

Effect of Physical Effort Due To Increased Intensity in Bio-Chemical Variables in Blood and Some Basic Skills of Volley Ball Players

M. D. Arif Abdul Jabbar Hussain

Republic of Iraq – Anbar University - Faculty of student activities.

ABSTRACTS:

The object of research is to know effects of physical exercise on treadmill focused on enzymes, creatine, Phosphokinase, Cholesterol, Haemoglobin (Hb), dihydrogenase (HDL) in blood and effect on performance of basic skills of volley ball. Researcher presumed existence of significant differences between before and after examinations focused on Haemoglobin (Hb), Cholesterol, Enzymes like creatine, phosphokinase (CPK), lactate dehydrogenase (HDL) in performance of some basic skills of volley ball. The tests proved differences. Total 18 persons physically suitable for the research were made to undergo in this trial. The main experiment was applied which included biochemical values before the skill test and later physical exercise by running on treadmill for 12 minutes with change in its angle of elevation, then biochemical values recorded post skill test. The result of research revealed positive effects for change in biochemical values related to this experiment and its enzymes like creatine, phosphokinase (HDL) (CPK) and at the performance of skill in volleyball like hitting ball within trial revealed said biochemical effect negative. It is also recommended in the research that biochemical tests brings traces of variation in blood within level related to each player at different level of their function.

INTRODUCTION:

The game of volleyball is a very popular game and liked in many countries all over the world. It has attracted lot of interest from many of specialists and critics, their interest have contributed to the promotion of game. The integration, harmony between the physical, skill, tactical and functional aspects added to its popularity in comparison to other sports in the world, which came as a result of the adoption of scientific planning by coaches to train the players and building of foundation and scientific principles of sports as well as reliance on calculations and based on timely scientific tests, which helped in physical effort during matches and training periods, so that player may display his physical, technical and tactical capabilities in a better way and can perform all that is required at the time of game.

And this study highlights importance in being way to most comprehensive studies for outlining standard levels for biochemical variables and skills specially and such levels have great and extreme importance in discovery of individual differences among players and reliance on these levels in selection process of sports as well as about giving clear picture of physical and skill level of tem especially to the trainer.

Research Problem:

Decline in the performance skill level of players belonging to Ambar Volleyball Club and that decline in level reflected clearly in the form of team's performance and this has been confirmed the expected results for the team in the 1st division league clubs and that is the case drew attention to carry out research and interest to know hidden causes behind it in order to be diagnosed and try to develop solutions and

suitable remedies of it among the trainers to use in their curriculum of training. It is one of those reasons and which has limited researcher in biochemical variables.

Method of Research and field procedures

Descriptive method (present study and correlation) used by researcher considered as best of methods for studying aims of research and hypotheses and the way to examine phenomenon of it indeed described as accurate description.

The Research Sample

As a sample of research players from Ambar Sports Club of Volleyball were selected in the season (2012-13) there were adult (20) players and excluded adamant players from sample due to non-involvement in performance of some skills which was not permitted by law, and selection for research (4) players randomly and applied them for two experiments of first phase, while not being excluded from sample research and applied them for main experiment and thus (18) players were selected to carry out main experiment.

Means for collection of information, research tools and its devices.

Research Field Procedures

Examinations and measurements conducted

Pulse is measured at normal state and then blood sample (5 ml.) is drawn from players before physical effort with increased intensity, the blood sample drawn intravenous from player* before start of warm-up process and after warm-up, player is made to stand after drawing of

Skill Test:

Experiment No. 1 : experiment for accuracy of hitting of shots at difficult points⁽²⁾.

Purpose of experiment : To determine the accuracy of sending shots at difficult points.

Material : (10) volleyballs, divide half of court as shown in figure 1 and show each grade exist within the division, each grade granted for the experimenter to make the ball fall in the area

Performance Specifications: 10 volleys made to fall in the designated area as per rules.

Conditions:

sample to go for test of intensified physical effort on the treadmill machine and after intensified physical effort test is done pulse reading taken immediately after getting down of machine and again blood sample quantity (5ml) drawn intravenous. These blood samples poured into test tube specially meant for preservation of blood, type of tube called 'E.d.T.A.' are used. These test tubes contains substance Heparin, an effective deterrent to prevent blood clotting. This sample preserved inside refrigerator and later sent to laboratory*. In order to be processed in the laboratory the sample separated using centrifuge and its treatment each variable with some chemical substance (catat) and then perform analysis of variables enzymes like creatine, phosphokinase (CPK), lactate dehydrogenase (HDL) Haemoglobin (Hb), Cholesterol

Test of Physical Effort

Test of Maksud and Coutts 1971 A.D.

It is a test done on player to carry out this test of intensified physical effort where every player is made to warm up for 10 minutes by way of walk on treadmill with speed of 3.5 mile/hour at an elevation of 0 degrees and after completion of warm-up process player is made to undergo test by way of treadmill according to this test player is made to walk at a speed of 7 mile/hour for 2 minutes at an elevation of 0 degrees and after an interval of 2 minutes elevation angle raised to 2.5 degrees, on completion of test, note that duration of test is 12 minutes altogether.

** Analysis were conducted by experimenter Dr. Mehdi Saleh in Ramadi

(1) Mohammed Naseruddin Rizwan : Method to measure physical effort in sports, T1, Cairo, Books Publishing Centre, 1998. Page 208

(2) Resaan Kharibat : Encyclopedia of measurements and experiments in physical exercise and sports, J1 : (Basra, College of Sports Training, 1990), Page No. 422

1. Each experimenter is allotted two attempts of practice before start of experiment.
2. The condition of performance, every time the ball should be served (sending the ball to other court) as per the rules of game.
3. In case ball falls on the line, then grade of top area thereof granted.

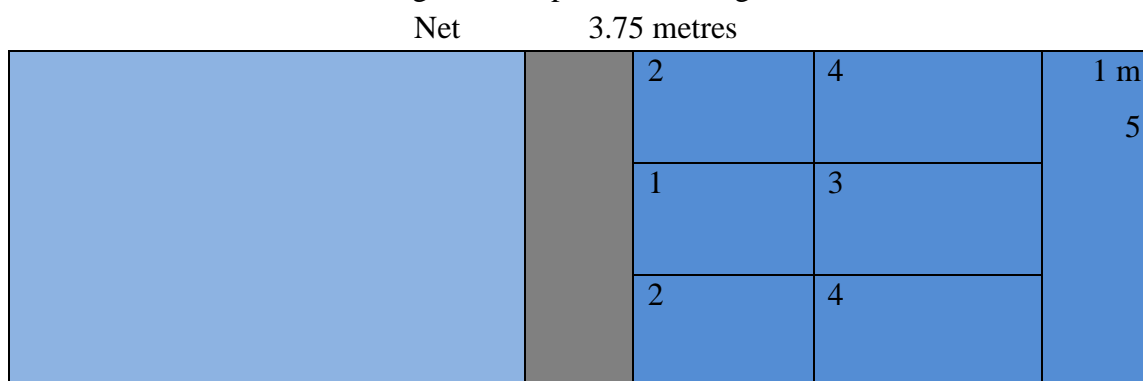


Figure (1)

Illustrates Experiment of accuracy of volley at difficult points

Experiment No. 2 : Experiment for measurement of accuracy in hitting in the direction diagonally or straight:

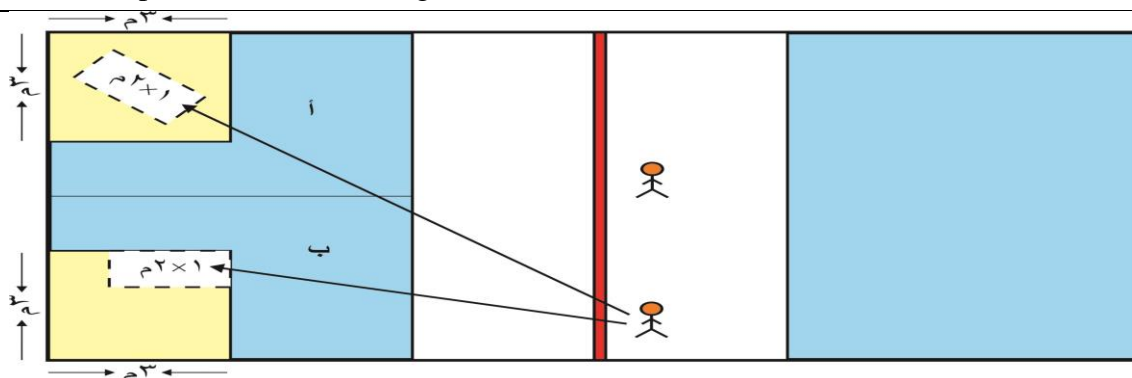
Purpose of Experiment: measurement of accuracy in hitting in the direction diagonally or straight.

Material: 30 volleyballs, playing area or court of volleyball as per rules, objects at point no. 5, (1) measured 1 x 2 m as position in part of court, so that they are in inside corner just 5 cm away from side line and end in shaded area of 3 x 3 m

- (1) Naeema Zaidan Khalf : Quantification of major contributions in physical and mental abilities in accuracy of aggressive skills in players of volley ball : (thesis of Doctor in Baghdad University, Girls Sports Training College, 2009)

Performance Specifications:

Shot from point no. (4) in which the coach pass the ball from point (3) using long diagonal in performance of experiment (15) attempts of shots towards direction of diagonal (existing object at point no. 5 and 15 attempts of shot in the straight.



(2) Illustration of performance method for accuracy of shot diagonally and straight.

Experiment no. 3: Experiment of accuracy in reception⁽¹⁾

Purpose of Experiment: Measurement of accuracy of receiving service among players.

Material : Make a fixed circle (cane or iron) with diameter 1 metre and 130 cm height from ground and should be parallel to the ground and make it stand on the grid or just make it 1 metre and after 4.5 metre beside the line. Draw two circles (A and B) in the corner of playing court, so that their centre of circles is at the distance of 1.5 metre from side line and at the distance of 3 metres from end of the court line. Draw a sign (Ç) from half of the circle at a distance of 3 metres from end of court and 4.5 metres from side line.

Performance Specifications:

The experimenter stands in circle (A) facing net and coach serves ball and he stands their to receive service in the circle facing grid.

Exploratory Experiment

A team for assistance supervised by researcher for procedure of exploratory experiment on Tuesday dated: 21/7/2013 exactly at 4: 00 pm drawn sample of research they adopted randomly procedure of exploratory experiment no. 1, those who have not been excluded from sample drawing two players taken for the procedure of experiment of physical effort on tread mill and measurement of biochemical and experiment of skills, as they faces team for assistance and researcher in exploratory experiment no. 1 which is aimed to find out the suitability of experiment for physical effort with intensity to measure required variables while making sure safety and power of devices and tools used in experiment and to know the difficulties and barriers which are faced by team for assistance and researcher in the procedure.

Main Experiment

Experiments and measurements before :

The team for assistance* supervised by researcher for procedure of before examination and measurements on persons by drawing their samples in the research shown up on dated: 28/7/2013 at exactly 4:00 pm at the hall of Anbar Sports Club in Ramadi, where the pulse measured by way of pulsating device and after

completion of procedure of pulse reading, blood samples drawn intravenously and put in special test tube for preservation and then sent to laboratory for analysis followed by examination of player's skill for basic technical skills in the research, which brings player for performance test of passing service then moves straight to test of hitting shots and after completion of this moves player to third test which is receiving ball. Examination of physical effort:

The team for assistance comes under supervision of researcher for procedure of examination for physical effort on tread mill as said above on dated: 5/8/2013 climatic conditions has been taken into account (temperature and wind which was similar to that day of procedure of examination and measurement of biochemical variables and skills before, and it is worth mentioning lifting the degree of inclination of tread mill higher to the pulse rate level, where indicates (Adnan Darwish Jalwan and Amru Hasan Askari) to this increase in level of carpet of tread mill to 1% caused higher rate of heartbeats (3-5) beats per minute.

But from foregoing it is clear that raising degree of inclination of tread mill flooring indicates clearly high intensity in examination and this is what researcher sought in the research. As the goal from that is the player giving his fullest physical effort in the game and rising level of pulse to the rate more than (160) beats in one minute and this rate of pulse which ranges

(160-182) beats per minute at the intensity of (75-90%) in level of performance⁽²⁾.

Examination of measurement after (post-test)

The procedure of examination and measurement after the end of each player from examination of intensified physical effort immediately once they getting down of tread mill where sample of blood of each player drawn through same method which made in the examination before then they go to perform examination of skills of servicing (ball to other court) and hitting shots skill and receiving and in the sequence and the procedure of these experiments on dated: 5/8/2013

Table (1)

Shows arithmetic means and standard deviations and variance of arithmetic means and standard deviations and value (T) calculated for variable measurements in cholesterol and hemoglobin

Statistical treatment of variables	Pre-test		Post – Test		Variance of Mean	Variance of Standard Deviation	T- Value	Indication
	A. M.	S.D.	A. M.	S.D.				
Cholesterol	174.53	23.90	193.7	30.2	19.175	11.772	6.515	Significant
Haemoglobin	14.07	1.152	15.27	1.23	1.146	0.565	8.113	Significant

T- Value Tubular (2.947) at 17 degrees angle of release of ball at the significance level 0.01

The table (1) indicates values by instructor of statistics of measuring cholesterol variable if arithmetic mean for measuring cholesterol variable as 19.175 at standard deviation 11.772 then T-value calculated as 6.515 and it is higher from T-value as per table valued as 2.947 at 15 degrees angle of releasing ball and level of significance 0.01 and this indicate significant variance and in favour of post-test. As T-value of arithmetic mean for differences in measurement of Hemoglobin variable 1.146 and standard deviation 0.565 and standard deviation 0.565 and got T-value calculated as 8.113 which is higher than T value as per table 2.947 at 17 degrees angle of releasing ball and level indicates 0.01 and this shows significant variance and in favour of post-test

The researcher explains this variance valid for post-test in view of results of post-test are more valuable than results of pre-test. The researcher attributes this to accumulation of incomplete substance in combustion in heart behind intensified physical effort and this is confirmed (Safa Al Marab) which indicated in the period followed by tough performance directly hits heart in terms of substance incomplete for combustion like lactic acid (lactate) and lipids and ketone bodies and all these matters exist ripe for combustion when you take oxygen in the period of rest which followed tough work and result of intensified physical effort of those players while running on tread mill led to more consumption of energy than while running through atmosphere. Fat as a source for energy, whereas cholesterol prepare compounds acid carriers fats to cells for the purpose of releasing energy and this is confirmed (Abu Ala Ahmed Abdul Fatah) that, with the increase in the intensity of physical load increases concentration of growth hormone and gives rise to the main cycle with increase of

concentration of acids, fats in blood ⁽²⁾ and as a result of that concentration of acids fats in blood increases at the time of intense physical effort it had to be with the height in relation to cholesterol which prepare through transmission of those acids fats in blood known to be used as a source of energy.

The researcher explains these variations in favour of post-test gives rise to result of post-test higher than the pre-test and researcher attributed these to great collaboration from working parts of body of players performing physical effort test at tread mill which leads to high proportion of Hemoglobin carrying great quantities of oxygen and transferring same to working parts for the purpose of perpetuate work of energy release, considering (Risan Kharibat Majeed) that, at training increasing rates of hemoglobin in parts, thereby increasing its efficiency to carry.

Oxygen while mentions (Amar Jasim Muslim), that process of physical training for longer periods leads to increases concentration of hemoglobin

Shows analysis and discussion of variance in results of variables measurement Enzymes Creatine, Phosphokinase (CPK) and lactate Dehydrogenases (LDH) before and after (pre & post)

Table (2): Presentation of Arithmetic Means and Standard Deviations and variance in Arithmetic Means and Standard Deviations and value of (T) calculated for variable measurements Enzymes, Creatine and Phosphokinase (CPK) and Lactate Dehydrogenase (LDH)

Statistical treatment of variables	Pre-test		Post – Test		Variance of Mean	Variance of Standard Deviation	T-Value	Margin of Error	Indication
	A. M.	S.D.	A. M.	S.D.					
Creatine Phosphokinase (CPK)	106.03	46.47	139.63	58.73	33.59	22.12	6.07	0.00	Significant
Lactate, Dehydrogenase (LDH)	256.23	84.94	304.29	83.55	84.05	23.47	8.19	0.00	Significant

While significant margin of error exist less than (0.05)

In experimenter shows statistics of variables Enzymes(CPK), Arithmetic Mean variance (33.59) and Standard Deviation (22.12) and T-value calculated as 6.07, thus this indicate significant presence of difference and valid for post-test, whereas margin of error being less than 0.05. As arithmetic mean for variance of variables Enzymes, Lactate Dehydrogenases (LDH) valued at 84.05 and Standard Deviation as 23.47, whereas T-value calculated as 8.19 this indicates presence of significant variance and valid for post-test because percentage of error is less than 0.05

From the results variance is clear in favour of post-test considering worth of post-test results higher than results of pre-test researcher attributes this effect of intensified physical effort to chemical compound of energy Adenosine Tri-phosphate (ATP) result of repeated muscles contractions, therefore

the proportion of this compound will be reduced with the help of enzyme creatine. Phosphokinase (CPK) which stimulates function of intensified physical effort and shall give rise to this enzyme by transferring collection of phosphate from compound phosphate creatine (CP) higher energy which exist in muscles. Likewise the compound bi Adnosin Phosphate (ADP) re-synthesis compound of energy Adenosin Tri Phosphate (ATP) and after end of physical effort (in the period of rest or recovery) this enzyme acts in reverse direction by transferring collection of phosphate from energy compound Adenosin Tri Phosphate (ATP) to creatine in order to synthesize compound of higher energy Phosphate creatine (CP) from new results to get low proportion of higher energy compound (CP) in muscles as a result of intensified physical effort (during work).

This is what confirmed from study (Hisham Hamdan) who points that “ the muscle work imposes requirements on body parts in order to make available energy produced and on this basis the physical effort help here to activate chemical reactions in muscle and to produce energy and most import of such reactions stimulation of enzyme Creatine Phosphokinase (CPK) for activity from which is reflected at level of stimulation of energy for cells performance and represented by Tri-Phosphate Adenosin”.

Table (3): Display, analysis and discussion of results of variance in examination of skills of sending sweeping shot and hitting and receiving volley ball.

Presentation of Arithmetic Means and Standard Deviations and variance in Arithmetic Means and Standard Deviations and value of (T) calculated for pre and post- skill examination for walking and running while handling medium and scoring.

Statistical treatment of variables	Pre-test		Post – Test		Varian ce of Mean	Variance of Standard Deviation	T- Value	Margin of Error	Indication
	A. M	S.D.	A. M.	S.D.					
Service	34.61	2.004	30.72	4.14	3.88	1.096	3.547	0.00	Significant
Sweeping shot	42.44	5,88	32.11	4.21	10.33	1.207	8.55	0.00	Significant
Lifting	23.33	2.16	20.16	1.68	3.166	0.606	5.22	0.00	Significant

While significant margin of error exist less than (0.05)

Table(3) shows statistical figures of skill variables attained for Arithmetic Mean for difference in examination of service (volleyball) 3.88 and for standard deviation attained 1.096 and calculated T-value as 3.547 and this indicate significant differences and in favour of pre-test whereas percentage of error is lower than 0.05 as arithmetic mean for differences in examination of shooting skills attained

10.33 and standard deviation 1.207 and T-value calculated 8.55 and this shows presence of significant variance in favour of pre-test, whereas percentage of error is lower than 0.05, as for lifting arithmetic mean for differences in examination attained 3.166 and standard deviation as 0.606 and T-value calculated 5.22, which shows significant variance in favour of pre-test, as percentage of margin is lower than 0.05.

Researcher explains these variance in favour of pre-test decreases the time it takes for pre-test in comparison to post-test reason being incidence of fatigue of muscles due to weakness in players fitness level of and quick drain of energy, the incidence of fatigue had come due to high intensity physical effort which experienced by players during running and on tread mill it was negative on level of performance of skills and it has appeared clearly when post-test implemented for shooting skills in comparison to pre-test (before effort) and that is what confirmed by examinations results.

And Explains on the muscle fatigue that “temporary decline in the efficiency of body and weakness of body as a result of performance of last act may be measured through basic performance by way of lack of mechanical work by player, and this fatigue symbolize the act of scaling of temporary capacity in the level during movement of body and self and fatigue reflects condition of weakness in the characteristics of capacity, lack of compatibility level, more clearly shown during response. The researcher finds that fatigue of muscles effects negatively and clearly shows in levels of capabilities and body parts and subsequently reflects on performance of skills.

As for shooting skills exhibits results available are in favour of pre-test considering being pre-test results are higher from post-test results and researcher attributes decline in level of accurate shooting skill to effect of physical effort which comes in players in examination of physical effort on tread mill due to fatigue on musculature from effort and fatigue of nervous system from other effort and this fatigue reflected negatively on accuracy impulses of nerves released from Central Nervous System (C.N.S.) and this decline in level of nerve impulses effect clearly on accuracy in the handling of post-test (after effort), that indicates (Bahauddin Ibrahim) continuous attention on muscles reduces energy to shrink, which increases period of muscle gap and extroversion period in particular. And researcher explains these variance in favour of pre-test considering infact the results of pre-test are higher from results of post-test and researcher attributes it to receiving skills, this skills require accuracy and speed to success and build offensive process and to get the position of ball at accurate point and elements of accuracy and speed require in receiving successfully and result of physical effect tell on players in the form of fatigue from this effects receiving accuracy directly and that’s what shown from post results in respect of skills as compared to pre-test results.

Table (4): Presentation of results of multiple correlations between variables of skills and biochemical variables after physical effort.

Biochemical Variables – Variables of Skills	Haemoglobin Cholesterol	Enzyme Creatine Phosphokinase (CPK) Enzyme Lactate Dehydrogenase

Service	0.463	0.236
Shooting (Smashing the ball)	0.375	0.313
Receiving the ball	0.453	0.276

Table (4) Shows correlations between service skills and haemoglobin and Cholesterol, the value of R calculated as 0.463 and it is higher of R-value 0.426 shown in the table at degree 14 of releasing ball and level of significance (0.05) and it shows presence of significant correlation between service of ball, cholesterol and haemoglobin.

And Table (4) shows correlations between service and Enzyme creatine Phosphokinase (CPK) and Lactate Dehydrogenase (LDH), the R-value calculated as 0.236 which is lower than R-value as 0.426 in the shown in table at degree of releasing ball (service) (14) and margin of significance (0.05) which shows absence of correlation between service of ball and enzyme creatine Phosphokinase (CPK) and Lactate Dehydrogenase (LDH).

Analysis and Discussion of results of multiple correlations between skills of service, shooting and receiving and variables of cholesterol and haemoglobin.

By way of previous presentation of results of correlations between variables of skills and biochemical variables it was shown significant correlations between all three skills with each of cholesterol and haemoglobin, the nature of relation between high intensity physical effort and each of cholesterol and haemoglobin (Hb) is direct correlation, While that, nature of relation between high intensity physical effort and performance of three skills are inversely related and this means nature of relationship between skills performance and each of cholesterol and haemoglobin (Hb) in inversely related, researcher attributes it to relations to the following:

2- to get players for performance of physical effort of great intensity for long period of time gives rise to high percentage of Lactic acid in blood, which is one of the reasons for fatigue of muscles and it is confirmed (Bahauddin Ibrahim Salama) according to (Hughes 1979) this indicated by rate of concentration of lactate in blood increases with increase in intensity of training and accompanied with increase in rate

of consumption oxygen ($V O_2 \text{ max}$) to a great extent, higher than rate of low or medium⁽¹⁾ physical activity and this cause of rise in lactic acid may be from fatigue of muscles from the execution of happening of decline of physical level of players, of them former on the physical side stay with concentration on skills, for the players who don't have required physical qualities and capacity cannot perform skills and tactical acts entrusted during game and it became clear when post-test of skill taken which was conducted after examination of physical effort and this was confirmed by results of post-test.

From the foregoing the researcher finds the nature of relationship between physical effort and percentage of lactic acid in blood is directly correlated, as for the nature of relationship between physical effort and performance of skill proved opposite and this shows the nature of relationship between performance of skill and percentage of lactic acid in blood (which was one of the reasons for fatigue of muscles) is inversely related and this is confirmed in nature of relationship between high intensity physical effort and each of cholesterol and haemoglobin (Hb) which is directly correlated. While nature of relationship

between high intensity physical effort and performance of skill are inversely related and this is clear by nature of relationship between performance of skill and each of cholesterol and haemoglobin (Hb) is an inverse relationship.

And stresses (Bahauddin Salama) that, the more training of sports the more concentration of glucose in blood and this means the blood becomes more pure due to sports training and readies for utilizing fatty acids as a source of energy. As a consolidation of above explains (Bahauddin Salama) that, the more intensity in physical training the more level of fatty acid in plasma ⁽²⁾ and that these increases percentage of fatty acids as compared to cholesterol percentage, which is a fat in blood and transporter of acids for oxidation and benefit of this as a source of energy through rebuilding compound for energy tri adenosine triphosphate(ATP) and this indicates to nature of relationship between released fatty acid and cholesterol as extreme.

Thus, the nature of relationship is clear between physical effort and compound of energy adenosine triphosphate (ATP) which is inverse relationship by increasing intensity of movement and performance at least this compound level, as it is clear by nature of relationship between physical effort and performance of skills of service, shooting and receiving which is inverse. Any increase in physical effort leads to decline in skill, as for the nature of relationship between physical effort and each of HDL, CPK it is directly correlated.any increase in intensity of performance leads to in percentage of HDL, CPK, and through this nature of relationship between energy compound Adenosine triphosphate (ATP) and each of HDL, CPK known as inverse relationship. Which means decline in level of adenosine triphosphate

(ATP) counters rise in stimulation of the enzymes.

Conclusions

There was a positive impact of Physical effort in increased intensity on concentration of biochemical variables in blood like haemoglobin and cholesterol and enzymes creatine phosphokinase (CPK) and lactate dehydrogenase (LDH) post test of physical effort and concentration in blood. There was a negative impact of physical effort on performance of skills in some basic skills of volleyball like service, shooting and receiving skills (post-test of physical effort), which led to the decline in the level of skill. Presence of significant correlation between each of service, shooting and receiving with each of cholesterol and haemoglobin. There was a positive impact of high intensity Physical effort on enzymes creatine phosphokinase (CPK) and lactate dehydrogenase (LDH) (post-test of high intensity physical effort) and this contributes to more generation of energy. There was a positive effect of high intensity physical effort on percentage of cholesterol and haemoglobin after performance of physical effort of high intensity result of increased physical effort.

Reference:

- [1] Klich, Sebastian. "Fatigue development mechanisms during increased intensity exertion." *Central European Journal of Sport Sciences and Medicine* 1.1 (2013).
- [2] Priyadharshini, V. P., & Mathew, S. (2012). Impact of a pre game meal on the performance level of female foot ball players. *Int. J. Health Sci. Res*, 2, 59-71.
- [3] Azeem, K., & Mohammed, M. H. H. Outcome of Nine Weeks of Combined Sports Training on Body Composition among Males.



[4] Mondal, M. S., & Mondal, I. A COMPARATIVE STUDY ON SOME SELECTED MOTOR PERFORMANCE, ANTHROPOMETRY AND BODY COMPOSITION VARIABLES AMONG KATTHAK DANCERS, ATHLETES AND SEDENTARY FEMALEES.

[5] Mondal, M. S., & Mondal, I. A COMPARATIVE STUDY ON SOME SELECTED MOTOR PERFORMANCE, ANTHROPOMETRY AND BODY COMPOSITION VARIABLES AMONG KATTHAK DANCERS, ATHLETES AND SEDENTARY FEMALEES.

[6] Sangeetha, K. M., Ramaswamy, L., & Jisna, P. K. Assessment of Nutritional Status, Nutritional Knowledge and Impact of Nutrition

Education among Selected Sports Persons of Coimbatore District. Age (yrs), 88, 12.

[7] Karmakar, R., Patel, M. M., & Barma, W. D. S. R. S. No Names Of The Articles Page. No.

[8] Pargman, D. (2006). *Managing performance stress: Models and methods*. Taylor & Francis. Cooper, C. (2012). *Run, swim, throw, cheat: the science behind drugs in sport*. OUP Oxford

[9] Nigg, B. M., MacIntosh, B. R., & Mester, J. (2000). Biomechanics and biology of movement. Human Kinetics.

[10] Weider, B., Weider, J., & Gastelu, D. (2003). *The edge: Ben and Joe Weider's guide to ultimate strength, speed, and stamina*. Penguin.