

Correlation of body mass index, with cardiometabolic and cardiorespiratory fitness in health care professionals of Multan

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Abstract

The current study was conducted at Ali-UI-Murtaza Department of Rehabilitation Sciences, Muhammad Institute of Medical and Allied Sciences, Multan, Pakistan, from October to December 2022 to explore the correlation of body mass index with cardiometabolic and cardiorespiratory parameters in 393 male and female healthcare professionals, including physiotherapists, pharmacists and medical laboratory technicians, aged 22-40 years. The evaluation was on the basis of the Physical Activity Readiness Questionnaire, body mass index, lipid profile, body fat and correlation of blood pressure, temperature, oxygen saturation, respiration rate and heart rate with cardiorespiratory fitness assessed through shuttle-run test, step test and treadmill test. Data was analysed using SPSS 25. Of the 393 subjects, 140(35.62) were underweight, 140(35.62) were overweight and 113(28.75) were obese. Of the total, 153(38.93) were pleased with their general health, while 240(61.06) had a history of cardiovascular and metabolic conditions. There was a highly significant correlation between lipid profiles and the subjects' quality of life ($p < 0.05$).

Keywords: Cardiorespiratory fitness, Body mass index, Stress inducers, Shuttle-run test, Step test, Treadmill test.

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Introduction

Higher incidence of obesity and cardiorespiratory disorders among healthcare professionals has become a global problem. The increased risk of cardiorespiratory disorders and increase in body mass index (BMI) is directly proportional to each other, which has an inverse relation with quality of life (QOL).¹

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Cardiorespiratory fitness (CRF) is widely recognised as an essential reversible cardiovascular risk factor. Significant factors associated with CRF are age, gender and level of physical activity. Compared to those who are physically active, sedentary people have about twice the risk of developing heart disease and dying from coronary heart disease. Increased physical activity is strongly recommended to improve the cardiac risk profile.²

It is essential to find out the correlation between cardiorespiratory parameters and body weight among healthcare professionals.³

The current study was planned to explore the correlation of body mass index (BMI) with cardiometabolic and cardiorespiratory parameters among healthcare workers.

Methods and Results

The cross-sectional study was conducted at Ali-UI-Murtaza Department of Rehabilitation Sciences, Muhammad Institute of Medical and Allied Sciences, Multan, Pakistan, from October to December 2022. Approval obtained from the institutional ethics review committee, and Helsinki guidelines¹ were strictly followed. The sample size was calculated using the Yamane formula.⁴ Those included were 393 male and female healthcare workers, including physiotherapists, pharmacists and medical laboratory technicians (MLTs). Those with physical and mental disabilities of any type, chronic cardiopulmonary conditions, major surgery of any type, chest pain, bronchitis, asthma, angina pectoris, myocardial infarction, smokers, females using contraceptives, pregnant women and athletes were excluded.

After taking informed consent from the participants, they were administered the Physical Activity Readiness Questionnaire (PAR-Q).^{1,5} Various parameters were recorded using mercury manometer, thermometer, pulse oximeter and stethoscope. The waist circumference (WC) and body fat were measured manually with a standard measuring tape.¹

CRF was measured using shuttle-run test, Harvard step test and treadmill test. Blood pressure (BP), heart rate (HR), respiratory rate (RR), maximal oxygen consumption

Table-1: Demographic, health and anthropometric characteristics of the participants (n=393).

Variables	n%
Health care professionals	
Male	200(50.8)
Female	193(49.1)
Socio-economic Background	
Rural	172(43.7)
Urban	221(56.2)
Regular Tea/coffee consumption	
Yes	250(63.6)
No	143(36.3)
Family history of cardiometabolic disorders(CMDs)	
Yes	184(46.8)
No	209(53.1)
Daily physical activity(150mint/week)	
Yes	83(21.1)
No	310(78.8)
Subjective quality of life	
Verypoor	26(6.6)
Poor	36(9.1)
Neither poor nor good	196(49.8)
Good	95(24.1)
Very good	40(10.1)
Satisfaction with health	
Very satisfied	30(7.6)
Dissatisfied	50(12.7)
Neither Dissatisfied Or Satisfied	78(19.8)
Satisfied	205(52.1)
Very satisfied	30(7.6)
Anthropometric indices	Mean±SD
Weight(kg)	58.36±15.04
Height(cm)	162.114±10.28
BMI(kg/m ²)	21.07±4.78
	n%
Underweight	140(35.62)
Overweight	140(35.62)
Obese	113(28.75)

BMI: Body mass index, SD: Standard deviation.

Table-2: Cardio respiratory parameters in correlation with demographic, anthropometric and physical fitness components.

	Mean	Standarddeviation	p-value
BP of shuttle-runtest			
Underweight	122.5	8.39	0.001
Overweight	135	3.19	
Obese	151.4	7.92	
HR of shuttle-runtest			
Underweight	107.5	5.66	0.003
Overweight	130	7.14	
Obese	152.6	5.71	

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Blood glucose of step test			
Underweight	97	4.86	
Overweight	112.2	4.87	
Obese	126.3	3.6	0.001
Cholesterol Level Of Step Test			
Underweight	3.78	0.35	0.001
Overweight	4.65	0.12	
Obese	5.54	0.72	
BP of treadmill test			
Underweight	126	9.79	0.005
Overweight	148	7.55	
Obese	165.1	4.18	
HR of treadmill test			
Underweight	116	10.3	0
Overweight	144	8.08	
Obese	163.5	4.86	
RR of treadmill test			
Underweight	33.5	3.81	0.003
Overweight	41.8	1.61	
Obese	47.3	1.72	
VO2-max of treadmill test			
Underweight	96.4	0.49	0.001
Overweight	97.8	0.4	
Obese	99	0	
Body Fat Of Treadmill Test			
Underweight	25.8	2.5	0
Overweight	34.6	2.44	
Obese	41.7	1.75	
Blood Glucose Of Treadmill Test			
Underweight	97.6	2.35	0.004
Overweight	109	3.77	
Obese	126.4	3.91	
	3.5	0.23	0.006
	4.5	0.37	
	6.11	0.74	

BP: Blood pressure, HR: Heart rate, RR: Respiratory rate, VO2-max: Maximal oxygen consumption

Table-3: Correlation of demographic with anthropometric, cardiometabolic, cardiorespiratory and physical fitness test.

	1	2	3	4	5
Age	0.425**	-	-	-	-
BMI	0.077	0.396**	-	-	-
VO2-max	-0.089	0.817	-0.98*	-	-
Quality of life	-0.593	0.572	0.45	-0.53*	-
Health Satisfaction	0.06	0.014	-0.029	-0.05	0.577**
Bodyfat					
Cholestrol level	0.05	0.018	0.043	0.03	
0.643***					
Blood glucose	0.436	0.368	0.074	-0.653	0.53***
	0.089	0.963	0.74	0.745	0.98**

BMI: Body mass index, VO2-max: Maximal oxygen consumption.

(VO₂-max), temperature, body fat and WC were measured before and after exercise.

Of the 393 subjects, 140(35.62%) were underweight, 140(35.62%) were overweight and 113(28.75%) were obese. There were 200(50.8%) male subjects and 193(49.1%) female subjects. Demographic, health and anthropometric characteristics of the participants were noted in detail (Table1). Cardiorespiratory parameters were noted and their correlation with demographic, anthropometric and physical fitness components was worked out (Table 2). There was a significant negative correlation between lipid profiles and the subjects' quality of life (QOL) (Table3).

Discussion

The present investigation explored the correlation of BMI with cardiometabolic and cardiorespiratory parameters. The adrenaline receptors were stimulated by the epinephrine secreted by the exercises. It has been demonstrated that epinephrine promotes lipolysis, which is primarily responsible for the release of fat from fat reserves. A significant increase in beta-adrenergic receptor stimulation favours lipolysis.^{1,6} Exercise causes an increase in blood flow, which removes localised ischaemia and meets the skeletal muscles' oxygen demand.⁷ This causes an increase in CRF. To preserve homeostasis, the body temperature also rises by up to 10C.⁸ A study in Karachi revealed a comparable relationship between medical students' cardiometabolic profiles and BMI.⁹ Similar cardiometabolic issues linked to BMI among Indo-Asian healthcare practitioners have also been documented.¹⁰ Because of the stressful nature of their work, many healthcare professionals experience lifelong stress, which negatively impacts their cardiometabolic and cardiorespiratory profiles as well as their QOL.

The current study has limitations in terms of its single-centre design and small sample size.

Conclusion

of the nature of their work, healthcare workers are

expected to have a high level of CRF, but CRF in obese healthcare workers was found to be below the acceptable level.

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Authors' Contribution:

EA: Principal investigator.

IAK: Study design.

PP: Data acquisition and statistical analysis.

SI: Data interpretation.

QUA: Final approval.

SA: Drafting.