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ASSESSMENT OF CARDIOVASCULAR ENDURANCE IN SWIMMERS AND NON-SWIMMERS BY COMPARING RESTING BLOOD PRESSURE

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ABSTRACT: Background and Objective: Swimming is often recommended by various authoritative groups as a mode of exercise for the prevention and treatment of hypertension and cardiovascular disease. Hence the current study compares the cardiovascular functional abilities with respect to Blood pressure in young freestyle swimmers practicing regularly and non-swimmers. **Materials and Methods:** The present Study was carried out at tertiary health centre of Municipal Corporation of Greater Mumbai on medical students after the informed and written consent. Sixty male medical students of age group 18 – 25 years fulfilling the inclusion criteria were included. The study was carried out by forming 2 groups. One group was the study group, comprising of 30 students who are swimmers, practicing for at least 3 months regularly with one session of 30-60 minutes duration per day and minimum three days in a week were include in the study group. The control group comprised of 30 students who are non-swimmers. Their Blood pressure was measured using sphygmomanometer. The data was recorded and analysed for the statistical significance using student's'‘t’ test. P less than 0.05 were considered the level of significance. **Result:** The mean resting systolic blood pressure in swimmers is significantly lower than in non-swimmers and is statistically significant ($p = 0.000$). The mean resting diastolic blood pressure in swimmers is significantly lower than in non-swimmers and is statistically significant. ($p = 0.000$). **Discussion and Conclusion:** Finding ways to initiate and maintain a physically active lifestyle, particularly with older adults, is a challenge to the practitioner. Swimming has been recommended as an alternative to land-based activity, particularly for older individuals, those who are obese or those who have limited mobility. Our finding may have important implications for exercise prescription in Younger and Older subjects.

Key words: Cardiovascular Functional Ability, Blood Pressure, Swimmers and Non-Swimmers

INTRODUCTION

Physical Fitness is the ability of the organism to maintain various internal equilibrium as closely as possible to the resting state during strenuous exertion and to restore promptly after exercise. Endurance refers to a person's ability to continue doing a stressful activity for an extended period of time. Studies have conclusively shown that keeping active- whether sports, exercise, or everyday chores will help us live longer. One such programme is aerobic or cardiovascular fitness. It is one of the most important health component required for performing more physical work with many health benefits. Aerobic exercise utilizes oxygen and involves use of larger muscle groups which can be maintained continuously or rhythmic in nature. This type of exercise strengthens cardiovascular system and increases overall strength and stamina.

Regular aerobic exercise induces significant adaptations both at rest and during exercise in a variety of dimensions related to cardiovascular regulatory system such as cardiac autonomic function. Aerobic exercise such as swimming performed regularly for minimum three months duration increases cardiovascular endurance. So swimming performed regularly as a hobby or leisure activity will lead to a well rounded fitness programme while incorporating less physical damage to joint and tendons.

Swimming is often recommended in the prevention and treatment of hypertension. Few studies have investigated the effect of swimming training on blood pressure (BP). Our objective was to evaluate 6 months of supervised moderate swimming or walking on BP in previously sedentary, normotensive, older women. Moderate intensity aerobic exercise such as walking[1, 2] and stationary cycling[3] has been shown to reduce resting blood pressure (BP) in normotensive individuals. Swimming is often recommended by various authoritative groups as a mode of exercise for the prevention and treatment of hypertension and cardiovascular disease[4–6]. These recommendations are based on data from studies using other forms of aerobic exercise. This approach assumes that all of the benefits conferred from walking, running and cycling studies may also be applied to swimming. There is a paucity of information to support this assumption, and the assertion that the health benefits are similar to those achieved with walking, running and cycling may therefore be tenuous[7]. Blood pressure increases with immersion in water and with acute swimming, particularly in older individuals[8]. For the same heart rate (HR), mean arterial BP is higher with swimming compared to running[9]. Furthermore, BP in trained swimmers is higher than in other endurance-trained athletes[10, 11]. Long-term effects of swimming training on cardiovascular endurance was not been compared with Non Swimmers. The current study looks into comparison of cardiovascular functional abilities with respect to Blood pressure of young freestyle Swimmers practicing regularly and Non Swimmers.

MATERIALS AND METHODS

The present Study was carried out at tertiary health centre of Municipal Corporation of Greater Mumbai on medical students after the informed and written consent. Prior to testing, pre-test instructions were given and test was properly explained and demonstrated. Sixty male medical students of age group 18 – 25 years fulfilling the inclusion criteria were included.

The study was carried out by forming 2 groups. One group was the study group, comprising of 30 students who are swimmers, practicing for at least 3 months regularly with one session of 30-60 minutes duration per day and minimum three days in a week were include in the study group. The control group comprised of 30 students who are non-swimmers. Students with history of any valvular heart diseases, who have undergone any major surgery like abdominal, cardiac and pulmonary, students with acute illness such as respiratory tract infection, gastroenteritis and students with history of any neuromuscular disorders and skeletal abnormalities, were excluded from the study. The subjects were asked to lie in a supine on a bed for 15 minutes. With the help of mercury sphygmomanometer the systolic and diastolic blood pressures were recorded. Three readings were taken and the average of these readings was noted.

Statistical analysis: The data was recorded and analysed for the statistical significance using student's't' test. p less than 0.05 was considered the level of significance.

RESULTS

The study procedure was carried out on 60 medical students of age group 18-25 years. They were divided into two groups of swimmers and non-swimmers. Parameters measured were Resting heart rate, Resting systolic and diastolic blood pressure and Physical fitness index. The mean and standard deviation was calculated for these parameters. The mean resting systolic blood pressure in swimmers is significantly lower than in non-swimmers and is statistically significant ($p = 0.000$, Table-1, 2 and 3, Fig-1). The mean resting diastolic blood pressure in swimmers is significantly lower than in non-swimmers and is statistically significant. ($p = 0.000$, Table-4, 5 and 6, Fig-2).

Table 1: Systolic Blood Pressure in Swimmers and Non-Swimmers

SYSTOLIC B.P.	NUMBER OF SWIMMERS	NUMBER OF NON-SWIMMERS
LESS THAN 120	23	0
MORE THAN 120	7	30
TOTAL	30	30

Table 2: Comparison of Systolic Blood Pressure in Swimmers and Non-Swimmers

	N	MEAN	S.D.	MINIMUM	MAXIMUM
SWIMMERS	30	120.3	1.1	118	122
NON-SWIMMERS	30	128	1.8	126	132

Table 3: Independent T-Test for the Comparison of Systolic Blood Pressure in Swimmers and Non-Swimmers

	GROUP	N	Mean	S.D	t-value	DF	Sig.	Mean Difference	95 % CI	
									LOWER	UPPER
SBP	SWIMMERS	30	120.3	1.1	-19.94	46.69	0.000	-7.667	-8.44	-6.892
	NON-SWIMMERS	30	128.0	1.8						

Table 4: Diastolic Blood Pressure in Swimmers and Non-Swimmers

DIASTOLIC B.P.	SWIMMERS	NON-SWIMMERS
LESS THAN 80	29	0
MORE THAN 80	1	30
TOTAL	30	30

Table 5: Comparison of Diastolic Blood Pressure in Swimmers and Non-Swimmers

	N	MEAN	S.D.	MINIMUM	MAXIMUM
SWIMMERS	30	79.9	0.7	78	82
NON-SWIMMERS	30	85.6	2.2	82	90

Table 6: Independent T-Test for the Comparison of Diastolic Blood Pressure in Swimmers and Non-Swimmers

	GROUP	N	Mean	S.D.	t	DF	Sig.	Mean Difference	95 % CI	
									LOWER	UPPER
DBP	Swimmers	30	79.9	0.7	-13.6	35.37	0.000	-5.733	-6.588	-4.877
	Non-Swimmers	30	85.6	2.2						

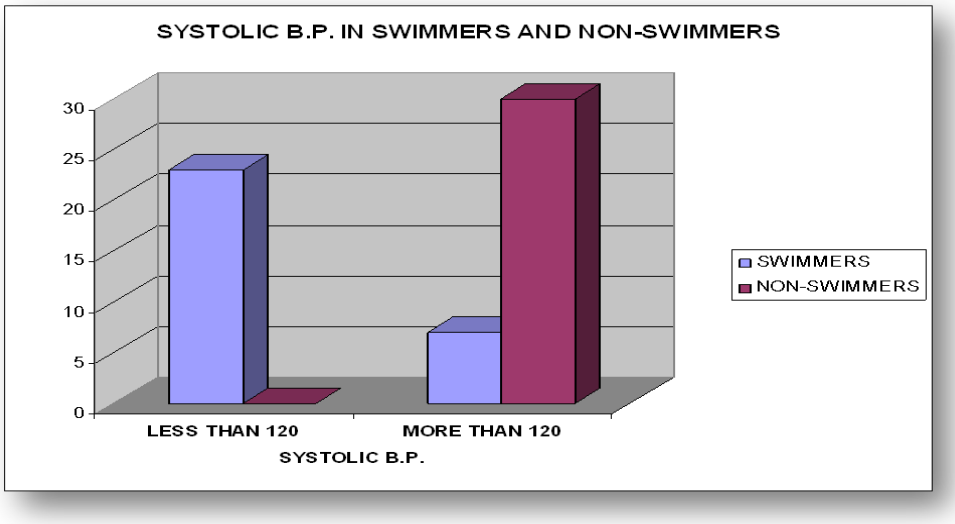

Fig.1 Systolic Blood Pressure in Swimmers and Non-Swimmers

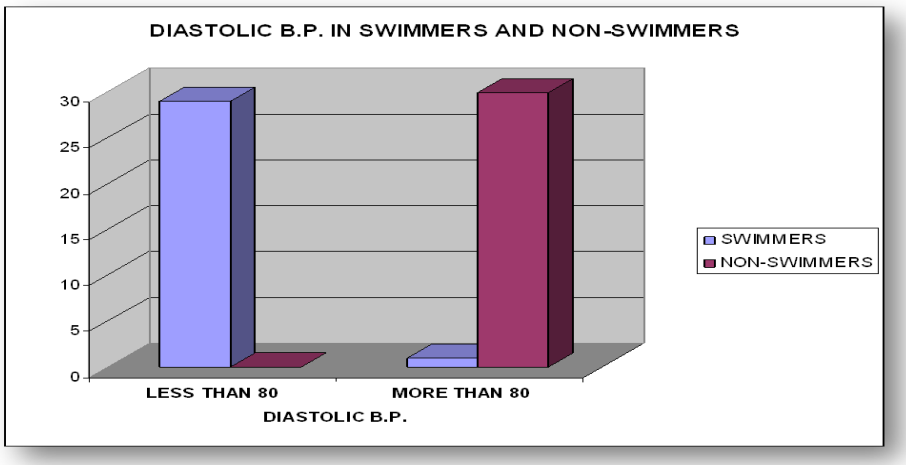

Fig.2 Diastolic Blood Pressure in Swimmers and Non-Swimmers

DISCUSSION

Swimming is primarily an aerobic exercise due to the long exercise time, requiring a constant oxygen supply to the muscles, except for short sprints where the muscles work anaerobically. As with most aerobic exercise swimming is believed to reduce the harmful effects of stress. Swimming can improve posture and develop a strong lean physique, often called a "swimmer's build." Swimming is a healthy activity that can be continued for a lifetime, and the health benefits swimming offers for a lifetime are worth the effort it takes to get to the swimming pool. It works practically all of the muscles in the body. Swimming can develop a swimmer's general strength, cardiovascular fitness and endurance. Regular swimming builds endurance, muscle strength and cardio-vascular fitness. It can serve as a cross-training element to your regular workouts. Before adryland workout, you can use the pool for a warm-up session. Swimming with increasing effort to gradually increase your heart rate and stimulate your muscle activity is easily accomplished in the water.

In the present study, it is seen that resting systolic and diastolic blood pressures of the students of the swimmers group have lower values (Mean systolic blood pressure 120.3±1.1 and Mean diastolic blood pressure of 79.9±0.7) compared to the non-swimmers group who have significantly higher values (Mean systolic blood pressure128±1.8 and Mean diastolic blood pressure of 85.6±2.2). The results of the present study have indicated statistically significant ($p = 0.000$) difference in blood pressure in the case of the swimmers group compared to the non-swimmers.

The results of this study are similar to the results found out by Whelton (2002)[12], Zivkovic[13] (2005), Kokkinos[14] et al. (1995), Kingwell and Jennings[15] (1993). The changes that occurred in blood pressure are probably the result of the regular aerobic exercise which causes better cardiovascular adaptations. The precise mechanisms for how regular exercise lowers blood pressure remains unknown. Contributing factors include reduced sympathetic nervous system activity with training, possible normalization of arteriole morphology, decreased peripheral resistance to blood flow to lower blood pressure and altered renal function facilitates the kidney's elimination of sodium, which subsequently reduces fluid volume and hence blood pressure[16, 17]. It has also been proven that regular aerobic exercise such as swimming, lowers both systolic and diastolic blood pressure significantly and it stays down if the exercise is continued.

Studies investigating its effects on blood pressure have used walking, running, or bicycling, but hitherto not swimming as the type of exercise. Since, swimming works both the upper and lower body with little or no impact; it is considered one of the best cardiovascular modes of exercise. To make the best use of exercise time, it is important to train at the right intensity.

CONCLUSION

In conclusion, inactivity is a major risk factor for hypertension and cardiovascular disease. Finding ways to initiate and maintain a physically active lifestyle, particularly with older adults, is a challenge to the practitioner. Providing variety in the modes of activity is a strategy used to promote increased physical activity. Swimming has been recommended as an alternative to land-based activity, particularly for older individuals, those who are obese or those who have limited mobility. Relative to moderately paced walking, regular swimming significantly elevates BP in previously sedentary, normotensive, older women. This finding may have important implications for exercise prescription in older subjects.

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