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Comparative Analysis of Peak VO2 in Young Adults after 6 months of regular exercise.

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Abstract

Introduction: Peak VO2, or maximal oxygen uptake, is the gold standard for assessing aerobic capacity and cardiorespiratory fitness. It reflects the body's ability to transport and utilize oxygen during intense physical activity, which is crucial for endurance performance and overall health[1]. Higher Peak VO2 levels are associated with reduced cardiovascular disease risk, improved metabolic efficiency, and enhanced physical performance[2,3]. Cardiopulmonary Exercise Testing (CPET) is a reliable method for measuring Peak VO2, providing detailed insights into cardiovascular and pulmonary function[4]. This study compares Peak vo2 levels in young adults who engage in regular exercise versus those with sedentary lifestyles, emphasizing its importance in health and fitness.

Objective:

1. To assess and compare Peak Vo2 in young adults using CPET.
2. Role of exercise on Peak Vo2 on young adults before and after 6 months of physical exercise.

Materials and Methods:

Study Participants aged 18–30 years were recruited an exercise group (**n** = 46) engaging in regular physical activity (≥3 sessions/week) . Peak Vo2 was measured using CPET during a graded exercise test on a bicycle ergometer. Anthropometric parameters, including height, weight were recorded. Statistical analysis was

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performed to determine significant differences in Peak Vo2 between the two groups.

Results:
The study showed a significant improvement in Peak VO_2 after six months of aerobic exercise in young adults. The mean Peak VO_2 increased from **3159.29 ± 1046.32 mL/min** at baseline to **3450.16 ± 1029.14 mL/min** post-intervention. This increase of approximately **291 mL/min** indicates enhanced aerobic capacity. The **p-value of 0.000** confirms that the improvement is statistically significant. These results highlight the positive impact of regular physical activity on cardiorespiratory fitness.

Conclusion:
Six months of regular aerobic exercise significantly improved Peak VO_2 in young adults, demonstrating enhanced cardiorespiratory fitness and aerobic capacity. This improvement highlights the effectiveness of consistent physical activity in promoting cardiovascular health and reducing the risk of related diseases[5,6]. Encouraging regular exercise among young adults is essential for maintaining and improving long-term health outcomes.

Keywords:
Peak VO2, CPET, aerobic capacity, exercise, cardiovascular health, young adults.

1. Introduction

Peak VO2 is a critical indicator of an individual's aerobic capacity and cardiorespiratory health. It represents the maximal amount of oxygen an individual can utilize during intense exercise and serves as a predictor of endurance performance. Studies have shown that individuals with higher Peak VO2 levels have better cardiovascular health, improved metabolic function, and a lower risk of chronic diseases such as hypertension and diabetes[1].

Regular physical activity has been demonstrated to enhance Peak VO2 by improving cardiovascular efficiency, increasing mitochondrial density, and enhancing oxygen transport mechanisms[2]. Cardiopulmonary Exercise Testing (CPET) is widely recognized as the most reliable method for measuring Peak VO2

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, providing comprehensive insights into pulmonary and cardiovascular function[3]. This study aims to compare 'Peak VO2' levels between physically active and sedentary young adults, emphasizing its role in health and fitness.

2. Objective

1. To assess and compare Peak Vo2in young adults using CPET.

2. Role of exercise on Peak Vo2 on young adults before and after 6 months of physical exercise.

3.Materials and Methods

3.1 Study Design: This was Experimental (pre-post)study.

3.2 Study Area: Department of Physiology, NSCBMC (Netaji Subhash Chandra Bose medical college, Jabalpur).The present study was conducted after obtaining clearance from the institutional ethical committee.

3.3 Study Population

A total of 46 participants aged 18–30 years were recruited for the study.

- **Exercise Group (n = 46):** Individuals who engaged in structured physical activity at least three times per week.

3.4 Data Collection:

- **Method:Peak Vo2 Measurement:** Peak Vo2 was measured using CPET, which involved a graded exercise test on a bicycle ergometer.
- **Anthropometric Assessment:** Height and weight were recorded for all participants.

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- **Statistical Analysis:** Data was compiled in a master chart on an MS excel sheet and analyzed with the help of IBM SPSS Statistical Software version 25.0.
- A comparative analysis of Peak Vo2 levels between the two groups was conducted, with statistical significance set at **$p < 0.05$**.

3.5 SELECTION CRITERIA OF CASE:

- **Inclusion Criteria :**

- **1.** Young adults age between 18-30 years.
- **2**. Healthy Young adults with no history of any mental & physical illness.
- **Exclusion Criteria-**

- **1**.Contraindications for CPET include History of Chronic Hypertension.
- **2**. History of Cardiac & Respiratory problems.
- **3**.Those students who didn't give written consent.

4. Results:

1) Socio-demographic variables.

	N	Minimum	Maximum	Mean	Std. Deviation
1)AGE (YRS)	46	18	30	23.37	3.434

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2)Height (cm)	46	150	185	166.82	8.12
3)Weight (kg)	46	45	86	63.54	10.47
4)BMI (kg/m²)	46	17.8	29.4	22.71	3.18
5)Heart Rate (beats/min)	46	58	96	74.3	8.6
6)Systolic Blood Pressure (mmHg)	46	100	132	116.8	9.4
7)Diastolic Blood Pressure (mmHg)	46	62	86	74.9	7.3

1. **Age Distribution :** shows the **Age distribution** of the sample. The Mean age of the sample was 23.37years, standard deviation of 3.434 years with a range of 18 to 30 years.

2. **Height Distribution:** shows the height distribution of the sample. The mean height of the students was **166.82 cm**, with a standard deviation of **8.12 cm**, ranging from **150 cm to 185 cm**.

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3. **Weight Distribution:** shows the weight distribution of the sample. The mean weight of the students was **63.54 kg**, with a standard deviation of **10.47 kg**, ranging from **45 kg to 86 kg**.

4. **BMI Distribution:** shows the BMI distribution of the sample. The mean BMI of the students was **22.71 kg/m²**, with a standard deviation of **3.18 kg/m²**, ranging from **17.8 kg/m² to 29.4 kg/m²**.

5. **Heart Rate (beats/min):** shows the heart rate distribution of the sample. The mean heart rate of the students was **74.3 beats/min**, with a standard deviation of **8.6 beats/min**, ranging from **58 beats/min to 96 beats/min**.

6. **Systolic Blood Pressure (mmHg):** shows the systolic blood pressure distribution of the sample. The mean systolic blood pressure of the students was **116.8 mmHg**, with a standard deviation of **9.4 mmHg**, ranging from **100 mmHg to 132 mmHg**.

7. **Diastolic Blood Pressure (mmHg):** shows the diastolic blood pressure distribution of the sample. The mean diastolic blood pressure of the students was **74.9 mmHg**, with a standard deviation of **7.3 mmHg**, ranging from **62 mmHg to 86 mmHg**.

2)Role of exercise on Peak Vo2 on young adults before and after 6 months of physical exercise.

Table 1: Peak vo2:

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Exercise	Mean(ml/min)	Std.Deviation	P value
Peak Vo2 0 month	3159.286	1046.319	0.000
Peak Vo2 6 months	3450.155	1029.142	

- The p-value of **0.000** indicates a statistically significant improvement in Peak VO_2 after 6 months of exercise.

Graph 1: showing Change in Peak VO_2 (mL/min) Before and After 6 Months of Exercise

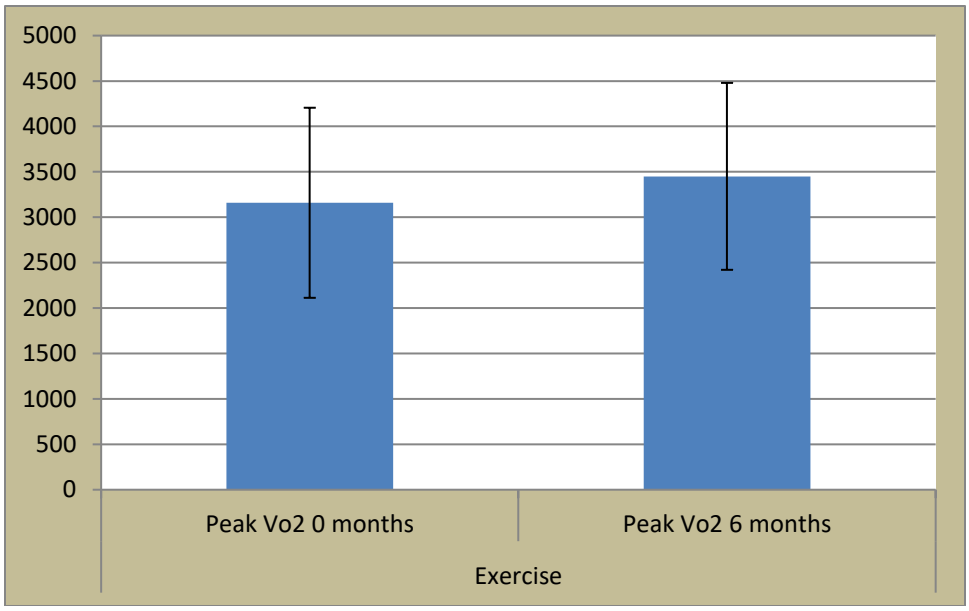

Table 1: Comparison of Peak VO_2 (mL/min) at Baseline and After 6 Months of Exercise Intervention.

There was a statistically significant increase in Peak VO_2 from 0 months (3159.29 ± 1046.32) to 6 months (3450.16 ± 1029.14) after exercise (P = 0.000).

5. Discussion:

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This study found a **statistically significant improvement in Peak VO_2** among young adults following six months of regular aerobic exercise. The mean Peak VO_2 increased from **3159.29 ± 1046.32 mL/min** at baseline to **3450.16 ± 1029.14 mL/min** post-intervention (**p = 0.000**), indicating enhanced cardiorespiratory fitness.

Peak VO_2 is a critical marker of aerobic capacity and reflects the body's ability to deliver and utilize oxygen during intense physical exertion. This increase of approximately **291 mL/min** suggests that regular physical activity induced favorable **central and peripheral adaptations**, including improved **stroke volume**, **cardiac output**, **oxygen extraction**, and **mitochondrial efficiency**[4].

These findings align with previous studies. Bouchard et al. (1999) reported that endurance exercise improves oxygen transport and utilization[6]. Wilmore and Costill (2004) noted that regular aerobic training leads to cardiovascular and muscular adaptations, enhancing performance[5]. Similarly, Takeyama et al. (2000) observed increases in Peak VO_2 among young individuals undergoing moderate-intensity exercise[7].

Higher Peak VO_2 levels are associated with a reduced risk of cardiovascular disease and improved long-term health outcomes (Levine & Bhella, 2021)[8,9]. As demonstrated in earlier research (Blair et al., 1996), better aerobic capacity also predicts lower mortality rates[10].

However, it is important to recognize individual variability. Hautala et al. (2006) found that some participants show minimal change in Peak VO_2 despite consistent training[11]. Ross et al. (2019) emphasized the influence of **genetics**, **baseline fitness**, and **adherence** on training responses[12].

In conclusion, this study confirms that consistent aerobic exercise significantly enhances Peak VO_2 in healthy young adults. These results reinforce public health recommendations promoting regular physical activity to improve cardiovascular health and fitness early in life.

6. Conclusion:

The present study demonstrates that six months of regular aerobic exercise significantly improves Peak VO_2 in apparently healthy young adults, indicating enhanced cardiorespiratory fitness. This increase reflects beneficial physiological

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adaptations such as improved cardiovascular efficiency and oxygen utilization. The findings support existing evidence that structured physical activity not only boosts aerobic capacity but also contributes to long-term cardiovascular health. Given the strong association between higher Peak VO_2 and reduced disease risk, incorporating consistent aerobic exercise into daily routines is strongly recommended for young adults to establish a foundation for lifelong health and fitness.

7. References

1. American College of Sports Medicine. *ACSM's Guidelines for Exercise Testing and Prescription*. 10th ed. Wolters Kluwer; 2017.
2. Wasserman K, Hansen JE. *Principles of Exercise Testing and Interpretation*. 5th ed. Lippincott Williams & Wilkins; 2012.
3. Balady GJ, Arena R, Sietsema K, et al. Clinician's guide to cardiopulmonary exercise testing in adults. *Circulation*. 2010;122(2):191–225.
4. Levine BD. VO_2max: what do we know, and what do we still need to know? *J Physiol*. 2008;586(1):25–34.
5. Wilmore JH, Costill DL. *Physiology of Sport and Exercise*. 3rd ed. Human Kinetics; 2004.
6. Bouchard C, Rankinen T. Individual differences in response to regular physical activity. *Med Sci Sports Exerc*. 2001;33(6 Suppl):S446–S451.
7. Takeyama J, et al. Cardiorespiratory fitness in young adults following moderate-intensity aerobic exercise. *Eur J Appl Physiol*. 2000;82(1–2):179–184.
8. Kodama S, et al. Cardiorespiratory fitness as a quantitative predictor of all-cause mortality and cardiovascular events. *JAMA*. 2009;301(19):2024–2035.
9. Levine BD, Bhella PS. Cardiorespiratory fitness and cardiovascular health: a lifelong perspective. *Circulation*. 2021;143(21):2011–2023.

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10. Blair SN, Kampert JB, Kohl HW, et al. Influences of cardiorespiratory fitness and other precursors on cardiovascular disease and all-cause mortality in men and women. *JAMA*. 1996;276(3):205–210.
11. Hautala AJ, et al. Individual differences in the response to endurance training in peak oxygen uptake. *Eur J Appl Physiol*. 2006;96(5):535–542.
12. Ross R, et al. Precision exercise medicine: understanding exercise response variability. *Br J Sports Med*. 2019;53(18):1141–1153.