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Estimation of Alanine Transaminase (ALT), Alkaline Phosphate (ALP) and Aspartate (AST) Irrespective of Dietary Supplementation, Body Mass Index and Nature of Exercise

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Authors' contributions

This work was carried out in collaboration among all authors. Author AK conceived of the study, developed the research design, completed data collection, performed statistical analyses. Authors MZIB, AM,MJ and contributed to the literature review and the interpretation of the results and drafted the manuscript; Author SK contributed to the interpretation of the results and helped in drafting the manuscript. All authors read and approved the final manuscript.

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ABSTRACT

Purpose: This research study was conducted for the assessment of liver enzymes i.e. Alanine Transaminase (ALT), Alkaline Phosphate (ALP) and Aspartate (AST) irrespective of dietary supplementation, body mass index and nature of the exercise.
Methods: A randomized control trails were taken and thus Sixty (60) subjects ageing 20 to 30 years, (Twenty (20) from low-intensity exercise (EXG-II), Twenty (20) from high-intensity exercise

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(EXG-III) and Twenty (20) subjects as a control group (CG-III) were included in the study by using International Physical Activity Scale (IPAQ).5ml blood samples were collected from the subjects for the determination of liver functions and blood redox status. Each blood sample was marked with a separate identification mark. After the collection of blood samples, three particular liver enzymes tests i.e. ALT, ALP and AST were performed. The results of the samples test proceeded through the Statistical Package for Social Science (SPSS) Version 23.

Results: The P-Value of the low-intensity exercise group (EXG-II) in term of ALT was less than the high-intensity exercise group (EXG-III) (p >.05), The P-Value of the low-intensity exercise group (EXG-II) in term of ALP was less than the high-intensity exercise group (EXG-III) (p >.05). The P-Value of low-intensity exercise group (EXG-II) in term of AST was less than high-intensity exercise group (EXG-III) (p >.05).

Conclusion: Based on findings, it was concluded that low-intensity exercise with dietary supplementation positively affects the functions of the liver i.e. Alanine Transaminase (ALT), Alkaline Phosphate (ALP) and Aspartate (AST) as compared to high-intensity exercise. Similarly high-intensity exercise with dietary supplementation also positively influence as compared to performers of high-intensity exercise without dietary supplementation.

Keywords: Low-intensity exercise; high-intensity exercise; ALT; ALP; AST; BMI; dietary supplementation.

1. STUDY BACKGROUND

Earlier epidemiological studies have confirmed that exercise has numerous health benefits. Besides many health problems also associated with exercise particularly the exercise of high-intensity exercise [1,2]. High-intensity exercises may cause damage of skeletal muscles similarly it is also evident high-intensity exercise induce free radicals which leads to oxidative damage. Due to oxidative damage different kind of enzymes like aspartate aminotransferase, alanine aminotransferase, lactate dehydrogenase, with all the muscle fibres in the blood increases [3].

According to Ozougwu (2017), more than 500 hundred functions are performed by the liver (Summary of liver functions is given in Fig.1). Digestion, sugar and fat metabolism, and the body's immune defence is the main functions of the liver. Almost liver processes everything a person eats, breathes, or absorbs through the skin. 90% of nutrients pass through the liver from the intestine [4,5].

In the metabolic process, the liver plays its function such as converting food into energy, regulating the production, storage, and release of sugar, fats, and cholesterol. During food digestion, the liver changes glucose (blood sugar) into glycogen, which is stored for later use. Likewise, during energy need, the liver convert's glycogen back into glucose in a process called gluconeogenesis. The liver controls the storage of fats by changing amino acids from digested food into fatty acids such as triglycerides; when the body does not have enough sugar, the liver converts fatty acids into ketones, which can be used for fuel. The liver also controls the production, metabolism, and excretion of cholesterol, which is an important component of cell membranes and certain hormones [6].

Per day liver secret 700 to 1200 ml of bile (it is alkaline, bitter-tasting, a yellowish-green fluid that comprises bile salts (conjugated bile acids), cholesterol, bilirubin (a pigment), electrolytes and water) which helps in intestinal digestion. It is moulded by hepatocytes and secreted into the canaliculi [7]. The author further stated that bile salts, which are conjugated bile acids, are required for the intestinal emulsification and absorption of fats. Having facilitated fat emulsification and absorption, most bile salts are actively absorbed in the terminal ileum and returned to the liver via the portal circulation for re-secretion.

The liver stores numerous nutrients such as vitamins A, D, B-9 (folate) and B12.in addition It also stores iron and plays a key role in changing iron into a component of haemoglobin (the oxygen-carrying molecule in red blood cells. The liver produces several types of enzymes such as ALT, ALP and AST etc. These enzymes help to break down amino acids from digested food and rebuild them into new proteins needed by the body. Damage of liver cells cause leakage of these enzymes and build up to a high level in the body [8]. The stored vitamins (Vitamin $B_{12,}$ D, E

S.No	Functions
1.	Secretion of Bile
2.	Metabolism of Bilirubin
3.	Vascular and Hematologic Functions (important blood reservoir)
4.	Metabolism of Nutrients (Fat, Protein, Carbohydrates)
5.	Metabolic Detoxification (Toxins, Hormones, Drugs)
6.	Storage of Minerals and Vitamins (Iron, Copper, Vitamins)
7.	Endocrine functions (Activation of vitamin D, Conversion of thyroxine (T4), secretes angiotensinogen, metabolizes hormones)
8.	Immunological/ Protective Functions Reticuloendothelial Component (Filters the portal blood from bacteria, Important in antigen presentation, Phagocytosis via kupffer cells, Removes hemolysis products)

Fig. 1. Illustrate the summary of liver functions

and K) and minerals (as ferritin, an iron-protein complex and is released as needed for red blood cell production) in liver use by the body during need. Vitamin B12 and D are stored in the liver for a few months. [7] Lastly, the liver has immunologic functions as the liver comprised of cells involved in adaptive and innate immunity [9].

Alanine transaminase and alkaline phosphate both are usually used to notice inflammation and viral contagions of the liver. AST is found in the liver and other body tissues, including the skeletal muscles, and amplified levels of AST show muscular inflammation. ALT mainly originates in the liver and other body tissues such as the kidneys and skeletal muscle, and thus increased levels of ALT are mainly attributable to liver inflammation [10].

Aspartate aminotransferase and alkaline phosphate both are rich in the liver, AST in other tissues such as the heart, kidney, skeletal muscle and red blood cells, there is plenty of ALT absorption is low in skeletal muscle [11]. Increased level of Aspartate aminotransferase and alanine aminotransferase signpost muscle and liver enzymes entry into the bloodstream [11]. Concentrations of ALT and AST can cause muscle injury.

Alanine aminotransferase (ALT) is an enzyme that catalyzes the transfer of amino groups to form the hepatic metabolite oxaloacetate [8]. ALT is made of 496 amino acids, which are encoded by a gene located in the long arm of the chromosome [12] ALT is found abundantly in the cytosol of the hepatocyte [13,14]. ALT activity in the liver is about 3000 times that of serum activity [12,13].

Alkaline phosphate is an enzyme that metabolites such as lipids and amino acids for aerobic energy production in the cell membrane pass. High level or increase resultant to exercise in alkaline may show increased activity of hepatic gluconeogenesis, lipid peroxidation and possibly increased bone turnover caused by the intensity and duration of physical activity [15].

In the body, liver is the most significant and major solid organ and the gland playing a vital role in the metabolism of nutrients and excretion of waste metabolites [16.7,8]. Liver converts food into energy, stores nutrients, and produces blood proteins. Similarly liver also works as a filter to confiscate injurious materials from the blood. In the developing fetus, blood cells are produced in the liver [17,18].The primary function of the liver is to regulate the flow and safety of ingredients absorbed from the digestive system before the distribution of these substances to the systemic circulatory system [8].Total body functions are directly associated with liver function similarly total loss of body function is also linked with the liver.

Many factors such as hepatitis C or B, use of alcohol and strenuous exercise can lead liver impairment [11,19,20] . As liver perform a variety of function consequently it is not astonishing that liver damage can affect almost all body systems of the body particularly digestive, endocrine, cardiovascular, and immune systems [21,22]. Long term liver damage may cause complete loss of liver function such as given in Fig. 2 [23,7].

1.1 Justification of the Study

Exercise is considered a basic tool for promoting the overall functional capacity of the body system. Liver is also a most important organ performing a variety of functions. Is there is any effect of exercise on liver function in term of ALT, ALP and AST? To discover the fact, the

researcher intends to carry on a research study titled "Estimation of Alanine Transaminase (ALT), Alkaline Phosphate (ALP) and Aspartate (AST) irrespective of dietary supplementation, body mass index and nature of exercise.

1.2 Objectives of the Study

To assess liver function i.e Alanine Transaminase (ALT), Alkaline Phosphate (ALP) and Aspartate (AST) among exercise performers (based on nature of exercise i.e Low and High Intensity Exercise).

2. METHODS AND MATERIALS

To reach certain findings and conclusion, the below procedural steps were taken by the researcher.

2.1 Participants of the Study

The participants of this particular research study were comprised of sixty (60) subjects (Twenty 20 (10 subjects using nutritional supplements and 10 subjects using no nutritional supplements) from low-intensity exercise performers (EXG-II), (Twenty 20 (10 subjects using nutritional supplements and 10 subjects using no nutritional supplements) from high-intensity exercise performers (EXG-III) and Twenty (20) subjects as the control group (CG-III) were included in the study by using International Physical Activity Scale (IPAQ).

2.2 Blood Sample Collection for Estimation of ALT, ALP and AST

5ml blood was collected from the subjects. Each blood sample was marked with a separate identification mark. After the collection of sample, three particular liver enzymes tests i.e ALT, ALP and AST were performed.

2.3 Statistical Analysis

The mean values of ALT, ALP and AST obtained from both group's i.e. control group and experimental group were processed in SPSS version 24.0 and were analyzed by using One Sample-Statistics, Paired Sample Statistics and Independent Sample T-test.

2.3.1 Presentation and analysis of data

The above table demonstrating the Comparison of Control Group N-20 (CG-I), Low-Intensity Exercise Group, N-20 (EXG-II) regarding Body Mass Index (BMI), Alanine Transferase (ALT), Alkaline Phosphate (ALP), and Aspartate (AST) Similarly the data are articulated as Mean, and Standard Deviation, T- Score and P-Value. The data of both groups about:

1. BMI shows that mean of CG-I was 20.95±1.79, Mean of EXG-II was 22.35±1.46, T Value of both CG-I and EXG-II was -2.709, P-Value was .010. Therefore significance difference is found in the BMI of both Groups CG-I and EXG-II (t 38 = -2.709, $p < .05$). The BMI of CG-I) was less than the BMI of EXG-II.
2. ALT shows that mean of CG-I was 33.50±2.11, Mean of EXG-II was 40.60±11.65, T Value of both CG-I and EXG-II was-2.680, P-Value was .011. (t 38 = -2.680, $p < .05$) Therefore significance difference was found in ALT of both Groups CG-I and EXG-II. The ALT of CG-I was less than the ALT of EXG-II.
3. ALP shows that Mean of CG-I was 40.60±51.54, Mean of EXG-II was 236.90±50.96, T Value of both CG-I and EXG-II was 1.44, P-Value was .158.(t 38 = 1.44, $p > .05$)Therefore no significant difference was found in ALP of both CG-I and EXG-II. The ALP of CG-I was high than the ALP of EXG-II.
4. AST shows that mean of CG-I was 25.35±4.81, Mean of EXG-II was 27.60±5.35, T Value of both CG-I and EXG-II was -1.40, P-Value was .170. (t 38 = 1.40, $p > .05$) Therefore no significant difference was found in AST of both Groups CG-I and EXG-II. The AST of CG-I was less than the AST of EXG-II.

The above table indicating the Comparison of Control Group N-20 (CG-I), High-Intensity Exercise Group, N-20 (EXG-III) regarding Body Mass Index (BMI), Alanine Transferase (ALT), Alkaline Phosphate (ALP) and Aspartate (AST) Similarly the data are articulated as Mean, and Standard Deviation, T- Score and P-Value. The data of both groups about:

1. BMI shows that Mean of CG-I was 20.95±1.79, Mean of EXG-III was 21.35±2.27, T Value of both CG-I and EXG-III was -617, P-Value was .541 (t_{38}= -2.709, $p >.05$). Therefore no significant difference was found in BMI of both CG-I and EXG-III. The BMI CG-I was less than the BMI value of EXG-III.

2. ALT shows that mean of CG-I was 33.50±2.11, Mean of EXG-III was 249.25±51.59, T Value of both CG-I and EXG-III was-.757, P-Value was .000. (t_{38}= -4.369, *p* <.05).Therefore significance difference was found in ALT of both CG-I and EXG-III. The ALT of CG-I was less than the ALT of EXG-III.
3. ALP shows that Mean of CG-I was 236.90±51.59, Mean of EXG-III was 236.90±50.96, T Value of both CG-I and EXG-II was 1.44, P-Value was .454. (t_{38}= -.757, *p* >.05).Therefore no significant difference was found in ALP of both CG-I and EXG-III. The ALP CG-I was less than the ALP value of EXG-III.
4. AST shows that Mean of CG-I was 25.35±4.81, Mean of EXG-III was 28.50±4.01, T Value of both CG-I and EXG-III was -2.246, P-Value was .031. (t_{38}= -2.246, *p* <.05 Therefore significance difference was found in AST of both CG-I and EXG-III. The AST of CG-I) was less than the AST of EXG-III.

The above table indicating the Comparison of Low-Intensity Exercise Group, N-20 (EXG-II), High-Intensity Exercise Group, N-20 (EXG-III) regarding Body Mass Index (BMI), Alanine Transferase (ALT), Alkaline Phosphate (ALP) and Aspartate (AST) Similarly the data are articulated as Mean, and Standard Deviation, T-Score and P-Value. The data of both groups about:

1. BMI shows that mean of EXG-II was 20.35±1.46, Mean of EXG-III was 21.35±2.27, T Value of both CG-I and EXG-III was 1.653, P-Value was .107. (t_{38}= 1.653, *p* > .05). Therefore no significant difference was found in BMI of both EXG-II and EXG-III. The BMI of (EXG-II) was high than the BMI of (EXG-III).
2. ALT shows that Mean of EXG-II was 40.60±11.65, Mean of EXG-III was 47.85± 14.53, T Value of both EXG-II and EXG-III was -1.74, P-Value was .090(t_{38}= -1.74,*p* >.05 Therefore no significant difference was found in ALT of Groups EXG-II and EXG-III. The ALT of EXG-II was less than the ALT of EXG-III.
3. ALP shows that Mean of EXG-II was 213.55±50.96, Mean of EXG-III was 249.25±5.33, T Value of both EXG-II and EXG-III was -2.20, P-Value was .034. (t_{38}= -2.20, *p* < .05). Therefore significance difference was found in ALP of both EXG-II and EXG-III. The ALP of EXG-II was less than the ALT of EXG-III.
4. AST shows that mean of EXG-II was 25.35±4.81, Mean of EXG-III was 28.50±4.01, T Value of both EXG-II and EXG-III was -2.246, P-Value was .031. (t_{38}= --2.246, *p* < .05). Therefore significance difference was found in AST of both EXG-II and EXG-III. The AST of EXG-II was less than the AST of EXG-III.

The above table demonstrating the Comparison of Control Group (CG-I, N-20, Low-Intensity Exercise Group (EXG-II, N-20) and High-Intensity Exercise Group (EXG-III, N-20) in term of Alanine Transferase (ALT), Alkaline Phosphate (ALP), and Aspartate (AST) Similarly the data are articulated as Mean, and Standard Deviation, T- Score and P-Value. The data of all three groups about:

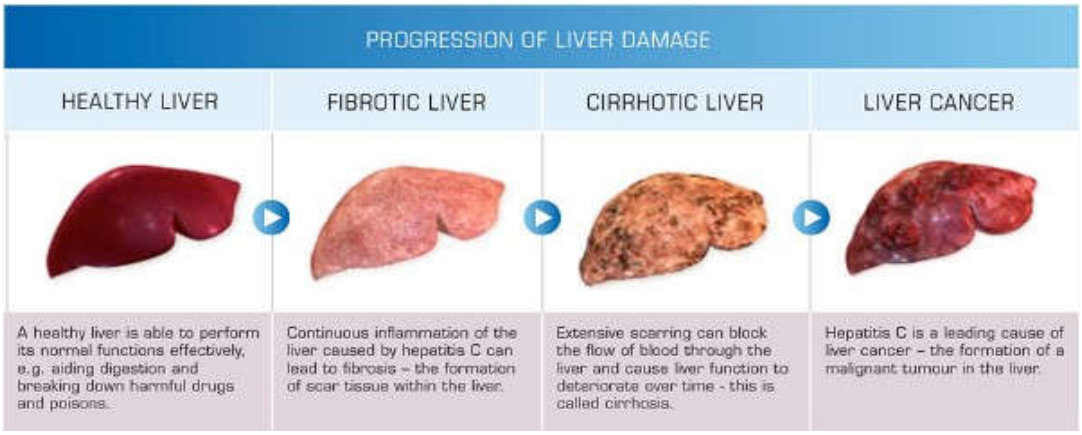

Fig. 2. Illustrate the progression of liver damage caused by various factors

Table 1. Showing Mean difference between the BMI, ALT, ALP and AST of Control Group (CG-I) and Low-Intensity Exercise Group (EXG-II)

Testing variables	category	N	Mean	SD	T	Sig.
Body Mass Index	Control group	20	20.9500	1.79106	-2.709	.010
	LIE	20	22.3500	1.46089		
Alanine Transferase (*IU/L*)	Control group	20	33.5000	2.11511	-2.680	.011
	LIE	20	40.6000	11.65920		
Alkaline Phosphate (*IU/L*)	Control group	20	236.9000	51.54548	1.441	.158
	LIE	20	213.5500	50.96074		
Aspartate (mg/dl)	Control group	20	25.3500	4.81527	-1.400	.170
	LIE	20	27.6000	5.33509		

Table 2. Showing the Mean difference between the BMI, ALT, ALP and AST of Control Group (CG-I) and High-Intensity Exercise Group (EXG-III)

Testing Variable	Category of the Respondents	N	Mean	SD	T	Sig.
Body Mass Index	Control group	20	20.9500	1.79106	-.617	.541
	HIE group	20	21.3500	2.27746		
Alanine Transferase (*IU/L*)	Control group	20	33.5000	2.11511	-4.369	**.000**
	HIE group	20	47.8500	14.53589		
Alkaline Phosphate (*IU/L*)	Control group	20	236.9000	51.54548	-.757	.454
	HIE group	20	249.2500	51.59955		
Aspartate (*IU/L*)	Control group	20	25.3500	4.81527	-2.246	**.031**
	HIE group	20	28.5000	4.01969		

Table 3. Mean difference between the BMI, ALT, ALP and AST of Low-Intensity Exercise Group (EXG-II) and High-Intensity Exercise Group (EXG-III)

Testing Variables	category	N	Mean	SD	T	Sig.
Body Mass Index	LIE Group	20	22.3500	1.46089	1.653	.107
	HIE Group	20	21.3500	2.27746		
Alanine Transferase (*IU/L*)	LIE Group	20	40.6000	11.65920	-1.740	.090
	HIE Group	20	47.8500	14.53589		
Alkaline Phosphate (*IU/L*)	LIE Group	20	213.5500	50.96074	-2.201	.034
	HIE Group	20	249.2500	51.59955		
Aspartate (*IU/L*)	LIE Group	20	27.6000	5.33509	-.603	.550
	HIE Group	20	28.5000	4.01969		

1. ALT shows that the Mean of CG-1 was 33.50±2.11, Mean of EXG-II was 40.60±11.65, Mean of EXG-III was 47.85±14.53, Df was 8.28, P-value was .000. Therefore no significant difference was found in CG-I, EXG-II and EXG-III. (CG-I>EXG-II>EXG-III).
2. ALP shows that the mean of CG-1 was 236.90±51.54, Mean of EXG-II was 213.50±50.96, Mean of EXG-III was 249.25±51.59, Df was 11.38, P-value was .092. Therefore significance difference was found in CG-I, EXG-II and EXG-III. (EXG-II> CG-I>EXG-III).
3. AST shows that the mean of CG-1 was 25.35 ±4.81, Mean of EXG-II was 27.60±5.33, Mean of EXG-III was 28.50±4.01, Df was 7.267, P-value was .107. Therefore significance difference was found in CG-I, EXG-II and EXG-III. .(CG-I>EXG-II>EXG-III).

The above table indicating the Comparison of High-Intensity Exercise Group, N-20 (EXG-III) With Nutritional Supplementation (EXG-III (A) N-10 and Non-Nutritional Supplementation (EXG-III (B) N-10 regarding Body Mass Index (BMI), Alanine Transferase (ALT), Alkaline Phosphate (ALP) and Aspartate (AST), Similarly the data is articulated as Mean, and Standard Deviation, T-Score and P-Value. The data about:

1. BMI shows that Mean of EXG-III (A) was 21.30±1.76, Mean of EXG-III (B) was 21.40±2.79, T Value of both EXG-III (A & B) was .-096, P-Value was .925. (t_{18}= .-096, p < .05). Therefore no significant difference was found in BMI of both EXG-III (A) and EXG-III (B). The BMI of EXG-III (A) was less than the BMI of EXG-III (B).
2. ALT shows that Mean of EXG-III (A) was 34.60±4.42, Mean of EXG-III (B) was 61.10±6.02, T Value of both EXG-III (A & B) was -11.20, P-Value was .000. (t_{18}= -11.20, p > .05). Therefore significance difference was found in ALT of both EXG-III (A) and EXG-III (B). The ALT of EXG-III (A) was less than the ALT of EXG-III (B).
3. ALP shows that Mean of EXG-III (A) was 275.90±12.71, Mean of EXG-III (B) was 181.00±44.70, T Value of both EXG-III (A & B) was 2.65, P-Value was .016. (t_{18}=2.65, p < .05). Therefore significance difference was found in ALP of both EXG-III (A) and EXG-III (B). The ALT of EXG-III (A) was less than the ALP of EXG-III (B).
4. AST shows that mean of EXG-III (A) was 29.50±3.74, Mean of EXG-III (B) was 27.50±4.22, T Value of both EXG-III (A & B) was 1.12, P-Value was .277. (t_{18}=1.12, p >.05). Therefore no significant difference was found in AST of both EXG-III (A) and EXG-III (B). The AST of EXG-III (A) was high than the AST of EXG-III (B).

The above table indicating the Comparison of both Low-Intensity Exercise Group (EXG-II, N-20) and High-Intensity Exercise Group (EXG-III, N-20) based on Body Types (Ectomorph, N-3, Mesomorph, N-36, Endomorph, N-1) in term Alanine Transferase (ALT), Alkaline Phosphate (ALP), Aspartate (AST) and FRAP, Similarly the data are articulated as Mean, and Standard Deviation, T- Score and P-Value. The data of both groups about:

1. ALT shows that mean of Ectomorph was 57.00±18.0, Mean of Mesomorph was 42.69± 12.46, Mean of Endomorph was 61.00±13.51, Df was 2.37, T Value of all body types was 2.525, P-Value was .094. (t_{38}= 2.37, p > .05). Therefore no significant difference was found in ALT of Ectomorph, Mesomorph and Endomorph. The ALT of Mesomorph was less than Ectomorph and Endomorph.
(Mesomorph<Ectomorph<Endomorph).
2. ALP shows that Mean of Ectomorph was 185.33±72.59, Mean of Mesomorph was 234.63± 52.07, Mean of Endomorph was 253.00±53.75, Df was 2.37, T Value of all body types was 2.525, P-Value was .294. (t_{38}= 2.525, p > .05). Therefore no significant difference was found in ALP of Ectomorph, Mesomorph and Endomorph. The ALP of Ectomorph was less than Mesomorph and Endomorph (Ectomorph<Mesomorph<Endomorph).
3. AST shows that mean of Ectomorph was 32.33±1.52, Mean of Mesomorph was 27.63± 4.73, Mean of Endomorph was 30.00±4.68, Df was 2.37, T Value of all body types was 1.519, P-Value was .232. (t_{38}=1.519, p > .05). Therefore no significant difference was found in AST of Ectomorph, Mesomorph and Endomorph. The AST of Mesomorph was less than Ectomorph and Endomorph (Mesomorph<Endomorph<Ectomorph).

Table 4. Showing Comparison of ALT, ALP and AST of Control Group (CG-I), Low-Intensity Exercise Group (EXG-II) and High-Intensity Exercise Group (EXG-III)

Testing Variable	Groups	N	Mean	SD	F	Sig.
Alanine Transferase (IU/L)	CG	20	33.5000	2.11511	8.282	**.000**
	LIE	20	40.6000	11.65920		
	HIE	20	47.8500	14.53589		
	Total	60	40.6500	12.17225		
Alkaline Phosphate (IU/L)	CG	20	236.9000	51.54548	11.388	.092
	LIE	20	213.5500	50.96074		
	HIE	20	249.2500	51.59955		
	Total	60	233.2333	52.65184		
Aspartate (IU/L)	CG	20	25.3500	4.81527	7.267	.107
	LIE	20	27.6000	5.33509		
	HIE	20	28.5000	4.01969		
	Total	60	27.1500	4.86016		

Table 5. Mean difference in BMI, ALT, ALP and AST of High-Intensity Exercise Group (EXG-III) with Nutritional Supplementation (EXG-III (A) and Non-Nutritional Supplementation (EXG-III (B)

Testing Variables	Supplement	N	Mean	SD	t	Sig.
Body Mass Index	Use Supplement (HIE)	10	21.3000	1.76698	-.096	.925
	No Use Supplement (HIE)	10	21.4000	2.79682		
Alanine Transferase (*IU/L*)	Use Supplement (HIE)	10	34.6000	4.42719	-11.20	**.000**
	No Use Supplement (HIE)	10	61.1000	6.02679		
Alkaline Phosphate (*IU/L*)	Use Supplement (HIE)	10	275.9000	12.71438	2.651	**.016**
	No Use Supplement (HIE)	10	222.6000	62.29714		
Aspartate (*IU/L*)	Use Supplement (HIE)	10	29.5000	3.74907	1.120	.277
	No Use Supplement (HIE)	10	27.5000	4.22295		

Table 6. Mean difference in ALT, ALP and AST of low-intensity exercise group (EXG-II) and high-intensity exercise group (EXG-III) in term of body mass index (Ectomorph, Mesomorph and Endomorph)

Testing Variables	BMI	N	Mean	Std. Deviation	Df	F	Sig.
Alanine Transferase (IU/L)	Ectomorph	3	57.0000	18.08314	(2.37)	2.525	.094
	Mesomorph	36	42.6944	12.66450			
	Endomorph	1	61.0000	13.51445			
	Total	40	44.2250				
Alkaline Phosphate (IU/L)	Ectomorph	3	185.3333	72.59017	(2.37)	1.265	.294
	Mesomorph	36	234.6389	52.07860			
	Endomorph	1	253.0000	53.75052			
	Total	40	231.4000				
Aspartate (IU/L)	Ectomorph	3	32.3333	1.52753	(2.37)	1.519	.232
	Mesomorph	36	27.6389	4.73982			
	Endomorph	1	30.0000	4.68467			
	Total	40	28.0500				

3. FINDINGS AND DISCUSSION

The study reveals that statistical difference was found in ALT of the control group (CG-I) and low-intensity exercise group (EXG-II) (t 38 = -2.680, $p < .05$). The findings of studies conducted by [24,25] testified that ALT was changed among the subjects as a result of low-intensity exercise. They further calculated the statistical difference in both the control group and experimental group before and after exercise (SMD -0.40, 95% CI -0.75 ~ -0.05, *P = 0.03*). Findings of the study conducted by [26] revealed that with or without nutritional supplementations (20 intervention groups) the level of ALT was not significantly altered in 10 groups and was significantly reduced (improved) in 5 groups and increased in 5 groups. Such emerging concept is supported by the study conducted [27,28] by indicating that physical exercise results in transient elevations of liver function tests. Findings of the study conducted by [29] found that the time pattern of enzyme activity following exercise compared with following acute myocardial infarction (AMI) has been reported previously, therefore this finding is also in line with the present study findings. A study conducted by [30] shown that aerobic exercise promotes the functional capacity of the liver. Besides, it is also aerobic exercise promote muscular strength, muscle mass and metabolic control, safely and effectively, in vulnerable populations independent of weight loss.

The present study divulge that exercise (low intensity exercise and high intensity exercise) affect the function of liver (ALT (t_{38}= -1.74, $p >.05$), ALP (t_{38}= -2.20, $p < .05$) AST (t_{38}= -2.246, $p < .05$). This emerging concept is supported by [31] and reported that ALP was almost unaltered during the 7 days of exercise. AST and ALT were pointedly increased for at least 7 days after the strenuous physical exercise. The findings of the study conducted by [32] indicated that Strength training and very heavy manual labour are more likely to cause raised in ALT than aerobic exercise [33]. ALT can be elevated in marathon runners and they have the potential to develop rhabdomyolysis in extreme. Exercise has no effects on liver enzymes such as ALT, ALP and AST, Although [34,35,36] found a significant increase in the level of liver enzymes after exercise. They also found that exercise improve the functional capacity of the liver if it is performed according to the nature and capacity of the body.

The above findings also supported [37] by concluding that ALP was almost unaltered during the 7 days of exercise. The study conducted by [38] revealed that AST and ALT were pointedly increased for at least 7 days after the strenuous physical exercise. The findings of the study conducted by [32] indicated that Strength training and very heavy manual labour are more likely to cause raised transaminases than aerobic exercise. Transaminases can be elevated in marathon runners and they have the potential to develop rhabdomyolysis in extreme. Findings of the study conducted by [36] reveal that exercise has no effects on liver enzymes Such as ALT, ALP and AST, Although a significant increase in the level of liver enzymes after exercise. They also found that improvement accurses in liver enzymes when it is performed according to the nature and capacity of the body [35].

4. CONCLUSION

Based on findings, the researcher concluded that low-intensity exercise with dietary supplementation positively affects the functions of the liver i.e. Alanine Transaminase (ALT), Alkaline Phosphate (ALP) and Aspartate (AST) as compared to high-intensity exercise. Similarly high-intensity exercise with dietary supplementation also positively influence as compared to performers of high-intensity exercise without dietary supplementation

CONSENT AND ETHICAL APPROVAL

Ethical approval was taken from Gomal University Ethical & Research Board (Ref No:137/ERB/GU/19) and similarly written informed consent was also obtained from the subjects

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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