		Post Test	1.45			
Forced Vital Capacity	HIEG	Pre Test	3.06	0.20	0.04	2.73*
		Post Test	3.18			
	CG	Pre Test	2.97	0.12	0.03	1.87
		Post Test	2.92			
Maximum Voluntary Ventilation	HIEG	Pre Test	76.30	5.46	1.22	4.26*
		Post Test	81.50			
	CG	Pre Test	75.25	2.34	0.52	1.34
		Post Test	74.55			
Expiratory Reserve Volume	HIEG	Pre Test	0.90	0.08	0.02	4.41*
		Post Test	0.97			
	CG	Pre Test	0.90	0.08	0.02	1.25
		Post Test	0.88			

*Note: HIEG- High Intensity Exercise Group, CG- Control Group. Significance at 0.05 level of confidence for df of 19 is 2.09.

Mean, standard deviation and t-value were calculated for each outcomes measure can be found in Table-II result shows that the pre-test mean values of high intensity exercise group and control group (1.47,3.06,76.30 and 0.90) and (1.47,2.97,75.25 and 0.90) respectively and the post-test mean values are(1.58,3.18,81.50 and 0.97) and (1.45,2.92,74.55 and 0.88) respectively. The obtained dependent t-test value on slow vital capacity (t=4.89*), forced vital capacity (t=2.73*), maximum voluntary ventilation (t=4.26*)

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and expiratory reserve volume (t=4.41*) of high intensity exercise group respectively. The table value required for significant difference with degrees of freedom 19 at 0.05 level of confidence. The obtained 't' test value of high intensity exercise group was greater than the table value 2.09. The results clearly indicated that the slow vital capacity, forced vital capacity, maximum voluntary ventilation and expiratory reserve volume of the high intensity exercise group improved due to effect on high intensity exercise on selected cardiorespiratory parameters among overweight children.

FIGURE-I Bar diagram showing the mean values of pre and post-test on slow vital capacity of HIEG and CG

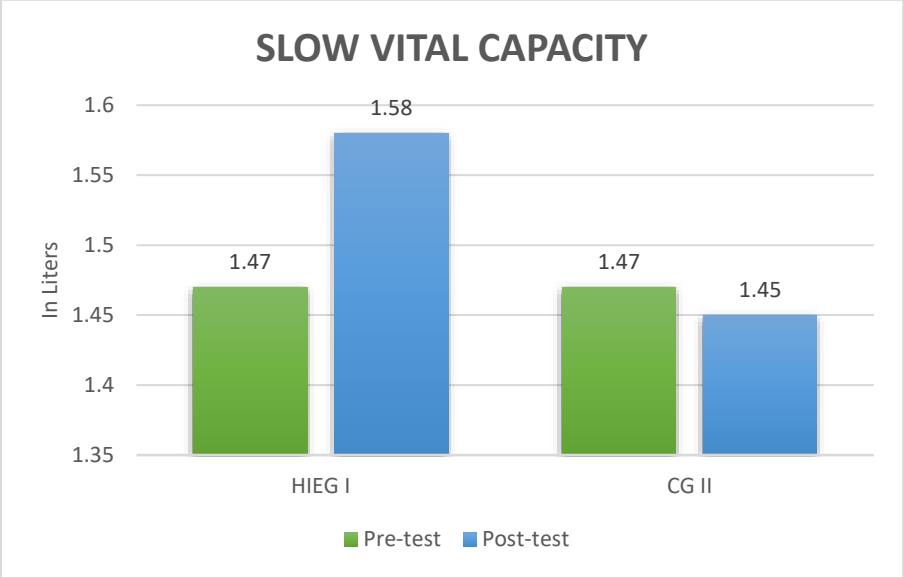

FIGURE-2 Bar diagram showing the mean values of pre and post-test on forced vital capacity of HIEG and CG

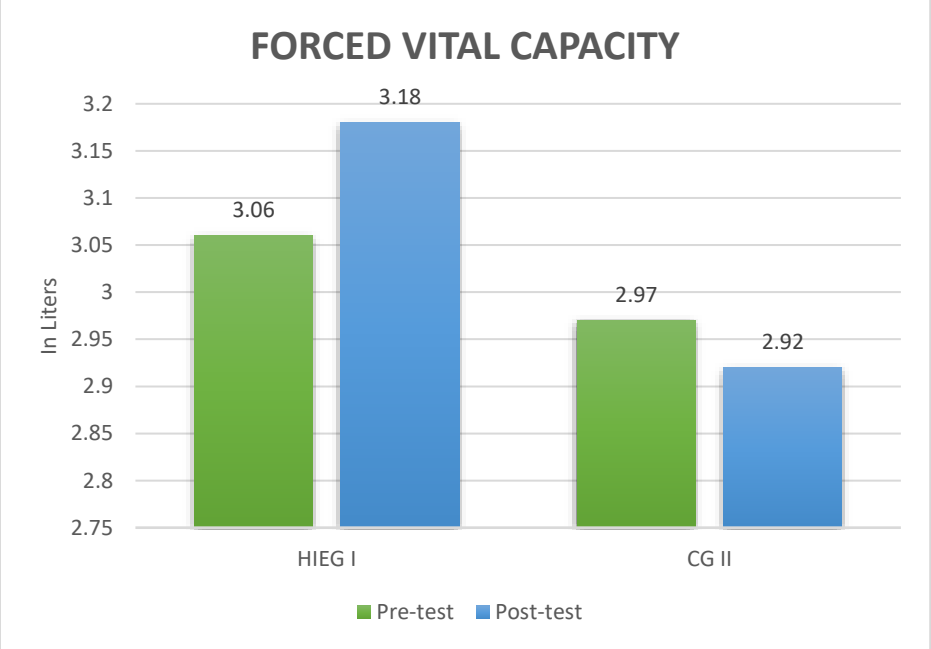

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FIGURE-3 Bar diagram showing the mean values of pre and post-test on maximum voluntary ventilation of HIEG and CG

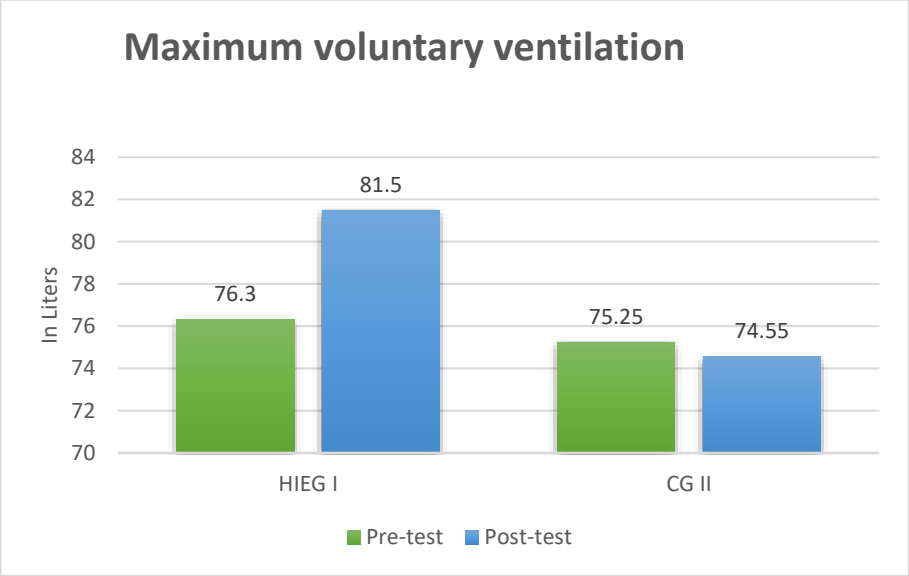
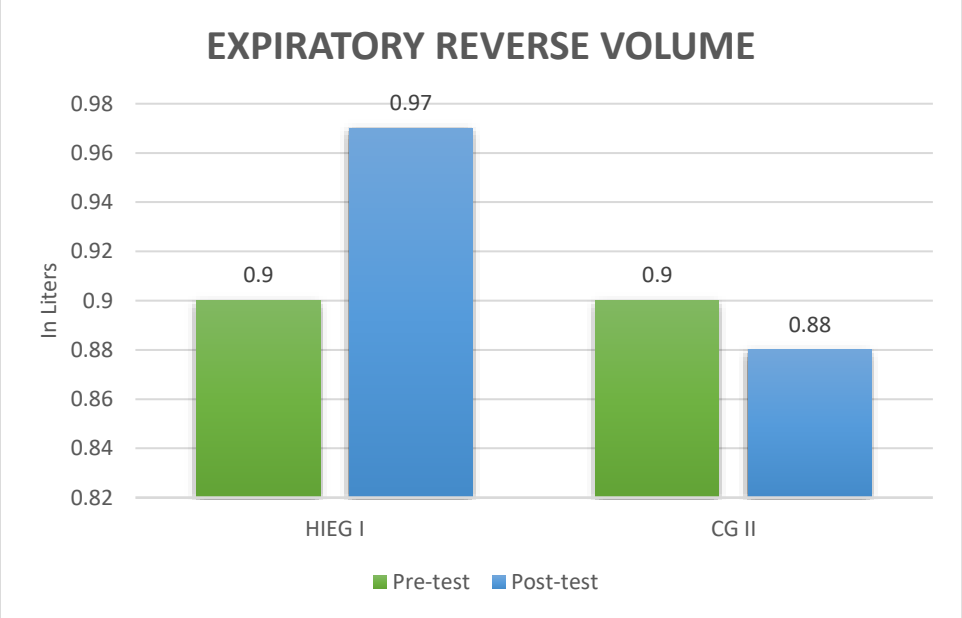


FIGURE-4 Bar diagram showing the mean values of pre and post-test on expiratory reserve volume of HIEG and CG



DISCUSSION ON FINDINGS

Considering the findings, the high intensity exercise group demonstrated significantly improved respiratory parameters, such as namely slow vital capacity, forced vital capacity, maximum voluntary ventilation and expiratory reserve volume. When compared to the control group, it was discovered that high intensity exercise was the reason for the improvement. According to this study, high-intensity exercise improved respiratory metrics and may be a useful strategy for improving performance in these domains. Thus, the results are in line with other study of which has emphasized the effect of high intensity exercise on selected cardiorespiratory parameters among overweight children. Results show that there was a significant difference among experimental and control groups on slow vital capacity. Slow Vital Capacity (SVC) represents the maximum amount of air that can be exhaled slowly after a full inhalation. The improvement in SVC following high-intensity exercise can be attributed to enhanced lung compliance and respiratory muscle strength. Studies indicate that exercise improves thoracic expansion and diaphragm function, which are essential for increasing lung capacity **(Nystoriak & Bhatnagar, 2018)**. Overweight children often exhibit reduced lung function due to chest wall restriction; however, sustained high-intensity exercise appears to counteract these limitations by promoting better respiratory efficiency **(Boreham et al., 2011)**.

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According to the current study, frequent high-intensity exercise primarily increases respiratory efficiency, as seen by very significant improvements in respiratory parameters. The observed improvement in FVC is consistent with findings from previous studies where high-intensity training significantly boosted lung function among overweight children **(Carson et al., 2014)**. The increase in FVC may be attributed to stronger respiratory muscles and increased alveolar recruitment. Weight loss associated with high-intensity training further reduces mechanical restrictions on the lungs, thereby improving FVC **(Hulens et al., 2015)**. This is crucial for overweight children who often present with impaired lung function due to excess adiposity.

In this study, there is a significant improvement on maximum voluntary ventilation in experimental group. MVV measures the greatest volume of air that can be breathed in and out within one minute. High-intensity exercise significantly improved MVV in overweight children, indicating enhanced respiratory muscle strength and endurance. Aerobic and high-intensity interval training are known to increase ventilator capacity and decrease breathing effort during exercise **(Sheel, 2016)**. The improvement in MVV can also be linked to better neuromuscular coordination, which is vital for efficient respiratory function during physical exertion **(Sperlich et al., 2018)**.

The present study demonstrates that high intensity exercise is an effective exercise strategy for improving ERV in overweight children. Previous data supports that, ERV refers to the additional air that can be exhaled after a normal exhalation. Overweight children often exhibit reduced ERV due to increased abdominal fat and thoracic compression **(Paramesh, 2014)**. The significant improvement in ERV following high-intensity exercise suggests better respiratory muscle performance and a decrease in chest wall resistance. Consistent exercise reduces adiposity around the thorax, thereby facilitating more effective lung expansion and contraction **(McKenzie, 2012)**.

CONCLUSION

High intensity exercise plays a vital role in improving the respiratory parameters of overweight children. The study revealed significant improvements in Slow Vital Capacity (SVC), Forced Vital Capacity (FVC), Maximum Voluntary Ventilation (MVV), and Expiratory Reserve Volume (ERV) among the experimental group. These findings suggest that high intensity exercise is highly effective in enhancing lung capacity and respiratory muscle strength. These changes are likely attributed to strengthened respiratory muscles, better lung compliance, and reduced mechanical restrictions due to fat loss. The results emphasize the importance of incorporating high-intensity exercise programs as part of intervention strategies to promote respiratory health and overall fitness among overweight paediatric populations. This study adds valuable insights to existing literature and supports the need for further research to establish long-term benefits and optimal exercise protocols for this demographic.

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