ISSN: 0975-3583, 0976-2833 VOL 12, ISSUE 03, 2021

ASSESS THE RELATIONSHIPBETWEEN VO_2 MAX AND SELECTED CLINICAL PROFILE AMONG NURSING STUDENTS

RASHMI P JOHN[1], NARSINGHVERMA[2], RANJANA SINGH[3], PRAVESHVISHVAKARMA[4]

ABSTRACT

Background - Cardiovascular endurance or aerobic fitness have an important role in cardiovascular diseases, which is the prime cause of mortality in India. Cardio vascular assessment is the good choice to determine these physiological functions. VO_2 max is one of the best method among them.

Aim- The aim of the study is toassess the relation between VO2 max and selected clinical profile among Nursing Students.

Method-Quantitative research approach was used in this study and exploratory research design was adopted for this study,150 BSc Nursing students were selected for this study and correlation between cardio respiratory determinants and demographic variables was analyzed using inferential and non-inferential statistical method. The association between the variables were assessed by using Chi square and fisher exact significance test and correlation was assessed by Kendall's Tau C.

Result- Our study result projects a clear negative correlation of skin fold test with VO_2 Max (-0.070*) and no other Clinical profile was shown association with VO_2 Max.

Conclusion: The younger population is often unaware about the cardiovascular risks and may fail to take the appropriate actions that could save their lives.

Key words- Cardiovascular endurance, VO_2 max, Clinical Profile, Nursing, students.

INTRODUCTION

Cardiovascular endurance or aerobic fitness have an important role in cardiovascular diseases, which is the prime cause of mortality in India [1]. Cardiovascular endurance is the body's capability to deliver oxygen to the muscles and which will help carry out the activities [2]. Cardiovascular assessment is the good choice to determine these physiological functions[3]. There are numerous methods to evaluating aerobic fitness of individuals. VO_2 max is one of the best method among them[4].

OBJECTIVES

1. To assess influencing factors of cardio-respiratory fitness among nursing students.
2. To determine association and correlation of cardio-respiratory determinant (VO_2 max) with selected demographic variables.
3. To determine association and correlation of cardio-respiratory determinant (VO_2 max) with selected clinical profile.

MATERIAL AND METHOD

The descriptive exploratory study was adopted to evaluate the influencing factors of cardio-respiratory fitness of the nursing students and explored the relationship between VO2 max and selected clinical profile among Nursing Students. The present study was approved by ethical committee of King George's Medical University, Lucknow, Uttar Pradesh, India (ref. code: 84th CCMIID/PI). 150 BSc Nursing students aged 18-25 years were enrolled in these studies, who were studying in KGMU College of nursing Lucknow.

Inclusion criteria: nursing student who were in between the aged 18-25 yrs. having no history of cardio-vascularIllness.

Exclusion criteria: Participant who had history if any pathology related to cardio- vascular system. Participant who had history of Asthma and who had health issues during the time of enrolment like fever, dysmenorrhea, cough, respiratory infection.

A Pro Bodyline treadmill was used for the exercise testing which was conducted with the Modified Bruce Protocol. **Pre-test phase**: **I**.pre-exercise HR was measured and recorded. **II**. The submaximal targeted exercise HR was estimated using the formula for estimating MHR [(208-(0.7x age) x85%]. The values were recorded on the form. The purpose of treadmill was described. Each of the stages were as per tolerance with a goal to achieve steady-state

ISSN: 0975-3583, 0976-2833 VOL 12, ISSUE 03, 2021

HR (HRss) at each workload as long as HRss has been achieved, the speed & incline was increased at the end of three-minute interval.

Test administration: **I**.The treadmill tests were started at 1.7 mph & 10% incline. The maximal HR were recorded. **II**. The test was terminated until the subject's HR response exceeds 85% of MHR the participant's responses were exceeded 115 bpm for two stages upon completion of test. **III**. The nursing students were cool down on the treadmill, walking with moderate speed until breathing returns to normal & HR drops below 100 bpm.The point at which exercise testing was stopped, when the desired heart rate was reached.

Post test phase: The measurement of VO_2 Max was done post completion of exercise. The formula used for calculating VO_2 Max was $HR_{max}/HR_{rest}\times$ 15.3ml/kg/min

The participants were then analyzedunder the following category:

For Females: Values from ≤23.6 to 28.9 were considered poor category, 29 to 36.9 were in good category and values from 37 to 41 came under excellent category.

For Males: Values from <33 to 36.4 were considered to be in poor category, 36.5 to 46.4 were in good category and values from 46.5 to >52.4 came under excellent category.

DATA COLLECTION AND ANALYSIS

A formal order was obtained from the ethical permission from the ethical committee of KGMU Lucknow. Data collection was done within the given period with the help of pre decided tool and tabulated by the inferential and non-inferential statistics.The association between the variables were assessed by using Chi square and fisher exact significance test and correlation was assessed by using Kendall's Tau C.

RESULTS AND DISCUSSION

Section -1 Description of sample characteristics

Variable	Category	Frequency	Percent
Age	18-19	24.00	16.00
	20-21	45.00	30.00
	22-23	31.00	20.67
	24-25	50.00	33.33
Gender	Male	51.00	34.00
	Female	99.00	66.00
Marital Status	Married	1.00	0.67
	Unmarried	149.00	99.33
Educational status	Pursuing B.Sc. Nursing	150.00	100.00
Financial dependency	Dependent	150.00	100.00
Place of stay	Rural	40.00	26.67
	Urban	110.00	73.33
Family income	>5000	14.00	9.33
	5001-10000	23.00	15.33
	10001-20000	29.00	19.33
	20001-25000	39.00	26.00
	>25000	45.00	30.00
Diet	Veg	83.00	55.33
	Non-Veg	67.00	44.67
Freq. OF Fast Food	0-2	87.00	58.00

ISSN: 0975-3583, 0976-2833 VOL 12, ISSUE 03, 2021

	3 or above	63.00	42.00
Freq. OF Fast	0-2	147.00	98.00
	3 or above	3.00	2.00
Freq. OF Feast	0-2	139.00	92.67
	3 or above	11.00	7.33
Drug indulgence	No	143.00	95.33
	Other	6.00	4.00
	Over counter	1.00	0.67
Physical Exercise	Not at all	25.00	16.67
	Occasionally	66.00	44.00
	Once a week	17.00	11.33
	Twice week	16.00	10.67
	3 time week	26.00	17.33
VO_2 Max	Low	46.00	30.67
	Normal	100.00	66.67
	High	4.00	2.67

Table No.1:Frequency & Percentage distribution of Demographic variables

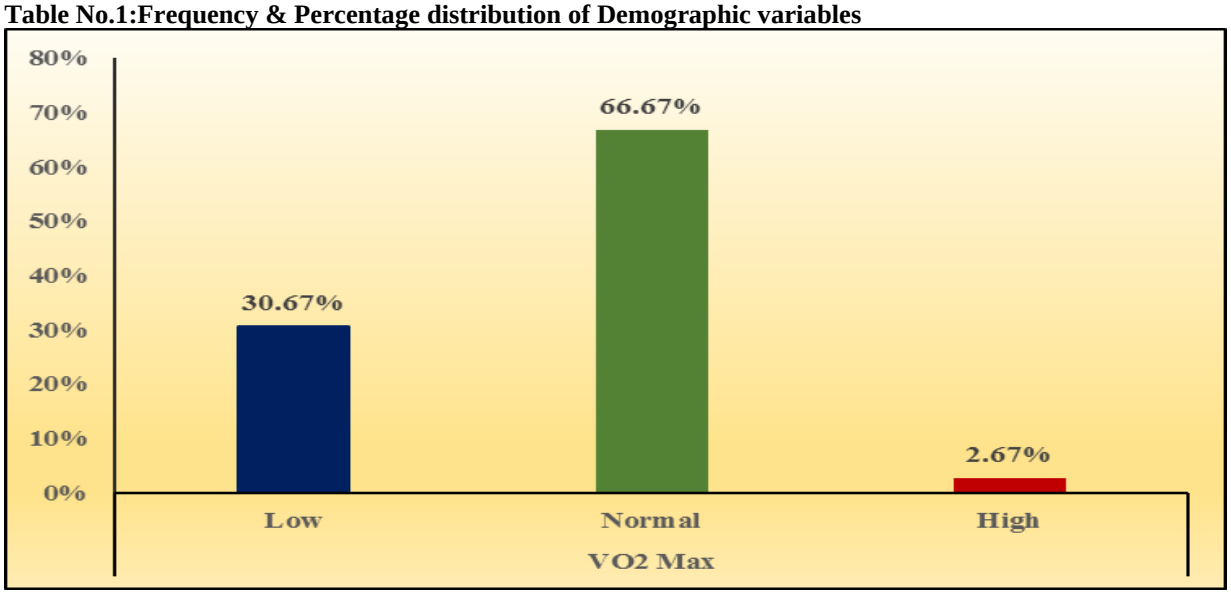

Fig No:1:Frequency & Percentage distribution of Demographic variables according to VO_2 Max

On the view of demographic variables, most of the individuals are of age group 24-25 (33.33%), maximum are females (66%). All the individuals except one (married) are unmarried. All of them are Pursuing B.Sc. Nursing. All of them are financially dependent. Maximum of them (73%) stays in urban area. Family income of most of them is >25000 (30%). Most of them are vegetarians (55%). Most of these consume fast food between 0 to two times in a week (58%).majority of the candidates are having the habit of 2 time fast per week (98%) and also has a habit of taking feast in a frequency of 2 time per week (92%).Maximum individuals are not having drug indulgence (95%). Maximum does physical exercise occasionally (44%).For most of the individuals the tolerated time in TMT is normal (79%) Heart Rate for most of the individuals is normal (68%). The VO_2 Max is Normal for most of the individuals (66.67%).

ISSN: 0975-3583, 0976-2833 VOL 12, ISSUE 03, 2021

Section -2

Section –2: Association and correlation of VO_2 Max with selected demographic variables

Variable	Category	VO2 Max			Chi Square (p-Value)	Fisher's Exact Significance	Correlation (Kendall's tau c)
		Low	Normal	High			
Age	18-19	9	14	1	7.148 (0.307)	0.237	-0.060 (0.386)
	20-21	11	32	2			
	22-23	6	25	0			
	24-25	20	29	1			
Gender	Male	18	32	1	0.862 (0.650)	0.695	0.068 (0.359)
	Female	28	68	3			
Marital Status	Married	0	1	0	0.503 (0.777)	>0.999	-0.007 (0.318)
	Unmarried	46	99	4			
Place of stay	Rural	9	31	0	3.601 (0.165)	0.187	-0.065 (0.302))
	Urban	37	69	4			
Family income	>5000	3	11	0	11.682 (0.166)	0.177	0.077 (0.241)
	5001-10000	11	10	2			
	10001-20000	10	19	0			
	20001-25000	11	28	0			
	>25000	11	32	2			
Diet	Veg	21	59	3	2.914 (0.233)	0.243	-0.130 (0.089)
	Non-Veg	25	41	1			
Freq. OF Fast Food	0-2	31	54	2	2.427 (0.297)	0.305	0.118 (0.114)
	3 or above	15	46	2			
Freq. OF Fast	0-2	46	97	4	1.531 (0.465)	0.587	0.022 (0.084)
	3 or above	0	3	0			
Freq. OF Feast	0-2	42	93	4	0.459 (0.795)	0.810	-0.022 (0.590)
	3 or above	4	7	0			
Drug indulgence	No	45	94	4	1.351 0.853	0.811	0.020 (0.303)

ISSN: 0975-3583, 0976-2833 VOL 12, ISSUE 03, 2021

	Other	1	5	0			
	Over counter	0	1	0			
Physical Exercise	Not at all	9	16	0	8.790 (0.360)	0.258	0.028 (0.650)
	Occasionally	18	46	2			
	Once a week	6	10	1			
	Twice week	8	7	1			
	3 time week	5	21	0			

Table No 2 :Association and correlation of VO2 Max with selected demographic variables

The study result project that there is no demographic variable significantly related with VO2 max. In a similar study by Majid Jalili et al, (2018)[5], conducted on 349 healthy boys,(12.49 ± 2.72 years).Inorder to generate VO_2max prediction equations, the multiple regression analysis wasused, the results showed a significant correlation between VO2 Max with selected demographic variables and Six-Minute Walk Test characteristics (R = 0.11-0.723, P < .01).

Section 3- Association &CorrelationVO_2Max with Selected Clinical Profiles

Variable	Category	VO2 Max			Chi Square (p-Value)	Fisher's Exact Significance	Correlation (Kendall's tau c)
		Low	Normal	High			
Family H/o cardiac diseases	Yes	11	31	1	0.801 (0.670)	0.762	-0.054 (0.425)
	No	35	69	3			
Family H/o respiratory diseases	Yes	8	19	0	0.957 (0.620)	>0.999	0.006 (0.915)
	No	38	81	4			
Co-morbid illness	Yes	4	7	1	1.737 (0.420)	0.295	-0.004 (0.928)
	No	42	93	3			
History of breathing	Yes	1	5	0	.827 (0.661)	0.716	-0.019 (0.445)
	No	45	95	4			
H/o Cough	Yes	3	2	0	2.141 (0.343)	0.285	0.041 (0.216)
	No	43	98	4			
H.R.	Normal	43	96	4	.652 (0.722)	0.735	-.026 (0.456)
	Abnormal	3	4	0			
B.P.	Normal	38	89	2	5.493 (0.064)	.059	-0.014 (0.824)
	Abnormal	8	11	2			
Auscultation Finding	Normal	43	92	3	1.707 (0.426)	0.425	0.030 (0.403)
	Abnormal	3	8	1			
R.R.	Normal	45	98	4	0.089	>0.999	-0.004

ISSN: 0975-3583, 0976-2833 VOL 12, ISSUE 03, 2021

	Abnormal	1	2	0	(0.957)		(0.866)
C.C.	Normal	41	94	3	2.629 (0.269)	0.189	-.022 (0.661)
	Abnormal	5	6	1			
A/P diameter	Normal	45	97	4	0.195 (0.907)	>0.999	0.004 (0.861)
	Abnormal	1	3	0			
transverse diameter	Normal	45	98	4	.089 (0.957)	>0.999	-0.004 (0.866)
	Abnormal	1	2	0			
Lungs Auscultation finding	Normal	43	94	4	0.278 (0.870)	>0.999	-0.011 (0.766)
	Abnormal	3	6	0			
Height	Low	4	16	0	6.466 (0.167)	0.179	-0.058 (0.133)
	Normal	40	84	4			
	High	2	0	0			
Weight	Low	7	21	0	4.314 (0.365)	0.463	-0.067 (0.201)
	Normal	31	70	4			
	High	8	9	0			
BMI	Low	4	22	1	6.291 (0.178)	0.138	-0.138 (0.009)
	Normal	31	65	3			
	High	11	13	0			
MUAC	Low	3	12	0	2.228 (0.694)	0.641	-0.040 (0.260)
	Normal	41	86	4			
	High	2	2	0			
W.C.	Low	26	62	3	8.104 (0.088)	0.103	-0.071 (0.235)
	Normal	14	36	1			
	High	6	2	0			
H.C.	Low	21	56	2	3.327 (0.505)	0.512	-0.083 (0.173)
	Normal	17	35	2			
	High	8	9	0			
Skin Fold Test	Normal	37	94	2	11.884 (0.003)	0.005	-0.070* (0.273)
	Abnormal	9	6	2			

Table 3- Association & Correlation VO_2 Max With Selected Clinical Profiles

The study result projects that Skinfold test is significantly associated to theVO2 Max and it shows a negative correlation with VO_2 Max and no other clinical profiles are showing a relation with VO_2 Max.

In a similar study conducted by Shete N Anjali, et. al (2014)[6], on VO2 Max and Body Fat Percentage in Female Athletes. The study was conducted on Twenty-five female athletes at an age group of 17-22years.The study results depicted, significant higher VO2 max in female athletes and showed a negative correlation between VO2 max and body fat percentage. But was not statistically significant.

CONCLUSION

ISSN: 0975-3583, 0976-2833 VOL 12, ISSUE 03, 2021

The study results projects a clear negative correlation of skin fold test with VO_2 Max. These results statistically proving H_1, H_2. That means there is a significant association and correlation of VO2 max with selected clinical profiles and there is no association and correlation of VO2 Max with demographic variables.However, there is a scope that if sample size increases some or all of the selected clinical profile findings may come out to be significantly related withVO_2 Max.

ACKNOWLEDGEMENT

Authors would like to thank all the participant of this study for their support.

CONFLICT OF INTEREST

Authors declare no conflict of interest related to this study.

REFERENCES

1. Booth, F. W., Roberts, C. K., & Laye, M. J. (2012). Lack of exercise is a major cause of chronic diseases. Comprehensive Physiology, 2(2), 1143–1211. https://doi.org/10.1002/cphy.c110025
2. Myers, J., 2003. Exercise and Cardiovascular Health. Circulation, 107(1). Lauer M, Froelicher ES, Williams M, Kligfield P. *Exercise testing in asymptomatic adults: a statement for professionals from the American Heart Association Council on Clinical Cardiology, Subcommittee on Exercise, Cardiac Rehabilitation, and Prevention. Circulation. 2005; 112:771-776.*Abstract/FREE Full TextGoogle Scholar
3. Thys, D., & Kaplan, J. (1989). Cardiovascular physiology: An overview. Journal of Cardiothoracic Anesthesia, 3(6), 2-9. https://doi.org/10.1016/0888-6296(89)90053-7.
4. Kamyan, Doua & Labania, Lena & Kamyan, Alaa & Rahman, Maram & Bagchi, Sovan. (2020). Assessment of Cardiorespiratory Endurance in Terms of Physical Fitness Index and VO2max among Young adult population of United Arab Emirates. International Medical Journal (1994). Volume - 25. 13412051.
5. Jalili, M., Nazem, F., Sazvar, A., & Ranjbar, K. (2018). Prediction of Maximal Oxygen Uptake by Six-Minute Walk Test and Body Mass Index in Healthy Boys. The Journal Of Pediatrics, 200, 155-159. https://doi.org/10.1016/j.jpeds.2018.04.026
6. Shete, A. N., Bute, S. S., & Deshmukh, P. R. (2014). A Study of VO2 Max and Body Fat Percentage in Female Athletes. Journal of clinical and diagnostic research: JCDR, 8(12), BC01–BC3. https://doi.org/10.7860/JCDR/2014/ 10896. 5329
7. Lauer MS, Pashkow FJ, Larson MG, Levy D. *Association of cigarette smoking with chronotropic incompetence and prognosis in the Framingham heart study. Circulation. 1997; 96:897-903.*
8. de Liefde II., Hoeks SE, van Gestel YR, Klein J, Verhagen HJ, van Domburg RT, Poldermans D. *Prognostic value of hypotensive blood pressure response during single-stage exercise test on long-term outcome in patients with known or suspected peripheral arterial disease. Coron Artery Dis. 2008; 19:603-607.*CrossRefPubMedGoogle Scholar
9. Nishime EO, Cole CR, Blackstone EH, Pashkow FJ, Lauer MS. *Heart rate recovery and treadmill exercise score as predictors of mortality in patients referred for exercise ECG. JAMA. 2000; 284:1392-1398.*CrossRefPubMedGoogle Scholar
10. Aktas MK, Ozduran V, Pothier CE, Lang R, Lauer MS. *Global risk scores and exercise testing for predicting all-cause mortality in a preventive medicine program. JAMA. 2004; 292:1462-1468.*CrossRefPubMedGoogle Scholar
11. Frolkis JP, Pothier CE, Blackstone EH, Lauer MS. *Frequent ventricular ectopy after exercise as a predictor of death. N Engl J Med. 2003; 348:781-790.*
12. Dhoble A, Lahr BD, Allison TG, Kopecky SL **Cardiopulmonary fitness and heart rate recovery as predictors of mortality in a referral population.**J Am Heart Assoc. 2014 Mar 24;3(2):e000559. doi: 10.1161/JAHA.113.000559.
13. US Department of Health and Human Services. *Physical Activity and Health: A report of the Surgeon General*. Atlanta, Ga: Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion;1996.
14. Fletcher GF, Blair SN, Blumenthal J, et al. Benefits and recommendations for physical activity programs for all Americans: a statement for healthcare professionals by the Committee on Exercise and Cardiac Rehabilitation of the Council on Clinical Cardiology, American Heart Association. Circulation. 1992; 86:340–344.

ISSN: 0975-3583, 0976-2833 VOL 12, ISSUE 03, 2021

15. Hurtig-Wennlöf A, Ruiz JR, Harro M, Sjöström M .Cardiorespiratory fitness relates more strongly than physical activity to cardiovascular disease risk factors in healthy children and adolescents: The European Youth Heart Study.Eur J Cardiovasc Prev Rehabil. 2007 Aug;14(4):575-81.