



## **Analysis of Blood Serum Bilirubin Concentration among Moderate Intensity Exercise Performers; A Randomized Control Trails**

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### **Authors' contributions**

*This work was carried out in collaboration among all authors. Author ADK, AK designed the study, author MZ performed the statistical analysis, author ZS wrote the protocol and wrote the first draft of the manuscript. Authors SK and MJ managed the analyses of the study. Author MZIB managed the literature searches. All authors read and approved the final manuscript.*

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### **ABSTRACT**

**Purpose:** A randomized control trails were conducted to evaluate the effects of moderate intensity exercise on blood serum bilirubin level.

**Methods:** A participants of the study were divided in two groups i.e. experimental group (EG= 10) and control group (CG=10). 5ml blood were taken from all the subjects and each blood sample

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was marked with separate identification code. Twelve weeks exercise (moderate intensity exercise) protocols was employed on the selected subjects. The collected blood samples were tested and thus the collected results were processed through Statistical Package for Social Sciences (SPSS, Version, 24) by applying Mean and Standard deviation etc.

**Result:** Based on analysis the researcher concluded that moderate intensity exercise has significant impact on Serum Bilirubin Concentration of the subjects. In addition significant difference was found in pre and post test result of experimental group ( $t_4 = 1.000$ ,  $Sig. = .374 > \alpha = 0.05$ ).

*Keywords: Moderate intensity exercise; blood; bilirubin.*

## 1. INTRODUCTION

During the break down of red blood cells (RBCs), the liver produce an enzyme called bilirubin (brown and yellow in color) [1,2]. This enzymes travel to the liver and finally stored in bile duct and thus the body expel in the shape of stool. The concentrated life span of RBCs is 120 days and renew frequently [3]. Basically RBCs contains hemoglobin which transports oxygen throughout the body and finally gets breakdown into bilirubin and other chemical substances. The bilirubin is passed to the liver by albumin, a simple protein [4,5].

There are two main lobes of liver i.e. "left" lobe and "right" lobe, weighted about 1400-1600gm in normal adult. Along with other functions, the main function of liver is to synthesis major biological compounds including protein, carbohydrates and lipids [6,7]. The author further stated that filtration of blood coming from the digestive tract, before passing it to the rest of the body is also a major function of liver.

Liver is a most important organ of the body performing a variety of functions [8,9,10]. In addition under the liver, gallbladder along with parts of the pancreas and intestines is located and thus these all organs works together and thus helps to digest, absorb, and process food [11,12]. The liver also detoxifies chemicals and metabolizes drugs [13,14].

Regular exercise is basic element of healthy life style [15]. Regular exercise not only promote the function of body systems but also helps to stay healthy [16]. Aerobic exercise improve the function of cardiovascular systems and also increase heart rate and change breathing pattern, increasing the amount of oxygen up take in and speeding up delivery of oxygen to vital body organs, such as liver [17].

Weight training promote strength of bones and muscles and reduce body fats and increase lean body mass and has an effect on metabolism [18].

Maintenance of muscles as well as bones strength especially important for adults as liver disease often leaves bones susceptible to osteoporosis [19,20].

In many ways, exercise improve the functions of liver [21]. Exercise improve the function of heart muscles and allow it pump blood with little efforts [22]. The author further stated that as a result pulse slows down and increase the blood flow which make it easier for heart get blood to the liver and for your liver to send filtered blood back through your blood system.

## 2. MATERIALS AND METHODS

### 2.1 Trails Design

In this research study, a randomized control trails were conducted for the purpose to examine the impact of moderate intensity exercise on blood serum bilirubin concentration among male athletes. A self-made, twelve weeks moderate intensity exercise protocol was applied on expimintal group.

### 2.2 Subjects

The age of the subjects were arranged in ascending order such from 20 to 30 years and thus they were divided into two group's i.e. Experimental Group (EXG= 10, Control group (CG=10) selected from the department of sports sciences & physical education, Gomal University Dera Ismail Khan, KP, Pakistan. All participants of the study were informed about the risk factors of the study protocols. Study objectives were explained to the participants and those who consented and fulfill the inclusion criteria were included in the study. During the selection process of the subjects all those subjects were included in the study that represents the exercise-trained cohort, and age and sex-matched sedentary control.

### 2.3 Inclusion Criteria

On the basis of the below criteria, the subjects were included in the study

1. The subjects who voluntarily participate in the study
2. The subject having no chronic health problems
3. The subject having age from 20 to 30 years
4. The subjects using no medicine

## 2.4 Exclusion Criteria

The subjects were excluded from study through the below criteria

1. Subjects refused participation
2. Subject having a chronic health problems
3. Subjects have age less than 20 and more than 30 years
4. Subjects using medicine

## 2.5 Blood Sample Collection

Blood samples (5 ml) were collected from all subjects by vein puncture and immediately transferred in heparinized tubes and centrifuged to separate plasma for determination serum bilirubin. Each tube was marked with a subject distinguishing proof code

## 2.6 Data Analysis

The data collected during pre and posttest were processed through statistical package for social sciences (SPSS, version.24) and were analyzed by using Mean, Standard deviation etc. as a statistical tools.

### 2.6.1 Section A: Raw data and descriptive statistics

The data shows that the mean age of the EXG before the treatment was 21.4 years, the weight mean was 67.2 kg, the mean height was 170.18 cm, and mean BMI in pretest was 23.28 and mean Bilirubin e before the treatment was 0.58 mg/dl.

The data shows that the mean age of the EXG after the treatment was 21.4 years, the weight mean was 64.4 kg, the mean height was 170.18 cm, and mean BMI in posttest was 22.2 and mean Bilirubin e before the treatment was 0.52mg/dl

The data shows that the mean age of the CG before the treatment was 23 years, the weight mean was 80.0 kg, the mean height was 175.86 cm, and mean BMI in pretest was 25.9 and mean Bilirubin e before the treatment was 0.5 mg/dl.

**Table 1. Experimental group (EXG) pretest of bilirubin with anthropometric measures**

#	Code	Age (years)	Weight (kg)	Height (cm)	BMI/Pre	Bilirubin
1	A1	22	65	172.72	21.78	0.5
2	A2	21	82	170.18	28.31	0.4
3	A3	22	70	167.64	24.90	1.2
4	A4	21	60	170.18	20.71	0.4
5	A5	21	59	170.18	20.73	0.4
<b>Average</b>		<b>21.4</b>	<b>67.2</b>	<b>170.18</b>	<b>23.28</b>	<b>0.58</b>

**Table 2 . Experimental group (EXG) posttest of bilirubin with anthropometric measures**

#	Code	Age (years)	Weight (kg)	Height (cm)	BMI/Post	Bilirubin
1	A1	22	63	172.72	21.1	0.5
2	A2	21	78	170.18	26.9	0.3
3	A3	22	65	167.64	23.1	1.1
4	A4	21	58	170.18	20.0	0.3
5	A5	21	58	170.18	20.0	0.4
<b>Average</b>		<b>21.4</b>	<b>64.4</b>	<b>170.18</b>	<b>22.2</b>	<b>0.52</b>

**Table 3. Control group (CG) pretest of bilirubin with anthropometric measures**

S/No	Code	Age (years)	Weight (kg)	Height (cm)	BMI/Pre	Billirubin
1	B1	24	92	185.42	26.75	0.5
2	B2	23	78	175.26	25.39	0.6
3	B3	22	90	170.18	31.07	0.5
4	B4	23	75	185.88	21.70	0.5
5	B5	23	65	162.56	24.59	0.4
<b>Average</b>		<b>23</b>	<b>80.0</b>	<b>175.86</b>	<b>25.9</b>	<b>0.5</b>

Table 4. Control group (CG) posttest of bilirubin with anthropometric measures

S/No	Code	Age (years)	Weight (kg)	Height (cm)	BMI/Post	Billirubin
1	B1	24	92	185.42	25.75	0.5
2	B2	23	78	175.26	25.39	0.5
3	B3	22	90	170.18	31.07	0.5
4	B4	23	75	185.88	21.70	0.4
5	B5	23	66	162.56	25.97	0.4
<b>Average</b>		<b>23</b>	<b>80.2</b>	<b>175.86</b>	<b>25.97</b>	<b>0.46</b>

The data shows that the mean age of the CG after the treatment was 23 years, the weight mean was 80.2 kg, the mean height was 175.86 cm, and mean BMI in posttest was 25.97 and mean Bilirubin e before the treatment was 0.46 mg/dl

### 2.6.2 Section B: Testing of Hypotheses

The data in the Table5 shows that there is no significant difference in both EXG ( $M= 23.28\pm 3.28$ ) and CG ( $M= 25.90\pm 3.43$ ) in term of BMI before the treatment  $t_8 = -1.230$ ,  $Sig. = .254 > \alpha = .05$ . Similarly, data also indicates that there is no significant difference in both EXG ( $M= 22.22\pm 2.90$ ) and CG ( $M= 25.97\pm 3.34$ ) in term of BMI after the treatment  $t_8 = -1.897$ ,  $Sig. = .094 > \alpha = .05$ . The data also shown that there is no significant difference in both EXG ( $M= .580\pm .349$ ) and CG ( $M= .500\pm 0.70$ ) in term of Serum Bilirubin Concentration before the treatment  $t_8 = .502$ ,  $Sig. = .629 > \alpha = .05$ . Similarly, data also indicates that there is no significant difference in both EXG ( $M= .52\pm .334$ ) and CG ( $M= .480\pm .044$ ) in term of Serum Bilirubin Concentration  $t_8 = .265$ ,  $Sig. = .798 > \alpha = .05$ . Hence inferentially there is no significant effect of moderate intensity exercise on BMI and in term of Serum Bilirubin Concentration of the subjects but descriptively the EXG shows better results in term of BMI in term of Serum Bilirubin Concentration (after the treatment).

The data shows that there is significant difference in term of BMI score of EXG before ( $M= 23.28\pm 3.28$ ) and after ( $M= 22.22\pm 2.90$ ) treatment. EXG shows better results in term of BMI score after the treatment  $t_4 = 4.66$ ,  $Sig. = .010 < \alpha = 0.05$ . The data demonstrate that there is no significant difference between in in term of Serum Bilirubin Concentration of EXG before ( $M= .580\pm .349$ ) and after ( $M= .520\pm .334$ ) the treatment, but descriptively posttest score of EXG shows better results in term of in term of Serum Bilirubin Concentration after the treatment  $t_4 = 2.449$ ,  $Sig. = .070 > \alpha = 0.05$ . the data shows that the weight of the subjects are significantly reduced ( $67.20 > 64.40$ ).

The data shows that there is no significant difference in term of BMI score of control group before ( $M= 25.90\pm 3.43$ ) and after ( $M= 25.97\pm 3.34$ ) the treatment, CG shows same results in BMI after the treatment  $t_4 = -.200$ ,  $Sig. = .851 > \alpha = 0.05$ . The data also shows that there is no significant difference in term of in term of Serum Bilirubin Concentration of CG before ( $M= .50\pm .070$ ) and after ( $M= .480\pm .044$ ) the treatment. CG shows same results in Bilirubin after the treatment  $t_4 = 1.000$ ,  $Sig. = .374 > \alpha = 0.05$ . The weight of the respondents was not significantly different in pre and post test score ( $80.00 < 80.20$ ).

Table 5. Independent sample t-test showing the mean difference between experimental group (EXG) and control group (CG) before and after the treatment in BMI, Bilirubin

Testing variables	Groups	N	Mean	Std. Deviation	T	Sig.
Body Mass Index Pre	EXG	5	23.2860	3.28947	-1.230	.254
	CG	5	25.9000	3.43029		
Body Mass Index post	EXG	5	22.2200	2.90637	-1.897	.094
	CG	5	25.9760	3.34019		
Bilirubin Pre	EXG	5	.5800	.34928	.502	.629
	CG	5	.5000	.07071		
Bilirubin post	EXG	5	.5200	.33466	.265	.798
	CG	5	.4800	.04472		

**Table 6. Paired sample t-test showing the mean difference between before and after the treatment scores in BMI, Bilirubin experimental group (EXG)**

Testing Variables	Mean	N	Std. Deviation	t	Sig.
Pair 1 Weight pre	67.2000	5	9.36483	3.810	.019
	Weight post	64.4000	5		
Pair 2 Body Mass Index Pre	23.2860	5	3.28947	4.662	.010
	Body Mass Index post	22.2200	5		
Pair 3 Bilirubin Pre	.5800	5	.34928	2.449	.070
	Bilirubin post	.5200	5		

**Table 7. Paired sample t-test showing the mean difference between before and after the treatment scores in BMI, Bilirubin control group (CG)**

Testing variables	Mean	N	Std. Deviation	t	Sig.
Pair 1 Weight pre	80.0000	5	11.15796	-1.000	.374
	Weight post	80.2000	5		
Pair 2 Body Mass Index Pre	25.9000	5	3.43029	-.200	.851
	Body Mass Index post	25.9760	5		
Pair 3 Bilirubin Pre	.5000	5	.07071	1.000	.374
	Bilirubin post	.4800	5		

### 3. RESULTS AND DISCUSSION

Study shows that there is no significant difference in both EXG ( $M= 23.28\pm 3.28$ ) and CG ( $M= 25.90\pm 3.43$ ) in BMI before the treatment  $t_8 = -1.230$ ,  $Sig. = .254 > \alpha = .05$ . It is also indicates that there is no significant difference in both EXG ( $M= 22.22\pm 2.90$ ) and CG ( $M= 25.97\pm 3.34$ ) in BMI after the treatment  $t_8 = -1.897$ ,  $Sig. = .094 > \alpha = .05$ . This findings is supported by the [18,23,24,25,26] that exercise with healthy diet is a more effective and helpful in managing body weight. In addition the author further stated that exercise also helps in managing many health complications such as high blood pressure, high level of blood cholesterol level and risks of heart attack etc.

It is also indicates that there is no significant difference in both EXG ( $M= 22.22\pm 2.90$ ) and CG ( $M= 25.97\pm 3.34$ ) in BMI after the treatment  $t_8 = -$

$1.897$ ,  $Sig. = .094 > \alpha = .05$ . There is no significant difference in both EXG ( $M= .580\pm .349$ ) and control group ( $M= .500\pm .070$ ) in term of in term of Serum Bilirubin Concentration before the treatment  $t_8 = .502$ ,  $Sig. = .629 > \alpha = .05$ . Similarly, data also indicates that there is no significant difference in both EXG ( $M= .52\pm .334$ ) and CG ( $M= .480\pm .044$ ) in term of Serum Bilirubin Concentration after the treatment  $t_8 = .265$ ,  $Sig. = .798 > \alpha = .05$ . In line of this finding the study conducted by [27,28,29,30,31] reveals that high level of serum bilirubin level may have a positive role reducing body fats and managing body weight. Similarly aerobic exercise also play a dramatic role in increasing the level of serum bilirubin level among subjects

### 4. CONCLUSIONS

On the basis of data analysis and findings of the study, the researcher concluded that moderate

intensity exercise has significant impact on Serum Bilirubin Concentration among the subjects. In addition significant difference was found in pre and post test result of experimental group (EXG).

### CONSENT AND ETHICAL APPROVAL

A written informed consent from all the subjects and ethical approval was taken from Gomal University Ethical Review Committee (ref no:137/ERB/GU/19) before initiating the study protocols. Permission was taken from the Department of Sports Sciences and Physical Education, Gomal University. Written informed consent was taken from the respondents before participating in the process of this research project. Privacy of participants was safeguarded at all times. Withdrawal policy was also ensured during the filling of the consent form. 5ml blood were taken from all the subjects and each blood sample was marked with separate identification code.

### COMPETING INTERESTS

Authors have declared that no competing interests exist.

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