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CARDIO- RESPIRATORY FITNESS OF PHYSIOTHERAPY PROFESSIONAL'S IN KAMRUP METRO-A CROSS SECTIONAL STUDY

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ABSTRACT

Background: The demand for physiotherapists is increasing steadily, highlighting the need for optimal physical fitness to perform their professional duties. However, fitness levels are rarely evaluated in practice. This study aimed to assess the cardiorespiratory fitness of physiotherapy professionals in Kamrup Metro.To evaluate the cardio respiratory fitness of physiotherapy professionals in Kamrup Metro using the Harvard Step Test.

Methodology: Sixty physiotherapy professionals aged 25–45 years were conveniently selected from hospitals, private clinics, and physiotherapy colleges in Kamrup Metro, based on specific inclusion and exclusion criteria. Body Mass Index (BMI) was calculated, and cardio respiratory fitness was assessed using the Harvard Step Test. Descriptive statistics and the Physical Fitness Index (PFI) were analyzed. Pearson's bivariate correlation was used to assess the relationships between BMI & VO_2 max, BMI & PFI, and VO_2 max & PFI.

Results: The results indicated poor cardio respiratory fitness among physiotherapy professionals, as reflected by low PFI scores. Correlation analysis showed a negligible negative correlation between VO_2 max and BMI ($r = -0.136$), and between BMI and PFI ($r = -0.462$). A small positive correlation was found between VO_2 max and PFI ($r = 0.040$). However, these correlations were not statistically significant ($p > 0.05$), except for the relationship between BMI and PFI, which was significant ($p = 0.001$).

Conclusion: The physical fitness of physiotherapy professionals in Kamrup Metro is unsatisfactory. There is a need to increase awareness regarding personal fitness and promote improvements by incorporating fitness-related activities into their daily routines and professional training curriculum.

KEYWORDS: BMI, Vo2 max, Physical fitness index (PFI),Harvard step test ,Maximal oxygen consumption

INTRODUCTION

Cardio-respiratory fitness is defined as, "The ability of the circulatory and respiratory system to supply fuel during sustained physical activity and to eliminate fatigue after supplying fuel"1. Low cardio-respiratory fitness is a prominent behavioral risk factor for cardiovascular diseases, morbidity and mortality .Cardio respiratory fitness reflects the overall capacity of the cardiovascular and respiratory systems and the ability to carry out prolonged exercise2.

Today as the technology has advanced people search for an optimal use of their time, and change in their lifestyle by providing comfort and minimal effort which leads to a sedentary life3 . The sustainable development goals aim to reduce premature mortality from communicable diseases by a third by 2030 through prevention & treatment. The national health policy of India 2017 recommends that premature mortality from non-communicable disease, including chronic respiratory diseases, should be reduce by 25% by 20254, The focus on non-communicable diseases (NCDs) in national health policies, such as India's 2017 policy, is crucial due to their increasing prevalence and impact on public health. NCDs like chronic respiratory diseases, cardiovascular diseases, diabetes, and cancers are major contributors to premature mortality and disability worldwide. They often result from lifestyle factors such as unhealthy diet, lack of physical activity, tobacco use, and alcohol consumption, which are largely preventable.Physiotherapists play a crucial role in NCD management by providing rehabilitation, exercise programs, and therapeutic interventions that help improve quality of life, reduce disability, and support recovery from chronic respiratory diseases and other NCDs5.

The Harvard step test is a useful measure of functional capacity6,The Harvard Step Test is a cardiovascular fitness test that measures an individual's aerobic endurance and functional capacity. It involves stepping up and down on a platform at a consistent rate for a specified duration, typically five minutes. The participant's heart rate is then recorded at intervals during the recovery period. This test is useful because it provides a simple, reliable assessment of cardiovascular fitness and recovery rate, which are indicators of overall functional capacity. The results can help in evaluating an individual's

physical condition, monitoring training progress, and designing appropriate exercise programs. The test is particularly valuable in settings with limited resources due to its minimal equipment requirements and straightforward protocol.points releted to Harvard step test 7.

Now a days, demand of Physiotherapy profession has increased the Physiotherapists working required to be engaged in various activities. The therapists work in hospitals and in rehabilitation centres with varieties of patients which demands high level of physical fitness so optimal level of fitness is required be to deliver quality service to their clients8.Physiotherapist are a relevant target group associated with community health promotion, as they will be responsible for health promotion in the general population. Because Older adults often seek physiotherapy for preventive care to maintain mobility and independence, increasing the demand for physiotherapy services,Physiotherapists are increasingly involved in managing chronic diseases like diabetes, obesity, and cardiovascular diseases through exercise and lifestyle interventions, Physiotherapist can demonstrate exercises effectively, perform manual techniques with precision, and sustain the physical demands of their job without fatigue and last for not least Physiotherapists are required to stay updated with the latest research and best practices in physical fitness and health promotion, further highlighting their role in community health.9

Considering the relationship between VO2max & various markers of health, the use of step tests as a measure of health in both the general adult population & rehabilitation is advocated. Step tests provide a simple, effective ecologically valid method of sub maximally assessing VO2max. This test designed to provide a safe & practical procedure for assessing aerobic fitness under sub maximal condition.10

Selection Criteria:

Inclusion Criteria

- Physiotherapists aged between 25 to 45 years who have completed their graduation (both male and female).
- Individuals who understood the study protocol.
- Participants who gave informed consent and were willing to participate.

Exclusion Criteria

- Physiotherapists with a history of chronic medical or cardiorespiratory conditions.
- Individuals with musculoskeletal disorders.
- Individuals with neurological conditions that could interfere with test performance.
- Participants currently engaged in any form of physical training.
- History of alcohol consumption or smoking.
- History of major surgery in the recent past.

METHOD

Data were collected from various Physiotherapy Departments , College of Physiotherapy and Medical Sciences(CPMS), Assam Down Town University(ADTU), GMCH and other Outpatient Department of Kamrup Metro. The study involved 60 physiotherapists practicing in the above-mentioned facilities. Both male and female physiotherapists of age group 25 – 45 years were conveniently selected according to inclusion criteria.A written consent was taken from the physiotherapists. Any physiotherapist with history of medical condition, history of alcohol and smoking and who were participating in physical training programmed were excluded.

Materials

Weighing machine ,wall mounted stadiometer, stepper (ideal height about 51cm or 20 inch for man , & 41cm or 16 inch for woman), Metronome and stopwatch ,one chair was arranged participant to sit down after Exhausting. To Check the resting heart rate and maximum heart digital smart band was used. The participants' demographic data and the frequency of their exercise engagement were recorded in a data capturing form. All the tests and measurements had been taken at the room temperature.

Procedure

The protocol for this study was approved by institutional Ethics Committee College of Physiotherapy and Medical Sciences. Procedure of the study were explained to the subjects and requested to sign the consent form prior to the commencement. Subjects was instructed to take their last meal at least two hours before conducting the test to prevent the specific dynamic action of food & to wear comfortable clothes and shoes. The subjects were made acquainted with the step and the speed of the metronome .After the completion of test post recovery heart rate was recorded between 1-1.5min, 2-2.5min, 3-3.5min.

BMI was calculated (weight in kilograms/height in meters square), Physical fitness index was measured with acquired value .

ANALYSIS AND RESULT

Table1- Descriptive Statistics

Variables	N	Minimum	Maximum	Mean	Std. Deviation
VO2 MAX	60	31.95	49.27	36.7730	3.47082
WEIGHT	60	5.0	88.0	62.360	13.3382

HEIGHT	60	124.97	182.88	166.9855	10.76126
BMI	60	16.9	33.7	22.712	3.7630

Descriptive statistics for the study sample total 60 subjects.

Table2- Values Of Study Parameters Across Gender

Parameters	N	Mean	Std. Deviation
RHR	60	80.53	5.979
MHR	60	191.03	3.273
PFI	60	32.2998	6.84631

Descriptive statistics for the parameter's RHR, MHR, PFI

Table 3- Correlation Between The Varients:

	PEARSON'S CORRELATION COEFFICIENT (r-value)	Level of Significance (2 tailed) (p - value)	REMARK
VO2 MAX & BMI	-0.136	0.302	NS
VO2 MAX & PFI	0.040	0.760	NS
BMI & PFI	-462	0.001	**

*NS-Not Significant ** Significant at 0.01NS-Not Significant ** Significant at 0.01*

Fig 1 - Vo2max and between BMI. (P<0.05)

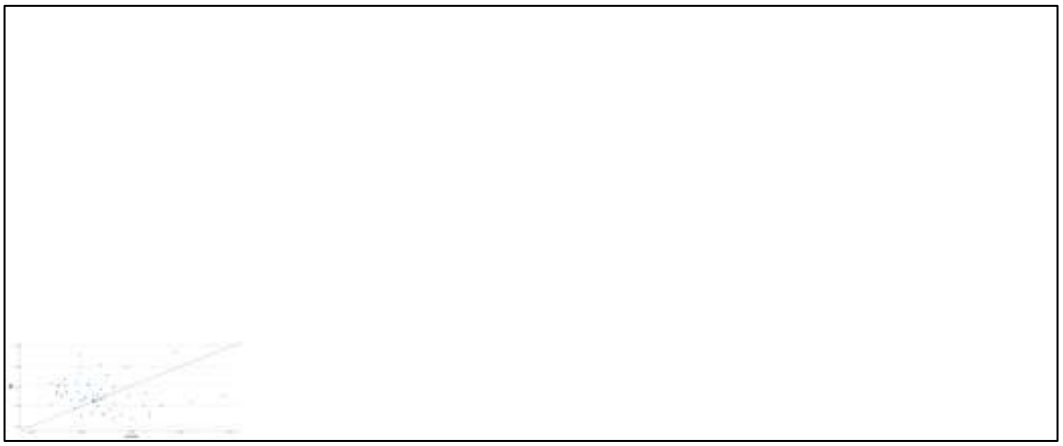

Fig 2- Vo2max and between PFI. (P<0.05)

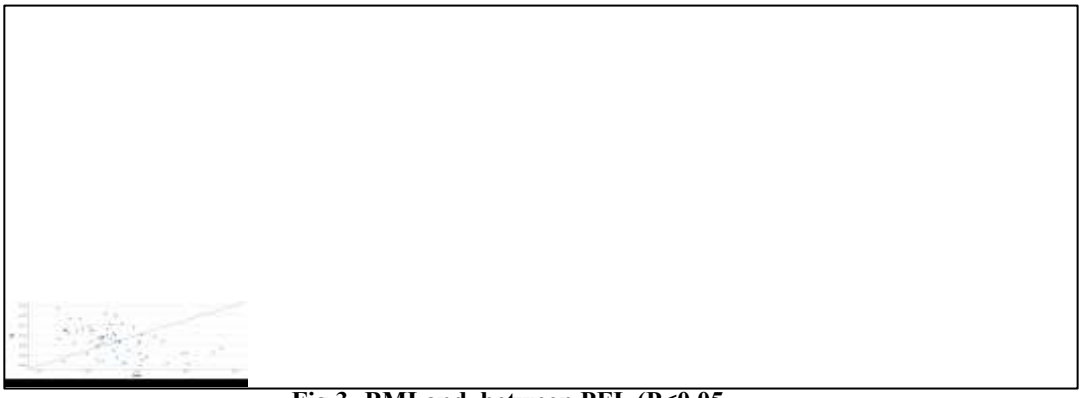

Fig 3- BMI and between PFI. (P<0.05

Table4-Comparison of Means of Pfi For Sample Statistics With Edward l. Fox Et Al

Statistics	Study Sample	MEAN ± SD	FOX ET AL.
MEAN	32.2998		
SD	6.84631	32.2998 ± 6.84631	>90 to <55

Data of the study was analyzed using MSOffice 2010 excel and SPSS statistics ver. Descriptive parameters included in the study. Correlation co-efficient were calculated using Pearson's Bivariate correlation co-efficient in SPSS statistics ver. 20.

DISCUSSION

The present study evaluated the physical fitness of professionals physiotherapist using Harvard step test and concluded that they have a low level of cardio –respiratory fitness as the Physical fitness score calculated was less compared to normal individuals .Also the study found out negative correlation betweenVo2max, BMI and PFI, there by indicating relative sedentary lifestyle in study population. Because

VO2max and BMI

VO2max, or maximal oxygen uptake, is a measure of cardiovascular fitness and aerobic endurance. BMI (Body Mass Index) is a measure of body fat based on height and weight. A negative correlation between VO2max and BMI means that as BMI increases, VO2max tends to decrease. This relationship is often observed because higher BMI is frequently associated with higher body fat percentage, which can impair cardiovascular function and reduce aerobic capacity11.

VO2max and PFI

PFI (Physical Fitness Index) is a composite measure of overall physical fitness, often including components such as strength, endurance, and flexibility. A negative correlation between VO2max and PFI suggests that individuals with lower aerobic capacity also tend to have poorer overall physical fitness. This is expected because aerobic fitness is a critical component of overall physical health.12

BMI and PFI

A negative correlation between BMI and PFI indicates that individuals with higher BMI typically have lower overall physical fitness. This is often because excess body fat can hinder physical performance and reduce strength, flexibility, and endurance.13

Obesity increases the workload for a given amount of exercise, probably resulting in the step test in participants with a higher body weight or BMI14. Pulse rate variability (pre and post exercise) was minimum among subjects who had excellent physical fitness and it was maximum among subjects who had poor physical fitness index. Concluded in the study that Increase in the BMI affects the physical fitness and causes decrease in the VO2 max15. There is a negative association between BMI and VO2 max 16.

The study compares the mean Physical Fitness Index (PFI) scores of the sample group with the normative values established by Edward L. Fox, Billings, and Mathews in their 1973 publication "Fitness Standards for College Students" in the European Journal of Applied Physiology. This landmark study categorized cardiorespiratory fitness levels—measured through the Harvard Step Test—into classifications such as "excellent," "good," "fair," and "poor" for both male and female college students. The Harvard Step Test protocol used in their study has since become a widely accepted and standard method for evaluating cardiorespiratory fitness across varied populations17. There is a need to motivate the physiotherapist to achieve the optimal level's of fitness. Also it is recommended that the physiotherapist should include physical activities in their day to day schedule.

Limitations:

The scope of study can be expanded by increasing the sample size. Standard step height may favor taller individuals and impact results based on body weight18.

CONCLUSION

Cardio Respiratory Fitness of physiotherapy Professionals of Kamrup Metro is not satisfactory as compared to the physical demands of the profession. High Body Mass Index is associated with lower VO2max values. Improving fitness levels through curriculum changes and daily activities is recommended19. There is a need to improve the fitness of physiotherapy Professionals by making changes in the curriculum of day to day activity.

Ethical Clearance:

Obtained from Institutional Ethical Committee of College of Physiotherapy and Medical Sciences, GUWAHATI-781026, On 19th September 2020

Conflict of Interest Statement

The authors declare no conflict of interest.

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