

The Effects of Moderate Intensity Exercise on Lipoprotein-Lipid Profiles of Haramaya University Community

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Abstract- This study was designed to investigate the effect of moderate intensity exercise on lipoprotein- lipid profile of Haramaya University community. Both male and female individuals were involved in the study and the study lasted twelve consecutive weeks. Individuals used for the study were Haramaya University community aged eighteen up to thirty years old and free from any impairment or chronic diseases. Purposive sampling technique was used to select the study participants. Twenty individuals, men (n = 10) and women (n = 10) were recruited for the study. All completed the study period properly. Laboratory measurements were conducted at Haramaya University higher health centre. 5 ml of blood sample was collected before, during and after moderate intensity training program to assess TC, TG, HDL, LDL, uric acid and glucose level and some physiological parameters such as RHR, BP (SBP& DBP) were measured. Descriptive statistics and t-test (using SPSS version 16 software) were used to analyze the data collected and to test the significance level at $P \leq 0.05$. Assessments to measure progress made after the exercise program were conducted in terms of reduction made in body weight (5.86% and 7.00%), BMI (6.00% and 7.17%), TC (36.26% and 42.11%), TG (23.93% and 22.98%) and LDL(44.98% and 57.70%)and increment made in HDL(36.82% and 34.22%), respectively for male and female study participants. The study confirmed that moderate intensity exercise resulted in higher reduction of body weight, blood cholesterol, triglyceride, LDL, uric acid and glucose levels and increase HDL (good cholesterol) levels in the blood for both male and female individuals. Thus, from this study it is most likely advisable to use moderate intensity exercise to lower LDL and elevate HDL.

Index terms- Blood pressure, BMI, Body weight, Glucose, HDL, Heart rate, LDL, Moderate intensity, Total cholesterol, Triglyceride and Uric acid.

I. INTRODUCTION

Physical inactivity and reduced cardio respiratory endurance contribute to risk of coronary heart disease (CHD) (Pate et al., 1995). Among the multiple proposed mechanisms for the postulated protective effect of regular physical activity against CHD is a favorable effect on blood lipids, particularly an increase in high-density lipoprotein cholesterol (HDL-C) and a reduction in triglyceride (TG) levels (USDHHS, 1996).

Sampling Size and Sampling Techniques

The purposive sampling technique was used to select twenty (20) participants for the experiment. Participants filled

Exercise, primarily aerobic exercise, is a low-cost therapeutic lifestyle change that has been recommended for improving lipid and lipoprotein levels in adults (Rosamond et al., 2008). While previous meta-analytic research has reported significant improvements in lipids and lipoproteins among both men (Kelley and Kelley, 2006) and women (Kelley et al., 2004) as a result of aerobic exercise on lipids and lipoproteins in adults have been overwhelming.

It is assumed that LDL may act directly or indirectly to cause endothelial damage with subsequent proliferation of arterial smooth muscle cells resulting in an accumulation of lipids and a progression to atherosclerotic plaque formation. HDL on the other hand, is assumed to be protective against CHD; and responsible for carrying cholesterol from peripheral tissue including the arterial walls and back to the liver where it is metabolized and excreted (Neil, 2007).

Physical activity can improve quality of life and is a critical component in reducing or eliminating health disparities through lowering resting heart rate and blood pressure, reducing hypertension, reducing blood glucose, decreasing fat body mass and increasing lean body mass, increasing bone mass and bone strength, increasing muscle strength, preventing arthritis, and reducing symptoms of mild or moderate depression. Rates of leisure-time physical activity, however, are lowest among women, ethnic minorities, and persons of low socioeconomic status, older adults, and persons living in rural settings (Jones, et al., 1998; Sallis and Owen, 1999).

The general objective of the study was to investigate the effect of moderate intensity exercise on lipoprotein-lipid profile of Haramaya University community. The specific objectives of the proposed study were to determine the effect of moderate intensity exercise on low and high density lipoproteins and to compare the effect of moderate intensity exercise on low and high density lipoproteins.

II. MATERIAL AND METHODS

The Study Design

The research work was focused on experimental and field study within 12 weeks of moderate intensity exercise on the effect of lipoprotein- lipid profile. Indeed, the effects of moderate intensity exercise on lipoprotein- lipid profile of Haramaya University community were studied in both males and females as a subject.

the medical history questionnaire. The questionnaire was prepared to identify whether the participants were free from pregnancy and chronic diseases (heart problem, cancer,

diabetes, stroke, hypertension and etc.). Additionally, injury statuses were also used as selection criteria.

Methods of Data Analysis

Descriptive statistics was used to analyze data. The mean and standard deviations (mean ± SD) were calculated using the established equations, in which the data was analyzed by SPSS statistical version 16 software package.

After collecting data on those parameters as blood cholesterol and other tests from the experimental participants; it was analyzed through T-test. Level of significance was set at $p \leq 0.05$.

Training Schedule

The exercise training program was consisted of moderate floor aerobics and treadmill running for 12 weeks of study. Frequency and duration of exercise were 3 days in a week and up to 60 minutes per session. The weekly exercise program was conducted on Monday, Wednesday, and Friday in the afternoon (5:00 Pm-6:00Pm) from the beginning up to the end of the study. After 6 weeks of training, the progress of the training program was ensured by increasing & adjusting the amount of sets, the number of repetitions, and the speed of the exercises.

III. RESULTS AND DISCUSSIONS

Table 1: Mean BW (kg) and BMI (kg/m²) for male and female under moderate intensity exercise training.

Tests	Parameters					
	Male			Female		
	PT	DT	PoT	PT	DT	PoT
BH	1.70 ± 0.03	1.70 ± 0.03	1.70 ± 0.03	1.59 ± 0.06	1.59 ± 0.06	1.59 ± 0.06
BW	61.4 ± 4.76	59.0 ± 4.39	58.0 ± 3.91	56.5 ± 6.89	54.5 ± 7.32	52.8 ± 6.72
BMI	21.2 ± 2.34	20.4 ± 2.23	20.0 ± 2.03	22.4 ± 2.86	21.6 ± 3.02	20.9 ± 2.76

PT= pre training, DT= during training test, PoT= post training test, BH = body height, BW = body weight and BMI= body mass index.

Table 1 showed the BW and BMI change both in male and female study participants. The mean difference showed that there was decrease in BW in both groups. This was due to moderate intensity exercise they were engaged in. 5.86% decrease of body weight was recorded in the male

participants and the female participants decreased by 7.00%. The graphical representation of mean values of body weight and body mass index of the participants has been exhibited in figure 1

Figure 1: Comparative analysis of BW (kg) and BMI (kg/m²) at PT, DT and PoT of male and female participants under moderate intensity exercise.

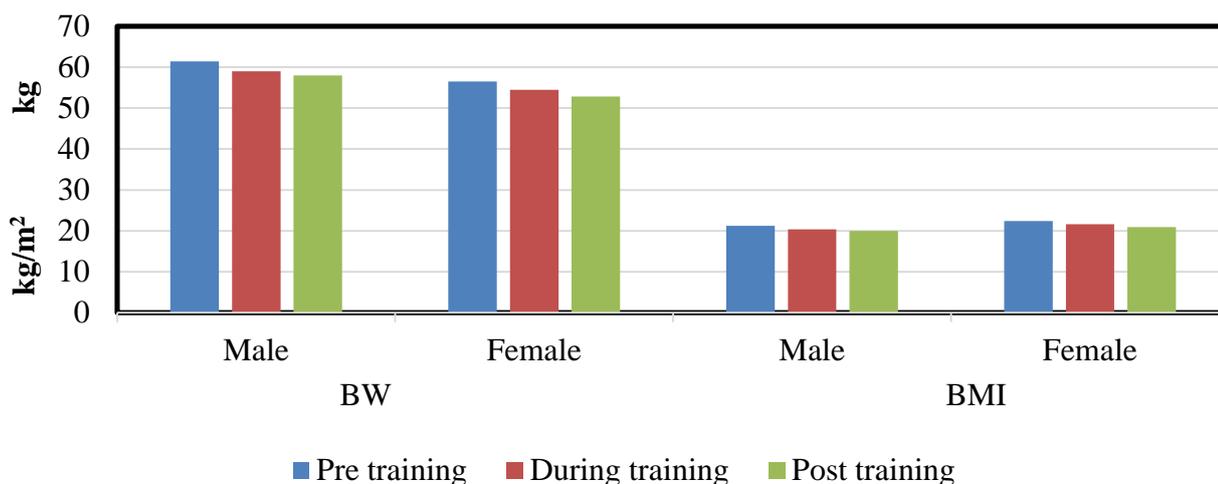


Table 2: Mean RHR (beats/min), SBP (mmHg) and DBP (mmHg) of male and female participants under moderate intensity exercise training.

Parameters	Parameters	
	Male	Female

Tests	PT	DT	PoT	PT	DT	PoT
RHR	77.10 ± 13.56	73.10 ± 10.39	69.70 ± 8.90	84.70 ± 8.70	81.40 ± 10.49	77.2 ± 10.20
SBP	130.20 ± 12.02	125.80 ± 12.19	123.00 ± 11.44	132.10 ± 7.97	130.60 ± 11.66	127.4 ± 10.39
DBP	88.70 ± 6.16	81.70 ± 11.98	79.70 ± 9.98	91.50 ± 9.27	86.20 ± 11.40	83.10 ± 8.78

PT = pre training test, DT = during training test, PoT = post training test, RHR (beat/min) = resting heart rate in beat per minute, SBP (mmHg) = systolic blood pressure and DBP (mmHg) = diastolic blood pressure.

Table 2 showed that the mean values of physiological test in male and female study participants before, during and after moderate intensity exercise training programs. Significance differences in RHR were observed between the sexes as indicated in Table 2. From this table the mean RHR distribution of male participants was 77.10 beats/min before and it was 69.70 beats/min at the end of the study period. Overall the RHR was decreased by 7.40 beats/ min (10.61%) throughout the study period.

However the mean RHR of female participants was 84.70 beats/min before training; and it was decreased to 77.2 beats/min at the end of the study period. Overall the mean of

RHR was decreased by 7.50 beats/min (9.71%) throughout the study period.

As indicated in Table 2 the male mean SBP (mmHg) and DBP (mmHg) were 130.2/88.7 mmHg and 123/79.7 mmHg for before and after training, respectively. Overall the mean difference was decreased by 7.2 mmHg (5.85%) for SBP and 9 mmHg (11.29%) for DBP. Table 2 also shows female participants mean value of SBP and DBP as 132.1/91.5 mmHg before training and 127.4/83.1 mmHg after training. The overall mean difference was decreased by 4.7 mmHg (3.68%) for SBP and 8.4 mmHg (10.10%) for DBP throughout the study period.

Figure 2: Comparative analysis of RHR (beats /min), SBP (mmHg) and DBP (mmHg) of male and female participants at PT, DT and PoT under moderate intensity exercise.

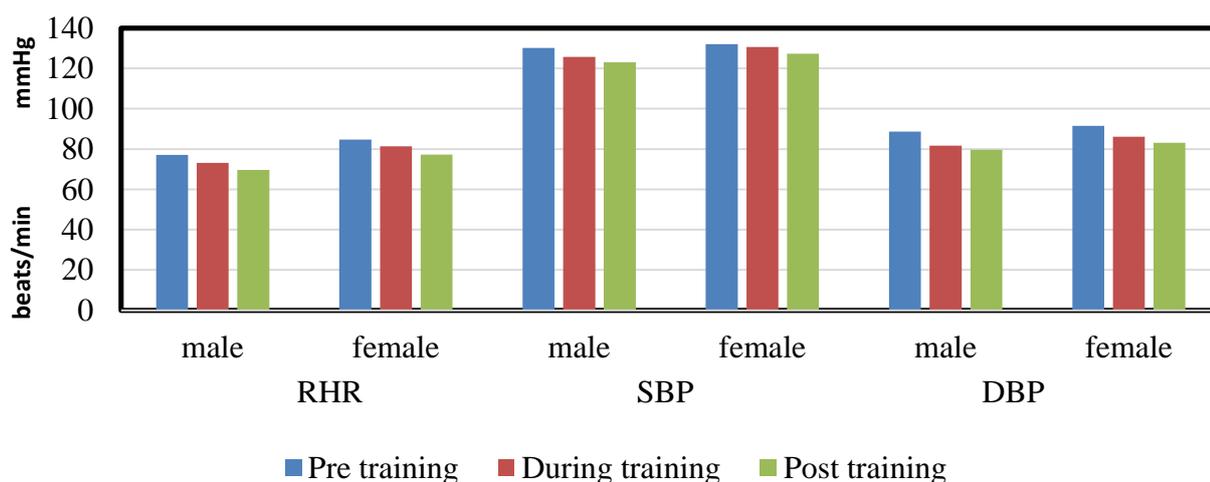


Table 3: Mean TC (mg/dl), TG (mg/dl), HDL (mg/dl) and LDL (mg/dl) of male and female participants under moderate intensity exercise training

Tests	Parameters					
	Male			Female		
	PT	DT	PoT	PT	DT	PoT
TC	147.15 ± 17.91	124.45 ± 20.36	107.99 ± 22.28	169.60 ± 12.96	138.44 ± 21.18	119.34 ± 25.93
TG	106.98 ± 16.07	99.43 ± 29.82	86.32 ± 34.76	123.18 ± 16.72	112.05 ± 27.85	100.16 ± 22.36
HDL	49.11 ± 5.75	58.80 ± 7.33	77.74 ± 12.35	46.73 ± 4.16	58.22 ± 8.19	71.05 ± 5.44
LDL	106.60 ± 26.55	91.26 ± 15.99	73.52 ± 12.81	131.76 ± 25.50	108.64 ± 13.62	83.55 ± 12.34

PT = pre training test, DT = during training test, PoT = post training test, TC (mg/dl) = total cholesterol, TG (mg/dl) = triglyceride, HDL (mg/dl) = high density lipoprotein and LDL (mg/dl) = low density lipoprotein.

Table 3 shows that the mean values of clinical blood chemistry test in male and female study participants during PT, DT and PoT under moderate intensity exercise training programs. Significance mean changes at $p \leq 0.05$ in TC, TG, HDL and LDL with in each test between male and female

were observed. From this table the mean TC distribution of male participants was 147.15 mg/dl before moderate intensity training and it was decreased to 107.99 mg/dl at the end of the study period. The overall mean of TC was decreased by 39.16 mg/dl (36.26%) throughout the study period.

However the mean TC of female participants was 169.60 mg/dl before moderate intensity training; and it was decreased to 119.34 mg/dl at the end of the study period. The overall mean of TC was decreased by 50.26 mg/dl (42.11%) throughout the study period. This shows greater change in female study participants over male study participants in decreasing TC.

The mean TG level was also reduced from 106.98 mg/dl to 86.32 mg/dl and from 123.18 mg/dl to 100.16 mg/dl following a twelve week exercise for male and female participants, respectively. As the results indicate levels of TG reduced by 20.66 mg/dl (23.93%) and 23.02 mg/dl (22.98%), respectively, for male and female participants.

As can be seen in Table 3, the mean increase in HDL and reduction in LDL were statistically significant at $p \leq 0.05$ for

both sexes. There was significant increase in the mean values of HDL from 49.11 mg/dl to 77.74 mg/dl and from 46.73 mg/dl to 71.05 mg/dl for male and female participants, respectively. In a similar pattern LDL mean value reduced from 106.60 mg/dl to 73.52 mg/dl and 131.76 mg/dl to 83.55 mg/dl for male and female participants, respectively.

This showed that the mean increase in HDL was 28.63 mg/dl (36.82%) and 24.32 mg/dl (34.22%), respectively, for male and female participants. Likewise, the mean reduction of LDL was 33.08 mg/dl (44.98%) and 48.21 mg/dl (57.70%) for male and female participants, respectively. The HDL levels tended to increase but the LDL level decreased throughout the study period for both sexes significantly.

Figure 3: Comparative analysis of TC (mg/dl), TG (mg/dl), HDL (mg/dl) and LDL (mg/dl) at PT, DT and PoT of male and female participants under moderate intensity exercise.

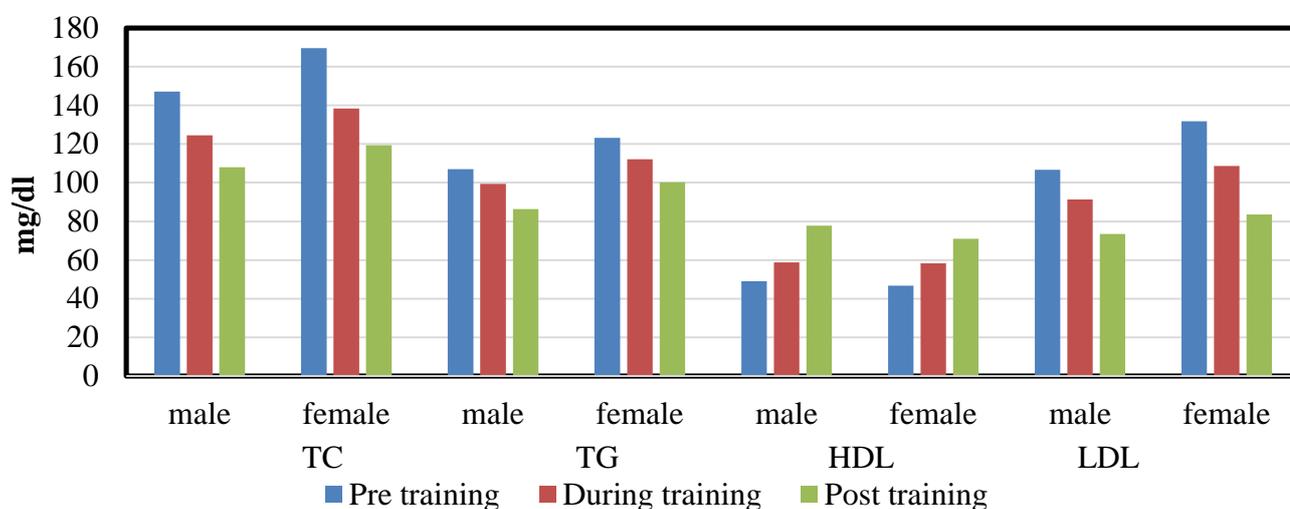


Table 4: Mean uric acid (mg/dl) and glucose (mg/dl) of male and female participants under moderate intensity exercise training.

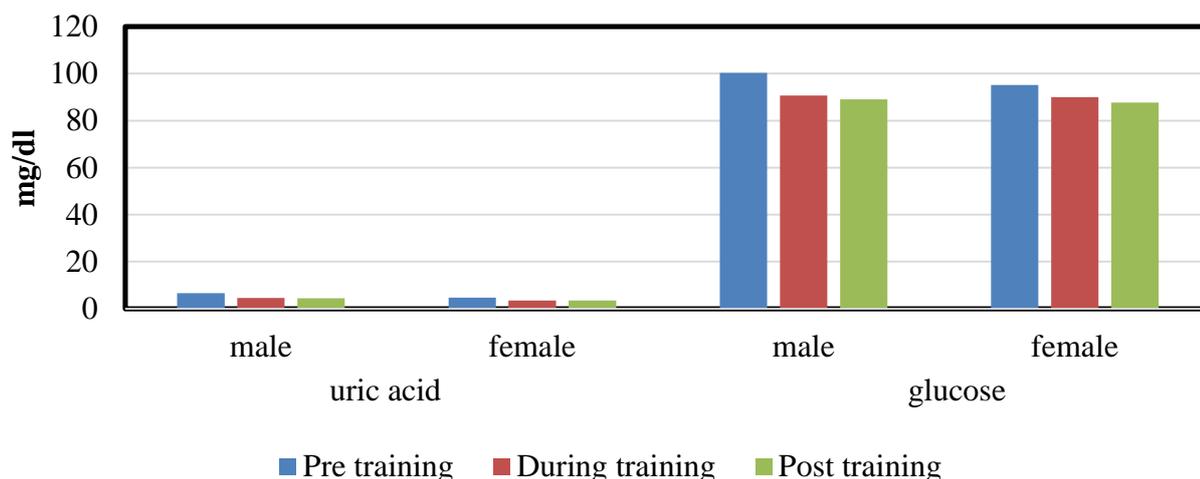
Tests	Parameters					
	Male			Female		
	PT	DT	PoT	PT	DT	PoT
Uric acid	6.63 ± 1.29	4.60 ± 1.34	4.49 ± 1.29	4.64 ± 1.14	3.49 ± 1.29	3.45 ± 1.21
Glucose	100.30±12.22	90.70± 11.84	89.00±11.03	95.20±12.10	90.00±13.64	87.70± 12.12

PT = pre training test, DT = during training test, PoT = post training test.

Table 4 showed mean uric acid (mg/dl) and glucose (mg/dl) changes at $p \leq 0.05$ for both male and female participants. The mean difference showed that there was decrease in uric acid and glucose in both participants. 47.66%

and 12.69% decrease of uric acid and glucose, respectively, were observed in the male participants. Similarly, the female participants' decreased 34.49% and 8.55% of uric acid and glucose, respectively.

Figure 4: Comparative analysis of Uric acid (mg/dl) and glucose (mg/dl) of male and female participants at PT, DT and PoT under moderate intensity exercise training.



IV. CONCLUSION

Within the limitations and delimitations of the study, the following conclusions were drawn:

- Moderate intensity exercise had a significant effect on the improvement of lipoprotein-blood lipid profile. Both male and female individuals who engaged in moderate intensity exercise could be able to enhance their blood lipid profile.
- The body weight was significantly changed. This loss in body weight was due to the decrease of blood lipid profile which ultimately changed the BMI.
- Moderate intensity exercise was appropriate to manage body weight, TC and TG levels. Moreover, there were reductions of body weight, blood cholesterol, triglyceride and LDL level, and improved HDL level for male and female participants.
- LDL level showed greater improvement over HDL following moderate intensity exercise training program.
- The improvement in blood lipid profile was due to moderate intensity work-out. In addition, the improvement of blood lipid profile components (TC, TG, HDL and LDL) and sub-components (uric acid and glucose) played a crucial role in the overall change of blood lipid profile.

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