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Pilates and Aerobic Exercises: The Relative Impact on Coronary Heart Infection Risk Factors and Functional Components among Sedentary Males

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ABSTRACT

The main purpose of the study was to discern the relative impact of aerobics and pilates training on coronary heart infection risk factors and functional components among sedentary males. Forty-five sedentary young males aged 18 to 23 years were allocated to Aerobic group I, Pilates group II, and Control group (n = 15 each). The experimental groups underwent a respective training program for two sessions per day, three days a week, for eight weeks. The variables were resting pulse rate, cooper –VO_2 Max test for the physiological parameters and total cholesterol, High-Density Lipoproteins (HDL), and Low-Density Lipoproteins (LDL) for the coronary heart disease risk factors. A pre- and post-test were conducted on the study variables. The statistical tools used were paired t-testpercentages, and the level of significance was 0.05. The results indicated that the Aerobic and Pilates groups had a noteworthy influence on resting heart rate and VO_2 Max ($P< 0.05$) and the changes recorded were 3.91 and 2.34 %, respectively. Similarly for the total cholesterol, HDL and LDL there was a substantial impact for the Aerobic and Pilates groups ($P < 0.05$), with the percentage change of 3.85, 1.46, 18.50, 8.40, 3.13, and 1.15 respectively. The Control group did not show any meaningful outcome on any of the variables. It was concluded that Aerobic and Pilates exercise package improved physiological parameters like resting heart rate, VO_2 Max, and lipid profiles like an increase in HDL and a decline in TC and LDL. The Aerobic group showed better results than the Pilates group in all study variables.

Keywords: *Aerobic, Pilates, Coronary heart infection, Functional components.*

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INTRODUCTION

Human beings have to care about their health. [1-4]. Physical education and sport sciences compliment each other and their focus is to promote and improve health and physical fitness through large muscular activities, like conditioning for countless adaptations. The enrichment of the energy dimensions of muscle through an exercise regime is denoted as conditioning [5]. Physical conditioning is indispensable to a projected level for the growth of specific motor aptitudes because of the necessities of the individual, maintaining and understanding the inadequacy of the person concerned [6].

The physical conditioning schedule offers an opening for the improvement and upkeep of physical fitness. It provides an occasion for the enablement of the customary growth of a child and averts the negative factors of the performance such as strength, endurance, flexibility, speed, and skill [7]. By experiencing a physical conditioning plan, one familiarizes

numerous modifications that result in improved performance and quicker recovery. Through constant muscular exertion, strength is expanded, and consequently, an individual manages to attain more power as there is a faster contraction, which reflects an improvement in both power and speed [8]. Conditioning the body by systematic and daily exercise permits a person to encounter difficulties more efficiently.

Consistent exercise and physical activity are exceedingly vital and constructive for long-term health and comfort. Universal fitness exercise works towards extensive objectives of complete health and well-being, rather than constricted goals of sports rivalry, larger muscles, or apprehensions over appearance [9]. An ordered judicious workout routine and a healthy diet can advance general appearance markers of good health. These include the muscle tone, healthy skin, hair, and nails while checking age or lifestyle-related decreases in health, and the sequence of heart and organ catastrophes that complement inactivity and meager diet [10].

Contrology was an important method introduced by [11], in which the brain cells with their electrical impulses stimulate the central nervous system. This system was named pilates training. In the present scenario, science has authenticated that exercise boosts understanding accurately and executive purpose [12]. Pilates workouts are exercise techniques of continual movements and are comprehensive styles for well-being and perpetual process of development [13]. They boost almost all the components of physical fitness that include power, suppleness, coordination, swiftness, agility, and stamina [14]. The development of pilates manoeuvres is achieved by monitoring the effects of the components of gravity such as the base of support and length of the levers [15]. Spring action trains the muscles vigorously on the concentric and eccentric form, and isometrics are a part of each workout strategy in pilates training.

An aerobic exercise is a form of physical exercise that advances the competence of the cardiovascular system in absorbing and conveying oxygen to all parts of the body. Aerobic is an analog to encompassing or necessitating free oxygen that denotes the use of oxygen to sufficiently encounter the energy loads throughout exercise including aerobic metabolism [16]. The concentration of the performance of each exercise is a feature that regulates the choice of metabolic area, which delivers energy for work. Aerobic effectiveness is significant from the viewpoint of training for developing the cardio-respiratory endurance of athletes [10]. Aerobic proficiency articulates the integral interface of all physiological systems accountable for oxygen consumption, carriage, and introduction into the metabolic alterations throughout muscles work. It also summarizes the capability to comprehend the work by the rate of energy emanated from resynthesized ATP throughout aerobic metabolism [17]. Ibrahim et al. (2020) in their study on Divergent Resistance Training Programs, Ramification on the Absolute and Relative Strength and Endurance among College Men assessed the biochemical adaptations to exercise and found that low-intensity long-duration training increases the activity of aerobic enzymes, whereas high-intensity short-duration training enhances the activity of aerobic enzyme [18].

The main risk factors of coronary heart diseases are 1. Elevated or changed levels of blood cholesterol 2. High triglycerides with less high-density lipoproteins 3. Hypertension 4. Diabetes 5. Smoking 6. Overweight or obesity 7. Inactivity 8. Excessive alcohol 9.Too much stress. These apart, there is the risk of getting older, the gender, and the family history to name a few.

Coronary artery ailment grows when the chief blood vessels that provide blood to the heart get impaired or diseased. Cholesterol-containing deposits (plaques) in the arteries and infection are customarily responsible for coronary artery disease. The coronary arteries give blood, oxygen, and nutrients to the heart. Accumulation of plaque can taper these arteries, diminishing blood movement to the heart [19]. Ultimately, the reduced blood movement may result in chest discomfort (angina), the rapidness of breath, or additional coronary artery ailment signs and indications. A whole impasse can result in a heart attack.

The highest risk factor for coronary diseases is the cholesterol that exists in the body in the form of low density and high-density lipoproteins. It is ultimately the LDL that tends to stick to the arteries that bring about their thickening described as atherosclerosis

resulting in tapering of the arteries [20]. The subsequent events lead to blood clots and blockages causing heart diseases or a stroke. The HDL considered as good cholesterol is helpful to the body and the aim of every individual is to increase its volume for reducing coronary heart problems [21].

Although the relationship between triglycerides and the risk of heart disease have not been as perfect as it is for cholesterol, in current years, numerous investigations have recognized that individuals with raised intensities of triglycerides are certainly at an augmented danger. Also, raised triglyceride intensities are frequently linked with other significant risk features, along with scanty levels of HDL cholesterol, obesity, insulin resistance, diabetes, and an inclination to extreme blood clotting [22]. Countless individuals do not fancy perceiving these risk factors, however consistent body workout might be the utmost convincing method to augment the HDL intensities. Current indication advocates that the length of workout, instead of the amount, is an additional vital feature in rising High-Density Lipoprotein cholesterol [23].

Hence, the purpose was to examine the impact of the Pilates and Aerobic training mode's impact on the coronary heart risk factors among females.

METHOD

Forty-five sedentary young males acted as a subject for the study and they were aged between 18 to 23 years. The designated participants were tested by a trained physician and approved to - - participate in the interventions of the study. These participants were arbitrarily assigned into three groups of 15 each. The experimental groups I and II underwent pilates training and aerobic exercises respectively and no special training was imparted to the subjects of Control group, apart from their routine program. The experimental groups underwent the respective training program for two sessions per day, three days a week, for eight weeks. There were no dropouts in this study. The selected variables were resting pulse rate, cooper –VO_2 Max test for the physiological parameters and total cholesterol, High-Density Lipoproteins (HDL) and Low-Density Lipoproteins (LDL) for the coronary heart disease risk factors. A pre- and post-test were conducted on the study variables. A digital blood pressure monitor was used to measure the resting pulse rate. Cooper VO_2 Max was measured on a 400 M track and the distance - traversed in 12 minutes was recorded and calculated with the formula: VO_2 Max = (22.35 X kilometers) – 11.29. The total cholesterol, HDL, and LDL were estimated through the blood samples collected from the participants during the morning hours after 12 hours of abstaining food in a medical laboratory. The statistical tools used were paired t-test percentages, and the level of significance was 0.05.

RESULTS

Table 1: showing the Mean and Standard Deviation for the physiological parameters for all groups

Component	Group	Pre-test M±SD	Post-test M±SD	%	t-ratio
Resting pulse rate	Aerobic	70.59±1.10	68.91±1.08	2.91	13.21*
	Pilates	70.43±1.04	68.37±0.97	2.34	11.35*
	Control	70.79 ±1.25	71.09 ±0.99	0.41	0.47
VO_2 Max	Aerobic	24.74±0.50	25.70 ±0.47	3.87	14.81*
	Pilates	25.24 ±0.95	25.93±0.76	2.76	10.93*
	Control	25.32 ±0.80	25.52 ±0.74	0.77	0.87

- Significant at 0.05

In table 1 the Aerobic, Pilates, and Control groups' data for physiological measurements are presented. The specific readings for the pre- and post-test Mean and Standard Deviation on resting pulse rate were70.59±1.10, 68.91±1.08, 70.43±1.04, 68.37±0.97, and 70.79 ±1.25, 71.09 ±0.99 for the Aerobic, Pilates, and Control groups, respectively. The resultant t-value was 13.21 and 11.35 for the Aerobic and Pilates groups, which was significant ($P > 0.05$). This apart, change of 3.91 and 2.34 percent in the Aerobic and Pilates groups was detected in the resting pulse rate. However, the Control group did not show any significant change ($P < 0.05$).

The values for the pre- and post-test Mean and Standard Deviation concerning the VO_2 Max in the Pilates, Aerobic groups were 24.74±0.50, 25.70 ±0.47 and 25.24 ±0.95, 25.93±0.76 respectively, indicating a t-value of 14.81 and 10.93, which were significant (P > 0.05). Whereas, the Control group did not yield any result which can be considered as significant (P < 0.05). The Pilates group recorded a 3.78 and Aerobic group recorded a 2.76 percent increase in the VO_2 Max.

Table 2: Mean and Standard Deviation for the coronary heart disease risk factors for all groups

Component	Group	Pre-test M±SD	Post-test M±SD	%	t-ratio
Total Cholesterol	Aerobic	194.31±1.70	186.79 ±2.29	3.85	31.53*
	Pilates	195.09 ±1.57	192.24 ±1.60	1.46	18.24*
	Control	195.70 ±1.46	195.44±1.48	0.12	0.40
High-Density Lipoproteins	Aerobic	61.79 ±1.41	64.11 ±1.49	3.76	18.50*
	Pilates	62.11± 1.83	63.71 ±1.42	2.56	8.40*
	Control	61.45 ±1.58	61.39 ±1.28	0.08	0.09
Low-Density Lipoproteins	Aerobic	84.44 ±1.57	81.79±1.84	3.13	9.27*
	Pilates	85.31±0.96	84.32 ±1.11	1.15	3.86*
	Control	84.79±1.36	84.41±1.33	0.42	0.83

- Significant at 0.05

Table 2 indicates the data concerning the heart disease risk factors in which the total cholesterol yielded readings of Mean, SD on total cholesterol as 194.31±1.70, 186.79 ±2.29, 195.09 ±1.57, 192.24 ±1.60 and 195.70 ±1.46, 195.44±1.48 for the Aerobic, Pilates, and Control groups from pre- to post-test, respectively. The t-ratio for the Aerobic group was 31.53 (P>0.05), for the Pilates 18.24 (P> 0.05) and Control 0.40 (P<0.05). The percentage change recorded was 3.85, 1.46, and 0.40 for the Aerobic, Pilates, and Control groups correspondingly.

For the HDL, the result of the Aerobic group had a Mean and SD s from pre- to post-tests as 61.79 ±1.41 and 64.11 ±1.49 with a t-ratio of 18.50 (P>0.05. The Pilates group had 62.11± 1.83 and 63.71 ±1.42 with the t-ratio as 8.40 (P> 0.05) and the Control group had 61.45 ±1.58 and 61.39 ±1.28 with a t-test value as 0.09 (P < 0.05). The percentage increase for the Aerobic, Pilates, and Control group was 18.50, 8.40, and 0.09, respectively.

LDL had Mean and SD recordings of 84.44 ±1.57, 81.79±1.84 from pre- to post-test for the Aerobic group with a t-ratio of 9.27 (P> 0.05) and percent increase of 3.13. The Pilates group had Mean and SD values of 85.31±0.96, 84.32 ±1.11from pre- to post-test with t-ratio of 3.86 (P> 0.05) and percent growth of 1.15 while the Control group had values of 84.79±1.36, 84.41±1.33 from pre- to post-test with 0.83 as the t-ratio (P<0.05) upsurge of 0.83.

DISCUSSION

The - goal of this investigation was to find out the relative impact of the aerobic and pilates exercise on the coronary heart infection risk factors and functional components among sedentary males.

Negligence of physical activity develops heart-associated maladies and numerous disorders resulting in less dynamic and less fit individuals with a superior menace of evolving high lipids concentration especially the total cholesterol and LDL [8]. It is a well-recognized testimony that the aerobic exercise and Pilates practices are of paramount importance and judiciously suited for controlling the physiological and coronary heart disease risk features [10]. The cause may be owing to the consistent and protracted time devoted to the practice of aerobic exercise and pilates training.

Physical exercise denotes to the diversity of exercise that excites the working of the heart and lungs for a period that is adequately long to yield favorable modifications in the body. The heart is constantly adapt to provide abundant oxygen-loaded blood to muscles to develop energy from fat and glycogen aerobically, since it escalates the adeptness of heart circulation and muscles.

Vanitha (2016) evaluated the impact of aerobic exercise on certain physiological components like resting heart rate and breath-holding time for eight weeks [24]. The outcomes discovered that there was a substantial alteration on the principle variables. The variance established owing to aerobic exercise administered to the experimental group on selected physiological variables when compared to Control group. Adling and Bangar (2017) assessed the upshot of aerobic training on designated physical and physiological components and found the significant change from the start to the end-teston muscular endurance, cardio-respiratory endurance, resting heart rate, and vital capacity [25]. Rufus (2016) - evaluated the effect of aerobic training on resting pulse rate, breath-holding time, and Vo_2 Max of women soccer players [26]. The analysis of data revealed that due to the impact of eight weeks of aerobic training the selected physiological parameters of women soccer players significantly changed. Bahram et al., (2014) examined the effects of eight-week aerobic exercise on cardiovascular endurance of sedentary high school male students [27]. They found that the VO_2 Max ($P = 0.001$) and the heartbeat at rest ($P = 0.0001$) meaningfully enriched in the experimental group after the training. All the above studies have found a significant difference in resting heart rate and VO_2 Max that are in line with the outcomes of our study, thus, validating its results.

The role of instabilities in lipid metabolism, predominantly caused by hyper-cholesterolaemia, is progressively being established as initiating the increase of artherosclerosis, Serum cholesterol prescribed standard in the- overall population is now suggested to be < 5.2 mmol/l, and this seems realistic given the very extraordinary danger of developing atherosclerotic disease. Low-density lipoprotein level that is powerfully linked with coronary heart diseases may be caused by many factors. In contrast, high-density lipoproteins concentration that is generally viewed as protective is declined. Augmented indulgence in physical activity influences numerous affirmative deviations in the breakdown of lipoproteins like the fall in the levels of Triglycerides and a corresponding rise in the high-density lipoprotein. The above-mentioned outcomes were backed by the studies of Kin Jsier et al., (2001), Leon and Sanchex (2001), Ades and Poehiman (1996), Leaksonen (2000), Lemura, et al. (2000), Damodaran et al. (2002), Mahahan et al. (1999) and Schmidt et al. (1997) [28-35].

Boreham et al., (2005) undertook a study on the exercise impact of 8 weeks of climbing of the stairs on VO_2 Max, blood lipids, and homocysteine in inactive healthy youth women [36]. The exploration validated that small spells of commotion stair climbing all through the day can positively adjust significant cardiovascular risk factors in earlier inactive youth women. This type of exercise may certainly be integrated into the daily working hours and ought to be encouraged by public health guidelines. Ades and Poehiman (1996) in their investigation on the impact of various tests in youth participants, recommend that aerobic exercise drill wield encouraging impact on explicit lipid sub fractions, specifcically serum triglycerides and HDL cholesterol [30]. Bonettle et al. (1995) advocated that aerobic workout bring modifications in the lipoprotein (a) in amateur fit persons [37]. Hagag Aisha (2013) examined the role of aerobic program on plasma lipid profile and cardio respiratory ability in overweight females [38]. The upshots of the research investigation pointed out significant variations in lipid profile apart from total cholesterol, VLDL, serum triglycerides (TG), and HDL intensities in aerobic exercise cluster. They concluded that aerobic exercise is a sound technique in augmenting lipid profile and cardiovascular aptness in overweight females and could be utilized as a precautionary action in controlling the heat related risk factors.

Hamid et al. (2014) examined the impact of 12 weeks of aerobic workout on Homocysteine, lipoprotein A and lipid profile intensities in inactive males who were middle-aged [39]. Exploration results exhibited a noteworthy reduction in Homocysteine ($P > 0.002$), lipoprotein A ($P > 0.003$), TG ($P > 0.008$), cholesterol ($P > 0.024$) and LDL ($P = 0.019$), substantial surge in HDL ($P = 0.017$) in post-test equated with pre-test. Besides, the study outcomes disclosed that Homocysteine ($P > 0.005$), lipoprotein A ($P > 0.001$), TG ($P > 0.006$), cholesterol ($P > 0.015$), LDL ($P = 0.022$), and HDL ($P = 0.004$) intensities amongst 2 clusters. The above answers disclose that 3 periods/weeks of

aerobic drill effect decrease Homocysteine, lipoprotein A, and lipid profile intensities in inactive males who are over 45 years ,and it is suggested for preclusion of cardiovascular ailment. Mann et al. (2014) analyzed 13 circulated research findings and 2 review manuscripts that talked about the impacts of aerobic workout, resistance exercise, and merged aerobic and resistance protocol on cholesterol intensities and the lipid topographies [40]. The records comprised in the previously mentioned evaluation endorse the favorable impact of consistent exertion on cholesterol intensities and portray the influences of divergent dimensions and concentrations of workout upon many categories of cholesterol. Fact-established workout approvals that are reported, intended at enabling the recommendation and practice of programs to optimize cholesterol levels. All of the above-reported studies in the literature support the outcomes of our study where the levels of HDL increased and that of the total cholesterol and LDL were decreased due to the aerobic training intervention measure, thus curtailing the risk of developing cardiovascular diseases.

Pilates technique corresponds with the contemporary doctrines of fitness, individual training, and psychological bliss by workouts that upkeeps an unaligned spine posture apart from using the surface and apparatus to improve the physical fitness in general [41]. Hence, pilates programs can be physical accomplishments with clinical advantage through numerous investigations in decreasing cardiovascular risk factors [42]. Pilates training improves every part of physical fitness specifically strength, flexibility, coordination, speed, agility, cardiovascular endurance, and reduces the lipids in the blood 10]. Mikalacki et al. (2017) in their study indicated that the pilates regime completed in an uninterrupted training package meaningfully improved the cardiovascular system resulting in lowering of heart rate and increase in VO_2 Max [43]. Therefore, amalgamating strength and aerobic workouts into an exercise regime is premeditated as the ideal tool for reducing cardiovascular risk factors. Pantelić et al in representation of 59 grown-up females, established substantial variations in physiological components for the assessment of highest aptitude exercise amid the preliminary and concluding evaluation in the participant in the aerobic exercise program group [44]. The outcomes of the final measuring exhibited a model of pilates-aerobic exercise depicting constructive influence on the physiological variables in the experimental group. The studies that indicated positive significant improvements in the heart rate and aerobic endurance substantiate the results of our study wherein the above-mentioned variables increased noticeably.

Choi (2012) in his investigation using one hour of pilates training per day, five days a week, for a six-month period found that the total cholesterol and LDL concentrations drastically reduced while the HDL levels got augmented at the end of the study [45]. Kim et al. (2014) from their study on lipid metabolism found that pilates exercise for 8 weeks affirmatively altered the levels of high-density lipoprotein [46]. Nam Sang-Nam et al. (2007) and Park and Kwon (2011) revealed that pilates exercise reduced body fat ratio and positively affected lipid metabolism [47, 48]. Ramezankhany et al. (2011) also supported the above results [49]. Hashemi et al., (2015) in the study on the influence of 8 weeks of pilates training on cortisol and lipid summary found a noteworthy decrease in body mass ($p=0.02$), BMI ($p=0.01$), cholesterol ($p=0.01$), LDL ($p=0.001$) and a substantial surge in cortisol in overweight women folk in the workout cluster [50]. In our study, there were noteworthy increases in the HDL and a reduction in the TC and LDL that also is in confirmation with the above studies who also reported the same results.

CONCLUSION

The investigation – exhibited that aerobic and pilates exercise package meaningfully improved numerous physiological parameters like resting heart rate, VO_2 Max, lipid profiles like increase in HDL and decrease in TC and LDL in the subjects. The Aerobic group showed better results than the Pilates group in all study variables. Hence, the above two pieces of trainingpieces of training interventions are very beneficial and can be utilized to circumvent the coronary heart infection risk factor.

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