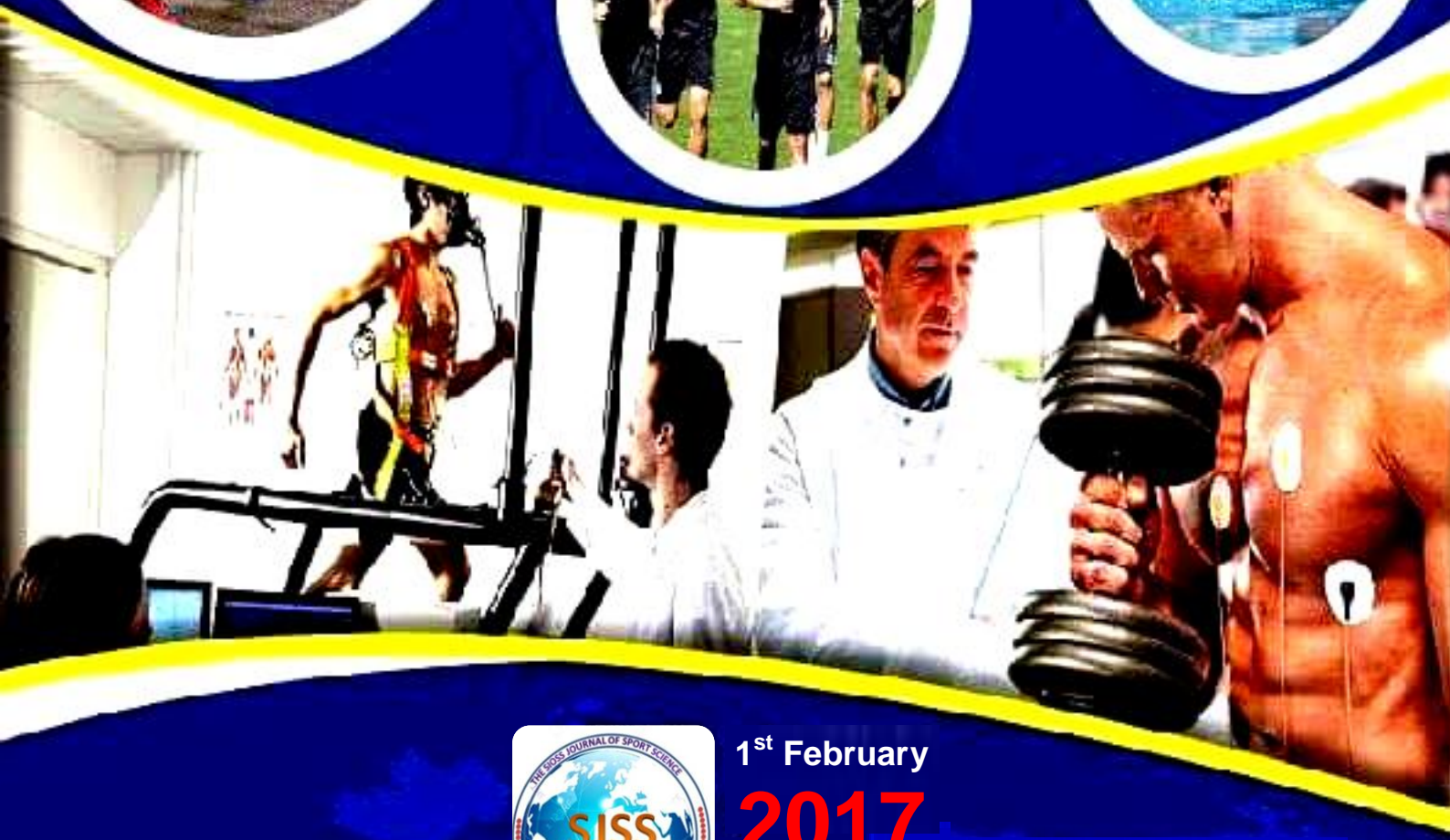




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Effect of Reverse Hierarchical Training Method to Develop the Explosive Strength and Strength Characterized by Speed also some of the Functional Variables for Basketball Players

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Abstract- The world nowadays strives to obtain more that it could from the human knowledge fruits and trying hard to find the most important facts, programs, means and developed devices in various aspects including the sport amongst of these means is the using of various and developed devices and training programs to accomplish the required objective represented by reaching the required level, basketball is considered one of the sport games in need of high technology in training according to scientific deliberated grounds being one of the games which is connected with mutability of its variables, structure and quick change and all are in need of excellent high-tech-training and the players enjoy various physical characteristics interfere in the physical and skillful performance and the study aimed at:-

- 1) Setting suggestive training in a method of hierarchal reversal method
- 2) Identifying the effect of to develop the explosive strength and the characterized by speed also some of the functional variables for basketball players and the two researchers used the experimental approach of two equivalents(control and experimental) groups of pre-and post tests and the research sample is represented by the young basketball players amounted(12) players and the prepared training units were applied using the heretical reversal training where the research lasted for (8) weeks of (3) training units per-week

The data were processed statistically and the two researchers concluded the following :-

It has become clear that using the hierarchal reversal method has contributed actively in developing the explosive strength and the characterized by speed also some of the functional variables for basketball players.

Keywords- Basketball, Hierarchical, Method, Strength, Speed

I. IDENTIFYING THE RESEARCH

A. introduction and importance of the research

Those concerned with the sport have a great role in development and prosperity of the society via promote the sport games and realizing the high objectives besides, research and investigation for best means and methods which shortened time and lessen efforts to realize the achievements whether in encouragement the society to practice sport or the sound election of heroes athletes or using the sport training according to the sound scientific grounds for the individual and team games. And basket ball is considered one of the

games needed high mastering in training according to scientific deliberated bases which is connected with mutability of its variables, structure and quick change and all are in need of excellent high-tech-training and the players enjoy various physical characteristics mixed with in physical functional and skillful performance of the body organs occur for the players and this study to know the adaptabilities for basket ball via special tests performed by the researchers in this field and the real indicators resulted from that illustrating the extent of improving for the players, especially the skillful and physical performance whose accomplishment is related with the linkage level among the physiological changes and adaptability in performance, this means s the ground the player depended in accomplishing the tasks at the competition periods so the coaches could develop and improve these abilities via the identifying

levels at the competition stage upon this the importance of the research appeared to identify Effect of reverse hieratical training method to develop the explosive strength and the characterized by speed also some of the functional variables for basketball players.

B. The research problem

Resorting to scientific research fields after the considerable development in basket ball game considered of the priorities of the sponsoring the research required successful methods to pursue the considerable development occurs for the sport in general and especially in basket ball and the research problem becomes clear including the essential research importance to make the basket ball players reach high level especially in physical and skilful preparing of the players to ensure development of their performance activity during the training contests, and subsequently achieving wining via observations and lots of comparisons with high levels reached by players in different parts of the world(at the Arabic , territorial and world levels), the two researchers have observed that there are considerable differences in preparing the Iraqi players in the mentioned aspects, and there is contrast among the players in the functionary variable levels and their effect on skilful and physical performance and it is in need of the trainers recognition of how to functionally and physically evaluate the players in light of these he be able to increase the load of fixing it, or activating it and could detect any unusual defect in health condition of the player at the beginning and for the two researchers are in touch with sport competitions, we observe that there is weakness in players levels and here lies the problem of the research to answer the question(is there any Effect of reverse hieratical training method to develop the explosive strength and the characterized by speed also some of the functional variables for basketball players.

C. The research objectives

- 1) Setting training unit in a method of reverse hieratical training.
- 2) Identifying the effect of method of reverse hieratical training to develop the explosive strength and the force characterized by speed and some of the functional variables for the basket ball players.

D. The research hypotheses

- 1) There are differences of statistical significance between the pre and post- tests for the two control and experimental) groups in the explosive strength and the force characterized by speed and some of the functional variables for the basket ball players.
- 2) There are differences of statistical significance between the pre and post- tests for the two control and experimental) groups in the explosive strength and the force characterized by speed and some of the functional variables for the basket ball players.

E. Domains of the research

- 1) The human domain:- young age group basketball players of Al-Karkh sport club
- 2) The time domain :- for the period from 29-2-2015-2-5-2015

3) Spatial domain

II. SECOND CATEGORY

A. Hierarchal training

The hierarchal method is considered one of the essential methods to build the utmost strength, via decreasing number of repetitions gradually with an increase of intensity with each group, when the weights are heavy countered less repetitions and the graduation should be rationalized and accurate and appropriated with the training state and the players level from simple to complex and from little to much (according to Bastosy,1999, p. 118)

The hierarchal training is one of the training method used to develop the strength and which depended on load intensity gradually with reduction of load size and could be increasing (Casil,1993, p.29)

Mohammed Othaman identify it quoted from (Rotting- 1977) the hierarchal method: it is a special type of training methods aimed at promoting the muscular strength via the successive process via increasing and decreasing load in the single training (Othaman, 1900, p.67)

The two researchers optioned that the hierarchal training included numerous methods and shapes where resources refer to numerous of these names of this term amongst norms, regulations and methods to improve the strength.

B. methods and shapes of hierarchal training according to studies and resources

- Ascending hierarchal method
- Descending hierarchal method
- Double(reversal) hierarchal method
- Double (counter) hierarchal method
- Identical hierarchal method
- Flat hierarchal method
- The multi tops hierarchal method
- Continuous hierarchal method (complete Hierarchal base)

C. Double(reversal) hierarchal method:

In which the work be gradual reaches(90%-95%) of the utmost strength with reduction by repetition using two hierarchal style methods each opposite the other, and the start is from below ascending with an increase then the state is reversed with the reduction of intensity with an increase in repetition, as in figure(1)

(Bomba,1999, p.152)

III. THIRD CATEGORY: THE RESEARCH APPROACH AN ITS FIELD PROCEDURES

A. The research approach

The experimental approach used for its suitability with the problem nature which is considered the best approaches which enabled its followers to reach real and authenticated results.

B. The research sample:-

the research sample is chosen deliberately from young basket ball players of Al-karkh sport club of basket ball amounted(12) players, where the research sample divided randomly in to two

groups, the control and experimental) groups and each group included (5) players, and harmony was done in (height, weight, and age) and it has become clear that the research sample was harmonious where the torsion coefficient value is ± 3 illustrated in table (1) and also the equivalent was performed for the research two groups in the post-tests as illustrated in table (2)

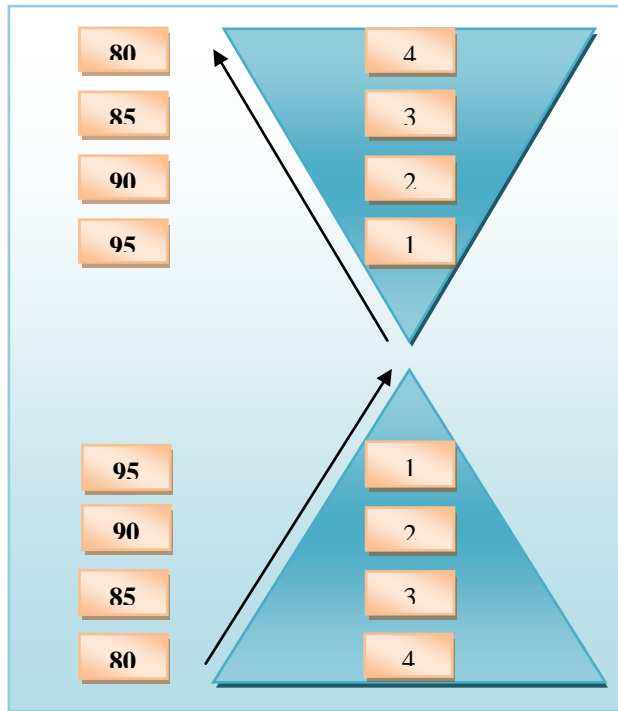


Figure 1. Double(reversal) hierarchal method

TABLE I. ILLUSTRATING THE MEAN, CRITERION DEVIATION AND VALUE OF TORSION COEFFICIENT FOR THE RESEARCH SAMPLE FOR HARMONY

Variables	Mean	Standard deviation	Mediator	Torsion coefficient
Age	17.00	0.49	17.33	1.020
Height	172	5.93	173.58	0.799
Weight	56.50	3.60	56.92	0.35

C. The used devices and tools in the research:-

- 1) Arabic and foreigner references
- 2) Tests and Measuring
- 3) Device of measuring weight and height
- 4) Form of recording and discharge of data

D. The tests used

Test of the explosive strength of the legs muscles (Hasanein, 1995, p.105) Test of the explosive strength of the arms muscles (Hasanein, 1995, p.105)

- 1) Test of the strength characterized by speed for the leg muscles (Alawi, Radhwan, 1999, p.392)
- 2) Test of the strength characterized by speed for the arm muscles ((Hasanein, 1997, p.42)

TABLE II. ILLUSTRATING THE TWO GROUPS IN THE POST-TESTS

Tests	Control group		Experiment al group		Calculated T	significance
Test of explosive strength for legs	38.97	2.8	39.17	4.96	0.215	Non-significance
Test of explosive strength for arms	7.61	1.08	7.04	1.04	0.763	Significance non-
Test of the strength characterized by speed for legs	8.33	1.86	8.30	1.26	0.323	Significance non-
Test of the strength characterized by speed for legs	7.5	0.55	7.67	0.52	0.542	Significance non-
Rate of pulse at rest	73.95	0.62	72.51	0.528	0.701	Non-Significance
Contracting blood pressure	116.93	0.54	115.1	0648	0.561	Non-significance
Relaxing blood pressure	76.40	0.64	76.10	0.691	0.902	Significance - non
Vital capacity	4361.3		.4212	61.47	0459	Non-significance

Value of tabular T at significance level and freedom degree 4= 2.78

E. The survey experiment

The survey experiment was done on 29/2/2015 on a sample consisted of 2 players from the research community and from out the research sample and the purpose of the survey experiment objective was to specify the repetitions and groups and the extent manner of performing the resistance exercises of the research sample and the suitable place for applying, besides identify the resulted mistakes of that and then performing the used tests.

F. The procedures of the research

- 1) The pre-tests:- the pre-test were done on 3/3/2015 on the sample research individuals.
- 2) The experimental training unit

The two researchers set training unit based on the survey experiment depended on setting some

references and scientific resources and the two researchers cared the level and the physical and skilful ability for the research sample and included.

3) The post-tests

The post- tests were performed on 2/5/2014 and the two researchers were keen to provide all the same conditions by which the pre-tests were performed and the same tests followed-up previously.

G. The statistical means

- Mean
- Standard deviation
- Torsion coefficient
- (T) test for two connected means
- (T) test for two disconnected means

TABLE III. ILLUSTRATING MEANS AND STANDARD DEVIATION AND VALUE OF CALCULATED T IN THE POST TESTS FOR THE TWO GROUPS OF THE RESEARCH

Tests	Pre-test		Post-test		Calculated T	Significance
	Mean	S.D.	Mean	S.D.		
Test of explosive strength for legs	39.17	4.96	42.12	4.03	3.36	Significance
Test of explosive strength for arms	7.04	1.04	9.33	0.89	4.33	Significance
Test of the strength characterized by speed for legs	8.30	1.26	11.65	1.05	5.37	Significance
Test of the strength characterized by speed for legs	7.67	0.52	9.58	0.84	3.11	Significance
Rate of pulse at rest	72.51	0.528	69.150	1.387	5.62	Significance
Contracting blood pressure	115.11	0.648	119.80	3.261	3.14	Significance
Relaxing blood pressure	76.101	0.691	77.65	2.541	3.85	Significance
Vital capacity	4212.3	61.47	4664.68	261.76	4.51	Significance

Value of tabular T under significance level 5.05 and freedom degree 4= 2.78

IV. FORTH CATEGORY: DISPLAYING , ANALYZING AND DISCUSSING OF RESULTS

A. Displaying , analyzing and discussing of the two experimental results in post-tests for the research sample

To identify the extent to which the occurred development in physical variables(the explosive and the strength characterized by speed for the arms and legs muscles) and the functional variables, then displaying the pre-and post-test in table (3) which illustrated means , standard deviation and calculated T and the results have illustrated that there are significance differences between the pre-and post- tests in favor of the post-test and the two researchers ascribed the improvement in the experimental group for using the hierarchal reverse training method which ensure using physical training with weights and contrary to training weights which is graduated from high to max and type and nature and rationed of the used weights suitable with the load placed on the players' muscles which is the most warming suitable for this training method, also the training of various resistances have contributed in development of the explosive strength and the strength characterized by speed for the arm and legs muscles through suitable stretching and contracting processes that may not cause damage of the joint ligaments where the training load intensity was suitable for certain age group and their training level to avoid damages, the muscular strengths of the arm and the shoulder could be developed(Mathews,1997, p.199) pointed out using training with weights with quick performance of the arm, as for the muscular ability of the legs considered more important via using jumping exercises and similar to that, where during performing various kinetic skills ,the players are in need of quick and repeated muscular contracting serving the specialized activity thus there is connection between the strength and speed and accordingly this leads to development of skillful development whereas the player's reaching the complete mastering stage via promoting the physical aspects, and this emphasizes that training loads executed according to hieratical methods currently under research was of activity to develop according to components of training load connected with the organizing matrix of the experimental group, and worth to be mentioned that occurrence in them within weeks could be ascribed to Nero changes assist the muscle to reach the possibility of better accomplishment the training units for(8) weeks of (3) training units, and its is applied on 5/3/2015 till 30/4/2015 and the execution of the training unit lasted (80) minutes, where the training load where the waves of the training load were 1/3 and the training units were accomplished at the special setting period and applied on the experiential group, as for the control group which was trained on the classical training units.

B. Displaying , analyzing and discussion of pre-and post tests results for the control group of the research variables

It has become clear from table (4) which illustrated mean values and standard deviation where there is development in the research variables for the control group, where the researcher opined the probability of not achieving high development in the research variables but the

used approach by the trainer did not depend on hierarchal training method besides non – rationalization load components according to variables appropriated with the research sample thus the development of the control group was less than the experimental group.

TABLE IV. ILLUSTRATING MEANS AND STANDARD DEVIATION AND VALUE OF CALCULATED T FOR THE CONTROL GROUP OF THE RESEARCH VARIABLES.

Tests	Pre-test		Post-test		Calculated T	Significance
	Mean	S.D.	Mean	S.D.		
Test of explosive strength for legs	3.212	4.04	40.11	4.03	3.362	Significance
Test of explosive strength for arms	4.93	1.03	8.4	0.89	4.332	Significance
Test of the strength characterized by speed for legs	4.561	1.03	9.67	1.05	5.371	Significance
Test of the strength characterized by speed for legs	5.432	0.89	8.11	0.84	3.113	Significance
Rate of pulse at rest	3.98	2.214	71.12	1.387	5.625	Significance
Contracting blood pressure	2.14	3.541	115.98	3.261	3.142	Non-Significance
Relaxing blood pressure	2.41	3.873	76.15	2.541	3.854	Non-Significance
Vital capacity	4.53	254.13	4331.6	261.76	4.512	Significance

Value of tabular T under significance level 5.05 and freedom degree 4= 2.78

It has become clear from table (4) which illustrated mean values and standard deviation where there is development in the research variables for the control group, where the researcher opined the probability of not achieving high development in the research variables but the used approach by the trainer did not depend on hierarchal training method besides non – rationalization load components according to variables appropriated with the research sample thus the development of the control group was less than the experimental group.

C. Displaying ,analyzing and discussing of r the experiential and control groups' results in the post-tests.

It has become clear from table (5) which illustrated displaying of means and standard deviation for the two groups of the research and there is development in both groups but the

improvement of the experimental group is clear and better compared with the control group and this ascribed to using of training units which is hierarchal reversal method of training which ensure exercises with weights , where all the exercises were similar in movements performed by players resulted in development of functioning muscular groups themselves in performance during playing this related with using this method leads to development besides using method of interval training of high intensity applied

TABLE V. ILLUSTRATED MEANS AND STANDARD DEVIATION AND VALUE OF CALCULATED T IN THE POST TESTS FOR THE TWO GROUPS OF THE RESEARCH

Tests	Pre-test		Post-test		Calculated T	Significance
	Mean	S.D.	Mean	S.D.		
Test of explosive strength for legs	3.212	4.04	40.11	4.03	3.362	Significance
Test of explosive strength for arms	40.11	4.04	42.12	4.03	3.362	Significance
Test of the strength characterized by speed for legs	8.4	1.03	9.33	0.89	4.332	Significance
Test of the strength characterized by speed for legs	9.67	1.03	11.65	1.05	5.371	Significance
Rate of pulse at rest	8.11	0.89	9.58	0.84	3.113	Significance
Contracting blood pressure	71.125	2.214	69.150	1.387	5.112	Significance
Relaxing blood pressure	115.98	3.541	119.80	3.261	3.782	Significance
Vital capacity	76.150	3.873	77.65	2.541	3.651	Significance

Value of tabular T under significance level 0.05 and freedom degree 8=2031

on the experimental group, where as the mastering training according to scientific bases and gradation also changing in the intensity degrees according to the pursued method mentioned below to increase the muscular intensity as a result of using the training loads below and close to utmost led to motivation more of muscular fibers then increasing the productive strengths((the more increasing contribution of more fibers, the more increasing of muscular strengths accomplished by the muscle(Alawai and Abdulfatah. 1997, p.123) and the interpretation of this that the training loads and gradation of them in the training units ranged from the high to low max., generating responses in the muscular tissue in the player body to face this change in the training circumstances and after reaching development in the interior organs of the

player's body reactions, the players responded to this training, and (Braqah, 2005, p.104) mentions that hierarchical training methods which are more common to develop strength and ability, and the most characteristic of this method is the gradient advancement from low weights to high weights with less repetitions after that the player may return to less weights and with more repetitions, and the rapid appearance of the muscular strengths which overweighed both the strength and speed in movement, where (Francdgo, 1988, p.78) emphasizes that the mastering scientific training in the physical fitness leads to occurring changes in most of the muscular components leads to develop the kinetic energy then the skills connected with the performance.

V. CONCLUSIONS AND RECOMMENDATIONS

A. Conclusions

After processing the obtained results statically, the two researchers have accessed to the following conclusions:-

- 1) The results of statistical evaluations in applying the hierarchical reverse method have showed positive development in favor of the research sample.
- 2) Applying hierarchical reverse method has assisted in developing the explosive strength of arm and legs muscles for the research sample.
- 3) Hierarchical reverse method has positive effect in developing the explosive strength and the strength characterized by speed for the arms and legs.
- 4) Hierarchical reverse method has assisted to develop the functional changes for the research sample.

B. Recommendations and suggestions

The two researchers have set the following recommendations and suggestions depended on what the two researchers have accessed in the current research and amongst the conclusion should be observed:-

- 1) The training unit depended the hierarchical reverse training method when developing some of physical and skillful abilities of the young players at the special preparation stage.
- 2) It is necessary to observe the scientific bases and methods in setting training when using hierarchical reverse method and introducing it for the trainers and their assistants for its nature.
- 3) It is important when training with hierarchical reverse method that the training tools be suitable with type of specialized sport.

REFERENCE

- [1]. Bastwisi Ahmed; bases and theories of training sport, 1st edition, Arabic Afikir house, 1999)
- [2]. Alberit Forcastil, (translation of training and programming centre), 1st edition(Beirut, Arabic house for sciences, 1993)
- [3]. Mohammed Uthaman; encyclopedia of athletics- technique- training- learning-coaching (Al-Kalim house for publishing and distribution, 1990)
- [4]. Mohammed Hasan Alawi and Abualual Abdalfatah; physiology of sport training; Halwan university, Al-fikir Arabic house, 1997)
- [5]. Mohammed Subhi Hasanein; scientific bases for volley ball and measurement methods ; 2nd edition , Cario, Alkitab centre for publishing , 1997.
- [6]. Mohammed Subhi Hasanein; measurment and evaluation in physical education, 1st edition, first part (Cario, Alfijir Al-Arabi house, 1995)
- [7]. Mohammed Hasan Alawi and Mohammed Nasiralddein Radhwan; tests of kinetic performance, 1st edition, Cairo, Al-fikir Al-rabi house, 1999.
- [8]. Mohammed Jabir Briqah; the integrated system in training strength, and muscular tolerance, published by Al-Maraif institution , Alasnkendrah, 2005.
- [9]. Bomba T.O per iodization . Theory and methodology of training ,human kinetics publishing company, 1999.
- [10]. FOX.E-L.MATHEWS.D.K: Interval training. conditioning of sport and central Fitness W.e saunder ,1997 .p19
- [11]. DESPINAL d. FRANDGO: MDABOLIC RESPONSES .to prolonged work during treadmill and wake immersion running . FACULTY OF HEALTH LONDON . 1998 , P. 78

The Personal Traits and its Relationship with the Psychological Stress Kirkuk Education Team Players in Technical Gymnastics

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Abstract- The research aims to discover the relation between the personal traits and the psychological stress of the players of Kirkuk education for youth in .Gymnastics. The researchers used the descriptive approach in a manner the relationship relational database to achieve the goal. The sample was elected of Kirkuk education for youth for the year 2014 - 2015 whose number (10) players selected deliberate manner. Use the two researchers identify the measurement of the personal characteristics of the identification and measurement of psychological pressures.

Results were processed statistically using statistical pouch (spss) to deal with the data through the use of covariance normative deviancy labs and simple link (Pearson). The researcher reached the following conclusions;

- Enjoy a sample search a good level of personal characteristics.
- Psychological Pressures to a sample of the research were average standard.
- The relationship between the personal characteristics of the psychological pressures of a sample of research is the relationship between negative links.

The researchers recommend the following;

- Emphasis on the use of the scientific means in the psychological preparation of the players, which enhance the easing of the psychological pressures positively in the games and sports competitions.
- Work to strengthen social relations and for the development of the personal characteristics of the players and the promotion of personal self-reliance to achieve better

Keywords- Personal Traits, Gymnastics, Stress, Team Players

I. RESEARCH DEFINITION

A. The submitted by the importance of research

The study of personality and an important place in th Studies of the Sport psychology, helped confirm this position, several factors including the consideration to human behavior that the outcome of the personal factors and enjoyed by the features. Is the phenomenon of psychological stress from more than psychological phenomena, social and complex notes that this phenomenon

increased with the increasing pace of technological progress and the development of sports side, hardly case differs in public life of individuals for their lives athletes specialties in general Gymnastics players in particular, as the competition between the difference in official championships and the desire to obtain the championship was placed on players great responsibility for trying to various roads and implemented to reach the objectives set for them. The more responsibilities the form that a considerable burden on the players to exert more effort which may expose them to psychological strees .This is confirmed by the more these responsibilities increasingly with. the player efforts exerted to outbid very largely psychological pressure and excitements. It is worth mentioning that the player despite all the preparations for the

Center owned by which shielding it from falling in skills the phenomenon of psychological pressures but those preparations may not be sufficient unless the player enjoys with personality and qualify him to face those circumstances that may occur through competition, the player in such circumstances of the need to speed up the adoption of the resolution and this depends on personal characteristics. Here lies the importance of research to identify the personal characteristics of the psychological stress to which the player and the relationship between them.

B. The research problem

The nature of the performance of the Gymnastics skills in all the competitions is either connected to time or performance of one-time and repetition is allowed which means that the player may lose the chance of winning in the case did not result in any movement diligently according to approved by the law on the game, in addition to many of the constraints that accompany the foregoing, political, economic not to be repetitive, , social and the paucity of support and the absence of meeting modern specialities and the delay to keep up with the pace of progress evolution in the game in many countries of the world, and this in itself generates players great psychological pressures they are reflected on the psychological aspects of behavioral and social. That unique Gymnastics player from other athletes that in addition to the years of preparation for the physical is in need of programs preparation of myself according to correct scientific bases which overlooked by many trainers and decision makers in the teams, so the opinion of the two researchers to tackle this problem studied the development of the personality of the role of the important and effective in overcoming psychological stress.

C. The research objective

Identify the relationship between the personal traits of the Gymnastics, psychological stress to players Kirkuk education for in

D. The research hypotheses

There are differences of statistical The presence of a statistically significant correlation between the personal traits and psychological stress.

E. Domains of the research

- Human Domain: Kirkuk education youth time players in Gymnastics for the year 2015 – 2016 .
- Time domain: Period from 2 / 6 / 2015 till 5 / 7 / 2015.
- Spatial Domain: training center hall for Gymnastics of the General Directorate of Kirkuk education.

II. RESEARCH METHODOLOGY AND FIELD PROCEDURES

A. Research methodology

The researchers used the descriptive method with the survey style for its suitability to the nature of the research.

methods and shapes of hierarchal training according to studies and resources

B. Doub Research sample

The research sample consisted of Kirkuk education team players with a number of (14) in which (10) players of them were chosen after excluding (4) players after their participation in the exploratory trial.

C. Means of data collection and research tools

1) Means of data collection

- Arabic References.
- The discrepancy a questionnaire

2) Research tools

For research purposes, the researchers used the personal traits measurement (Abdulwadood and Abdulmunim,2009) consisting of (36) items and the answer is achieved through choosing one alternative out of two (Yes/No). Two marks are given to an answer (Yes) and one mark to an answer (No). The total marking of the measurement ranged from (36 - 72) .

Psychological stress measurement was used consisting of (40) items and the answer is achieved through choosing one alternative out of Four alternative (Applying completely on me, Applying very much on me, Applying little on me, Never applies), The marks (4, 3, 2, 1) are given. The total marking of the measurement ranged from (40 - 160).

3) Main Trial

The main trial was a applied for the experience of the period from 2/7/2015 till 5/7/2015.As forms were distributed both on a sample search of the,20 standards form after the restoration of these forms a statistical transactions.

4) Statistical Means

The Statistical processing's were conducted according to transactions the statistical program (SPSS) and the following statistical methods were used: Arithmetic Mean, Simple Correlation Coefficient (Pearson), Standard Deviation.

III. PRESENTATION, ANALYSIS AND DISCUSSION OF RESULTS APPROACH AN ITS FIELD PROCEDURES

The presentation and analysis of the results: in light of the data obtained through the different procedures conducted by the researchers, the results will presented and discussed to achieve the research aim as clarified in the following :

TABLE I. I

Variable	Arithmetic Mean	Standard Deviation	Mean	Correlation Coefficient	Freedom degree	Level of the significance	Level of the morale
Personal Traits	60.700	4.957	54	0.585-	8	0.003	Not morale
Psychological Stress	96.700	3.654	105				

From table (1), the researchers found that the Arithmetic Mean for the answer of the research sample on the personal traits measurement reached (60.7000) with a Standard Deviation (4.957) . As for the psychological stress measurement, the Arithmetic Mean for the answer of the research sample amounted to (96.7000) with a Standard Deviation (3.654) . The value of the (r) calculated amounting (- 0.585) when the degree of freedom of (8) the level of moral ≤ 0.05 the level of Significance (0.003), which is less than the level of the morale of this demonstrates that there is a relationship between personal traits and psychological stress of Kirkuk education team players.

IV. CONCLUSIONS AND RECOMMENDATIONS

A. The procedures of the research

- The research sample enjoyed a good level of personal traits .
- The Psychological stress of the research sample was of medium level.
- The relationship between the personal traits and Psychological stress of the research sample appeared to be negative .

B. Recommendations

- Emphasis on the use of the scientific methods in the psychological preparation of of the players which enhance the reduction of the psychological stress in a positive manner in sport competitions and games .
- Working on strengthening social relations for the development of the players personal traits and enhancing personal self to achieve better achievement .
- Conducting further studies on the personal traits and psychological stress and comparing it with psychological variables and cases of other groups.

REFERENCE

- [1]. Bastwisi Ahmed; bases and theories of training sport, 1st edition, Arabic Afikir house, 1999)
- [2]. Baraa Mohammad Al-zaidi; the relationship of psychological tension at the site of the reset and sex and specialization phase of the Baghdad University: (letter master, Faculty of Education-Ibn Al Haytham, Baghdad University, 2000.
- [3]. -Badran Amr Hassan; Sport psychology, i2: (Egypt, Mansoura, library island of roses, 2005.
- [4]. -Amer Saeed psychological and soccer, i1:,Iraq, Dar es Salaam into the printing of publications, 2008 .
- [5]. -Abd Al-Wadood Ahmed speech, Abdul Moneim Ahmad Jassem; building a measure of the personal characteristics of the football players in Salah al-Din province; published, the Tikrit University, Faculty of Physical Education, 2009
- [6]. -Aziz Hanna, Nazem Hashem; Personality psychology, i1: (Iraq, Baghdad, Oxford Higher Education, 1990. -
- [7]. -Emad selfeej; the dreams of the vigilance and their relationship with the psychological pressure of football players " letter master, the Tikrit University, Faculty of Physical Education and Sports Sciences, 2015;
- [8]. -Magda Bahaa Eddin; psychological pressure and its problems and its impact on the psychological health, i1: (Amman, Dar es Salaam serenity for publishing and distribution, 2008
- [9]. -Mohammad Hassan Allawi; combustion psychology player sports trainer: (Cairo, Book Center for publication, 1998
- [10]. -Mahmoud Al Ziadi; the foundations of Psychology (Cairo, Book Center for publication, 1972 .



The Strategies of The Coping of the Sporting Competition Solicited by the Footballers U15 of All the Regional Centers of Performations of the Football Federation of Tunisia (FFT). Effect of: Experience, Coaching and Technical Position

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Abstract- Today, the training center represents an unavoidable passage in the career of the high-level footballer (Röger, Rütten, Zeimann and Hill, 2010). Training centers are among the mechanisms of National Technical Direction, to develop Tunisian football, and to improve performance in youth categories.

The objective of our study is to examine the coping strategies of the competition, solicited by the elites affiliated to the regional training centers of the Football Federation of Tunisia (FFT). And evaluate the interaction effects of coaching, experience, and the technical position.

76 U15 football players regularly evaluated through high-stakes competitions, are invited in one hour after the competition, to settle against the Arabic version of the inventory of coping strategies of the sporting competition (Hajji J, et al. 2016). Data was collected and analyzed by SPSS IBM and AMOS version 21.0.0.

The results suggest that mental distraction is the coping strategy most solicited by our participants, the MANOVA analysis, only disclosed the effect of the coaching factor on mental imagery, thought control, Effort expenditure and Relaxation, but regression analysis revealed no strong explanatory relationship.

Overall, this study allowed us to deepen our knowledge about the coping strategies of the competition used in the preformation process in the different training centers of the FFT. In addition, the impact of experience, coaching and the specificity of the technical position, on the choice of these strategies in competitive contexts.

Keywords: coping strategies, training center, Football Federation of Tunisia (FFT)

I. INTRODUCTION

In order to demonstrate their personal competence, elite footballers will be evaluated several times, (Martinent and Decret 2015). An adequate transition period between the ages of 13 and 15 allows the athlete to achieve high-level performance and to specialize before the advanced years (16 and over), (Faure and Suaud, 1999; Slimani, 2000 Demazière and Csakavary, 2002, Bertrand, 2008, Roderick, 2006). Young people in this way face a double uncertainty, their chance to lead to the end, in which the achievement of a career rests on a virtuosity acquired early; And the initiation in which the environment plays a fundamental role (Julien Bertrand 2015). Moreover, coping with the stresses of sporting competition is an essential factor of self-regulation to promote optimal levels of sporting success (Gaudreau, Nicholls, & Levy, 2010).

The treatment of the threatening action is always done only in relation to the answers that the individual judges himself capable or not to bring. It is in this treatment that the strategies of coping of coping,

defined by Lazarus and Folkman, come into play as "the constantly changing cognitive and behavioral efforts deployed by the individual to respond to specific internal and / or external demands, Which are assessed as very strong and exceeding its adaptive resources ". Coping is a dynamic process, which changes according to situations and how the individual treats them. The athlete adopts this mechanism to manage the stressful stresses of competition and maximize performance (Calmeiro & al., 2010, 2014, Doron & Gaudreau, 2014, Doron & Martinet, 2016).

Carton-Caron (2004) states that the modes of "coping" are based on internal and / or external factors, indicating great inter and intra-individual variability. Some studies show that coping changes through the different phases of the competition (Gaudreau, Lapierre, Blondin 2001, Gaudreau and Blondin, 2004).

For some authors the determinants of coping, are provisional. For others, coping is determined by situational or transactional characteristics. The transactional approach of Lazarus and Folkman (1984) is based on the principle that the individual

permanently assesses his relationship with the environment and his report on personal well-being. In the spirit of the Lazarus model, coping has two essential functions, direct action on the causes of the problem, or moderation of the emotional consequences of the stressful interaction. Mellalieu, Hanton, and Fletcher, (2006), indicate that the level of the athlete's experience influences the choice of coping strategies used. Some authors point out that young people use emotion-based strategies, while others point to the use of problem-oriented strategies. The same applies to the elderly (Callahan and Chabrol 2013).

Cosh and Tully, (2015), Anshel and Si (2008), identified that the behavior of the trainer (coaching) was described as a key stressor. The study by Gearity & Murray (2011), on coaching, showed that the athletes indicated that the style of coaching was associated with their adaptation and their sports motivation. Support coaching can play a positive role in providing direction in the process of achieving goals and in promoting the development of athletic and mental skills (Côté et al., 1999). In this sense, it can also be considered as a potential resource (Hobfoll, 2002), to make athletes more capable of solving problems and to cope with the stresses inherent in sports competitions (Ntoumanis, Biddle and Haddock, 1999). Effective coaching requires not only the establishment of a satisfactory relationship, but also the physical, technical, mental and tactical preparation of athletes (Hollembek and Amorose, 2005).

II. MATERIALS AND METHODS

A. Population and Procedure

76 footballers U15 (average age 14.00, SD: 0.33) affiliated to the regional training centers, these elites are subject to a preformation program supervised by the National Technical Direction of the Tunisian Football Federation.

TABLE I. FREQUENCY TABLES

		Effective	%
Training Center	Gafsa	20	26,3
	Sidi Bouzid	19	25,0
	Gabès	20	26,3
	Le Kef	17	22,4
Level Experience	Less than 2 years	26	34,2
	More than 2 years	50	65,8
Technical position	Goalkeeper	10	13,2
	Defender	22	28,9
	Midfielders	21	27,6
	Attacker	23	30,3
Total		76	100,0

B. Measure

We examined coping strategies through the Arabic version of the Inventory of Coping Strategies in Sports Competition (Hajji, J. et al, 2016). The ISCCS (Gaudreau and Blondin, 2002) is a questionnaire of 39 items. When handling the questionnaire, participants had to position themselves against a Likert scale ranging from 1 (not at all used) to 5 (used very frequently). The questionnaire consists of 10 subscales: Mental imagery, Thought control, Effort expenditure, Seeking support, Relaxation, Logical analysis, Venting of unpleasant emotions, Disengagement, Social withdrawal, Mental distraction.

After having contacted the managers of each training center through letters of recommendation certified by the National Technical Direction of the FFT. Coaches are subsequently invited to engage in the evaluation process. During their sectoral groupings, in December 2015 and March 2016, athletes were invited to position themselves against the Arab version of the ISCCS, one to two hours after the competition.

The questionnaire was then preceded by clear and concise instructions, indicating information concerning age, gender, sports discipline, technical post held, and level of experience. The data was then analyzed by SPSS IBM and AMOS version 21.0.0.

III. RESULTS

A. Psychometric properties of ISCCS / the report of the subscales

- 1) Significant positive correlations at $P < 0.05$ were observed (see Table 2)/ the internal consistency of the ISCCS.
- 2) The Cronbach α coefficient of the different subscales ranges from 0.71 to 0.87, while the overall Cronbach α coefficient of the scale is 0.77. (See Table 3).
- 3) Exploratory Factor Analysis:
 - The 6-factor model : *Task-oriented coping: TOC* :
 - Determining = 3,478E-005.
 - KMO index and Bartlett test: 0.696 (Meaning of Bartlett < 0.001).
 - The 4-factor model: *emotion-oriented coping: EOC* :
 - Determining = 0.001.
 - KMO index and Bartlett test: 0.714 (Meaning of Bartlett < 0.001).

4) Confirmatory Factor Analysis.

B. Level of coping and anxiety

The average scores and standard deviations of each subscale are presented in (see Tables 7 and 8). Generally mental distraction, Social withdrawal and disengagement, are the coping strategies most requested by our participants.

TABLE II. INTER-SUBSCALE CORRELATIONS OF ISCCS

		1	2	3	4	5	6	7	8	9	10
Mental imagery	r	1									
	p										
Thought control	r	,022	1								
	p	,850									
Effort expenditure	r	,087	,047	1							
	p	,457	,690								
Seeking support	r	-,095	,147	-,122	1						
	p	,414	,207	,294							
Relaxation	r	-,126	-,007	-,315**	,344**	1					
	p	,277	,950	,006	,002						
Logical analysis	r	,168	,164	,381**	-,003	-,096	1				
	p	,147	,157	,001	,980	,408					
Venting of unpleasant emotions	r	,232*	,081	,071	-,020	,062	,223	1			
	p	,044	,486	,542	,864	,596	,053				
Disengagement	r	-,152	-,087	,102	,280*	,134	,038	-,007	1		
	p	,190	,455	,380	,014	,248	,742	,950			
Social withdrawal	r	-,272*	,071	-,003	,287*	,306**	,129	,113	,339**	1	
	p	,017	,544	,982	,012	,007	,267	,332	,003		
Mental distraction	r	-,030	,189	-,034	,185	,348**	,096	,237*	,011	,254*	1
	p	,795	,102	,772	,109	,002	,411	,040	,926	,027	

TABLE III. ALPHA CRONBACH COEFFICIENT OF THE ISCCS

ISCCS	Alpha Cronbach	N
Mental imagery	0,871	4
Thought control	0,842	4
Effort expenditure	0,729	3
Seeking support	0,709	4
Relaxation	0,711	4
Logical analysis	0,719	4
Venting of unpleasant emotions	0,845	4
Disengagement	0,830	4
Social withdrawal	0,726	4
Mental distraction	0,825	4
The ISCCS scale	0,772	39

TABLE IV. STANDARDIZED SOLUTIONS FOR FACTOR LOADINGS FOR THE TASK ORIENTED COPING (TOC).

	1	2	3	4	5	6
Item 31	,895					
Item 11	,842					
Item 1	,839					
Item 21	,795					
Item 34		,855				
Item 26		,809				
Item 16		,806				
Item 6		,772				
Item 18			,787			
Item 36			,692			
Item 28			,658			
Item 8			,594			
Item 29				,781		
Item 9				,744		
Item 19				,721		
Item 37				,570		
Item 35					,799	
Item 17					,770	
Item 27					,608	-,378
Item 7			,453		,577	
Item 24						,796
Item 14						,761
Item 4				,400		,644

TABLE V. STANDARDIZED SOLUTIONS FOR FACTOR LOADINGS FOR THE EMOTION ORIENTED COPING (EOC)

	1	2	3	4
Item 2	,848			
Item 32	,819			
Item 22	,809			
Item 12	,788			
Item 30		,878		
Item 20		,816		
Item 10		,804		
Item 38		,700		
Item 39			,833	
Item 15			,816	
Item 25			,776	
Item 5			,739	
Item 3				,782
Item 23				,776
Item 13				,763
Item 33				,533

TABLE VI. CONFIRMATORY FACTOR ANALYSIS OF THE ISCCS MEASUREMENT MODEL

	χ^2	χ^2/df	P	CFI	TLI	RMSEA
6-factor model	251,84	1.17	0,048	0,93	0,92	0,048
4-factor model	130,44	1.33	0,016	0,93	0,91	0,066

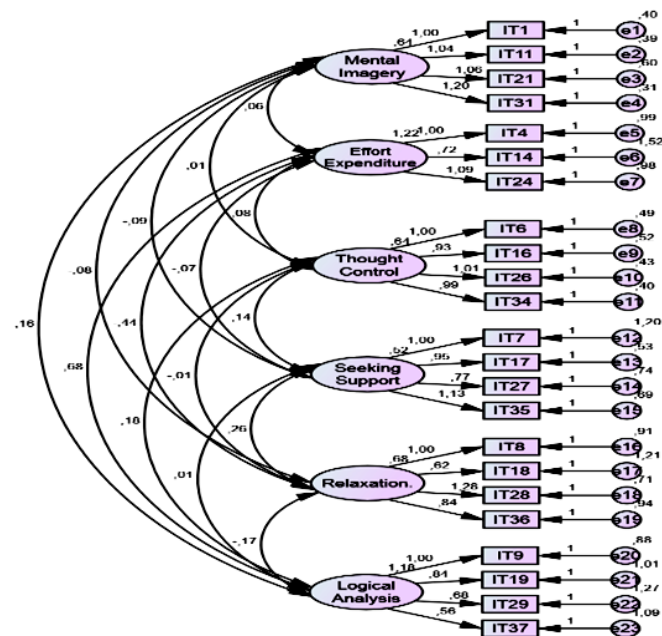


Figure 1. 6-factor model

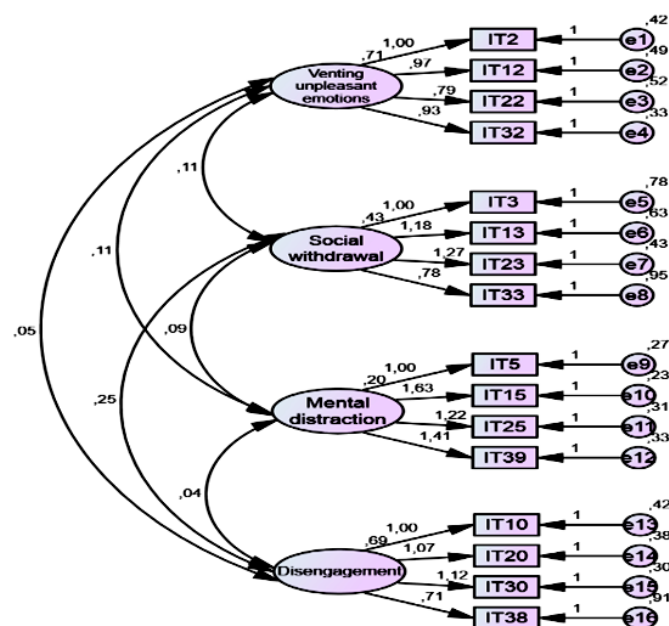


Figure 2. 4-factor model

TABLE VII. THE LEVEL OF COPING STRATEGIES AMONG THE FFT- U15 ELITES

	Mental imagery	Thought control	Effort expenditure	Seeking support	Relaxation	Logical analysis	Venting of unpleasant emotions	Disengagement	Social withdrawal	Mental distraction
Mean	10,25	14,89	9,12	14,51	14,38	10,95	10,95	15,03	15,17	15,93
SD	3,69	3,44	3,66	3,34	3,70	3,98	3,98	3,41	3,54	3,26
N	76									

TABLE VIII. THE LEVEL OF COPING STRATEGIES IN RELATION TO FACTORS: TRAINING CENTER, EXPERIENCE AND TECHNICAL POSITION

Training Center		Mental imagery	Thought control	Effort expenditure	Seeking support	Relaxation	Logical analysis	Venting of unpleasant emotions	Disengagement	Social withdrawal	Mental distraction
Gafsa	Mean (SD)	12,75 (3,61)	16,40 (1,96)	10,65 (3,16)	13,40 (3,33)	11,25 (2,99)	12,60 (3,69)	14,75 (3,26)	14,45 (3,60)	14,35 (3,26)	15,15 (3,43)
Sidi Bouzid	Mean (SD)	8,32 (2,52)	14,31 (4,62)	9,84 (3,71)	14,74 (3,62)	15,26 (2,96)	12,00 (4,72)	14,79 (4,32)	15,52 (3,39)	16,84 (3,08)	15,84 (2,52)
Gabès	Mean (SD)	10,60 (3,67)	13,85 (3,06)	6,10 (2,81)	15,85 (2,87)	17,15 (2,47)	8,85 (3,33)	15,50 (2,98)	15,45 (3,75)	16,05 (3,62)	16,85 (1,90)
Le Kef	Mean (SD)	9,06 (3,30)	15,00 (3,33)	10,06 (3,17)	14,00 (3,22)	13,82 (3,64)	10,29 (3,03)	15,17 (3,14)	15,29 (3,60)	16,64 (2,52)	17,35 (1,83)
Expérience											
Less than 2 years	Mean (SD)	11,65 (3,86)	14,65 (4,20)	10,00 (3,12)	14,11 (2,82)	13,92 (3,56)	11,23 (3,37)	15,73 (2,96)	14,88 (3,95)	16,11 (2,97)	16,27 (2,44)
More than 2 years	Mean (SD)	9,52 (3,41)	15,02 (3,00)	8,66 (3,82)	14,72 (3,58)	14,62 (3,77)	10,80 (4,29)	14,70 (3,60)	15,32 (3,34)	15,84 (3,43)	16,26 (2,73)
Poste de jeu											
Goalkeeper	Mean (SD)	9,80 (3,42)	15,30 (4,44)	8,30 (3,88)	14,10 (3,90)	15,40 (4,29)	8,50 (4,88)	13,40 (3,89)	15,00 (5,45)	16,50 (3,03)	15,90 (2,84)
Defender	Mean (SD)	9,45 (3,70)	14,68 (3,45)	9,86 (3,63)	15,00 (2,99)	15,50 (2,92)	11,45 (3,91)	14,59 (3,71)	15,54 (2,42)	16,36 (2,57)	16,54 (1,97)
Midfielders	Mean (SD)	10,62 (4,22)	14,24 (3,83)	8,24 (4,09)	14,38 (4,27)	14,09 (4,01)	9,47 (3,58)	16,29 (2,22)	15,66 (2,43)	16,00 (3,75)	16,47 (2,46)
Attacker	Mean (SD)	10,87 (3,33)	15,52 (2,55)	9,56 (3,13)	14,35 (2,49)	13,13 (3,58)	12,87 (3,02)	15,08 (3,60)	14,43 (4,32)	15,22 (3,54)	15,95 (3,27)

TABLE IX. THE EFFECT OF INTERACTION BETWEEN FACTORS (IV) AND STRATEGIES OF COPING (DV)

Effect		Value	D	Ddl of the hypothesis	ddl error	Sig.
Training Center (coaching)	Trace of Pillai	1,070	2,052	30,000	111,000	,004
	Wilks' Lambda	,233	2,216	30,000	103,408	,002
	Hotelling Trace	2,132	2,392	30,000	101,000	,001
	Roy's Biggest Root	1,517	5,613 ^c	10,000	37,000	,000
Level of experience	Trace of Pillai	,211	,935 ^b	10,000	35,000	,514
	Wilks' Lambda	,789	,935 ^b	10,000	35,000	,514
	Hotelling Trace	,267	,935 ^b	10,000	35,000	,514
	Roy's Biggest Root	,267	,935 ^b	10,000	35,000	,514
Technical positions	Trace of Pillai	,810	1,369	30,000	111,000	,122
	Wilks' Lambda	,366	1,409	30,000	103,408	,105
	Hotelling Trace	1,274	1,430	30,000	101,000	,096
	Roy's Biggest Root	,654	2,421 ^c	10,000	37,000	,025

TABLE X. INTER-SUBJECT INTERACTION EFFECTS BETWEEN TRAINING CENTER FACTOR AND COPING STRATEGIES)

Source	Dependent variable	Sum of type III squares	ddl	Mean of squares	F	P-value.
Training Center (coaching)	Mental imagery	87,564	3	29,188	2,882	,046
	Thought control	77,250	3	25,750	3,117	,036
	Effort expenditure	121,532	3	40,511	3,969	,014
	Seeking suport	82,723	3	27,574	2,143	,108
	Relaxation	207,474	3	69,158	6,508	,001
	Logical analysis	72,319	3	24,106	2,250	,096
	Venting of unpleasant emotions	21,018	3	7,006	,580	,631
	Disengagement	27,433	3	9,144	,930	,434
	Social withdrawal	29,877	3	9,959	,832	,483
	Mental distraction	62,374	3	20,791	2,737	,055

Doron and Martinent, 2016) that task-oriented coping strategies are positively associated with performance. At the level of achievement the objectives of the competition (Amiot, Gaudreau, and Blanchard, 2004; Dinca & Rosnet, 2007).

A. The interaction effect of determinants

To estimate the interaction effect of the factors, the MANOVA variance analysis proves that only the training center or coaching factor has an interaction effect on task-oriented coping strategies such as imaging Mental control, thought control, effort deployment and relaxation. While the experience and the game post, have no interaction effect. Our results are similar to those published in the study by Nicolas, M., Gaudreau, P., and Franche, V. (2011), who asserts that task-oriented coping strategies is an important process by which the Perceived support coaching has an influence on athletes during a specific competition. Similarly for Kristiansen and al. (2008), in elite athletes in four different European countries.

B. Regression

In order to know what factors (coaching, experience, technical position) influence the coping strategies of the competition. We performed a multiple regression analysis, the input method. The results suggest that :

- 1) The VIF and tolerance values confirm the absence of multicollinearity problem (see Table 12).
- 2) The Durbi-Watson test values for assessing the correlation between residuals and errors are in the range of 1.5 to 2.5. The regression model is validated.
- 3) The coefficients of F obtained are significant at $p < 0.05$, indicating that the model contribute to better predict coping strategies (Hair, J.F., et al. 2010).

- 4) The results also suggest that there are only four significant explanatory relationships at $p < 0.05$; Whereas the values of R^2 indicate that the strength of all these relationships is very low (see Table 11).

- 15.7% of mental imagery is explained by factors, training center (coaching) and experience.
- 16.1% of relaxation is explained by the factors, training center (coaching) and Technical positions
- 14.5% logical analysis is explained only by the factor, gaming station.
- 10.6% of the mental distraction is explained only by the factor, training centre.

IV. CONCLUSION

Research on coping in sports was strongly influenced by the transactional coping approach of Lazarus and Folkman (Nicholls & Polman, 2007a). In this context, our work was designed to provide a descriptive basis for understanding how our elites in regional state training centers manipulate coping strategies in key competitive events.

In the sports field, the use of task-oriented coping strategies and disengagement during a sporting competition are associated, positively and negatively, with the gap between the objectives set beforehand and the result achieved (Gaudreau & Blondin, 2004a Gaudreau, Blondin, & Lapierre, 2002), (Ntoumanis & Biddle, 1998, Kim and Duda, 2003). Athletes who have a high use of task-oriented coping strategies, adapt better to the competition situation (Gaudreau & Blondin, 2004a). Contrary to what was expected, our elites

are more impatient of emotion-based coping strategies.

Task-oriented coping strategies are associated with a more efficient organization of learning and working methods (Devonport & Lane, 2006). Coaching among the determinants of the effectiveness of training in sports field. In our work, analysis of variance revealed only the effect of training center where the trainer plays the crucial role, on the coping strategies used by our elites. Coaching has been established as a stressor in elite athletes. The flexibility and support of coaches was a crucial source for overcoming stressors (Cosh and Tully 2015).

Today, applied research is needed to examine whether preventive psycho-educational interventions that teach coaching support behaviors (Smith, Smoll and Cumming, 2007) have effects on the use of athletes Coping strategies.

V. LIMITS

Among the limitations of our work, only situational coping strategies have been examined, while coping strategies are also provisional, changing over time, situations and contexts (Gaudreau & Miranda, 2010).

The second limit in our work is that there was no possibility to evaluate the coping during the competition (Gaudreau and Blondin 2002).

REFERENCES

- [1]. Amiot, C. E., Gaudreau, P., & Blanchard, C. M. (2004). Self-determination, coping, and goal attainment in sport. *Journal of Sport and Exercise Psychology*, 26, 396-411.
- [2]. Anshel, M. H., & Si, G. (2008). Coping styles following acute stress in sport among elite Chinese athletes: A test of trait and transactional coping theories. *Journal of Sport Behavior*, 31, 3-21.
- [3]. Bertrand, J., (2008). Preparing for the profession of footballer: analysis of professional socialization, *Staps*, 82 (4), p. 29-42. DOI: 10.3917 / sta.082.0029.
- [4]. Bertrand J., (2015). How does one become a professional footballer?, *Human Sciences*, Monthly No. 272.
- [5]. Briggs, S. R., & Cheeks, J. M (1986). The Role of Factor Analysis in the Development and Evaluation of Personality Scales. *Journal of Personality*, 54, 106-148.
- [6]. Calmeiro L, Tenenbaum G, Eccles D. (2014). Managing pressure: patterns of appraisals and coping strategies of non-elite and elite athletes during competition. *J Sports Sci* 2014; 32: 1813-1820. doi:10.1080/02640414.2014.922692.
- [7]. Calmeiro L, Tenenbaum G, Eccles D. Event (2010). Sequence analysis of appraisals and coping during trapshooting performance. *J Appl Sport Psychol* 2010; 22: 392-407 doi:10.1080/ 10413200.2010.495325.
- [8]. Callahan, S. Chabrol, H. (2013). Mechanisms of defense and coping. Collection: Psycho Sup, Dunod 2nd edition.
- [9]. Carton-Caron A. (2004). Coping Strategies in Athletes. Doctoral thesis in psychology. University of Lille3 Charles de Gaulle.
- [10]. Cosh S, Tully JP, 2015. Stresseurs d'adaptation et de mécanismes desoutien pour les étudiants-athlètes Combinant Elite Sport et enseignement supérieur : Implications pour l'apratique. Texte intégral de l'article. *Sport Psychologue*.
- [11]. Côté, J., Yardley, J., Hay, J., Sedgwick, W., & Baker, J. (1999). An exploratory examination of the coaching behavior scale for sport. *Avante*, 5(2), 82-92.
- [12]. Demaziere, D., and Csakavary B., (2002), "Becoming professional", *Panoramiques*, 61, p. 85-91.
- [13]. DeVellis, R. F. (1991) *Scale Development: Theory and Application*. London: Sage.
- [14]. Devonport, T. J., & Lane, A. M. (2006). Cognitive appraisal of dissertation stress among undergraduate students. *The Psychological Record*, 56, 259-266.
- [15]. Faure, J., and Suaud, C., (1999), *French professional football*, Paris, university Press of France.
- [16]. Dinca, A., & Rosnet, E. (2007). Relationship between personal effectiveness, coping strategies and performance in sports competitions. Paper presented at the Proceedings of the International Congress of the French Society for Sport Psychology, Montpellier.
- [17]. Doron J, Gaudreau P. A (2014). point by point analysis of performance in a fencing match: psychological processes associated with winning and losing streaks. *J Sport Exerc Psychol*: 36: 3-13: doi:10.1123/ jsep.2013-0043.
- [18]. Doron J, Martinent G. (2016). Trajectories of psychological states of women elite fencers during the final stages of international matches. *J Sports Sci*: 34(9): 836-842. doi:10.1080/ 02640414.2015.1075056.
- [19]. Gaudreau P, et Blondin, J. (2002). Development of a questionnaire for the assessment of coping strategies employed by athletes in competitive sport settings. *Psychology of sport and exercise*, 3, 1-34.
- [20]. Gaudreau, P., Lapiere, A. M. and Blondin, J. P. (2001) "Coping at three phases of a competition: Comparison between pre-competitive, competitive, and post-competitive utilization of the same strategy," *Int. J. Sport Psychol.*, vol. 32, no. 4, pp. 369-385,.
- [21]. Gaudreau, P., & Blondin, J. P. (2004a). Different athletes cope differently during a sport competition: A cluster analysis of coping. *Personality and Individual Differences*, 36, 1865-1877.
- [22]. Gaudreau, P., Nicholls, A., & Levy, A. R. (2010). The Ups and Downs of Coping and Sport Achievement: An Episodic Process of Analysis within Person Associations. *Journal of Sport & Exercise Psychology*, 32, 298-311. <http://dx.doi.org/10.1123/jsep.32.3.298>

- [23]. Gaudreau, P., & Miranda, D. (2010). Coping across time, situations, and contexts: A conceptual and methodological overview of stability, consistency, and change. In A. R. Nicholls (Ed.), *Coping in sport: Concepts, theories, and related constructs* (pp. 15–32). New York: Nova.
- [24]. Gearity, B., & Murray, M. (2011). Athletes' experiences of the psychological effects of poor coaching. *Psychology of Sport and Exercise*, 12(3), 213–221. doi:10.1016/j.psychsport.2010.11.004
- [25]. Hair, J.F., Black, W.C., Babin, B.J., & Anderson, R.E. (2010). *Multivariate Data Analysis*. Seventh Edition. Prentice Hall, Upper Saddle River, New Jersey.
- [26]. Hajji J, (2016). Validation of the Arabic Version of the Inventory of Coping Strategies of Competitive Sport (ISCCS) *Advances in Physical Education* Vol.6 No.4, Pub. Date: October 14, 2016.
- [27]. Hobfoll, S. E., (2002). Social and psychological resources and adaptation. *Review of general psychology* 6 (4), 307
- [28]. Hollembeak, J., and Amorose, A. J., (2005). Perceived coaching behaviors and college athletes' intrinsic motivation: A test of self-determination theory *Journal of applied sport psychology*, 17 (1) (2005), pp. 20–36
- [29]. Kim, M. S. & Duda, J., (2003). The coping process: Cognitive appraisals of stress, coping strategies, and coping effectiveness. *The Sport Psychologist*, 17, 406–425.
- [30]. Kristiansen, E., Roberts, G.C., & Abrahamsen, F.E. (2008). Achievement involvement and stress coping in elite wrestling. *Scandinavian Journal of Medicine & Science in Sports*, 18, 526–538.
- [31]. Lazarus, R. S., & Folkman, S. (1984). *Stress, appraisal, and coping*. New York: Springer.
- [32]. Martinent, G., et Decret, J.-C. (2015). Motivational profiles among young table-tennis players in intensive training settings: A latent profile transition analysis. *Journal of Applied Sport Psychology*, 27, 268–287. doi: 10.1080/10413200.2014.993485.
- [33]. Mellalieu, S. D., Hanton, S., & Fletcher, D. (2006). A competitive anxiety review: Recent directions in sport psychology research. In S. Hanton, & S. D. Mellalieu (Eds.), *Literature reviews in sport psychology* (pp. 1–45). New York: Nova Science.
- [34]. Nicholls, A. R., & Polman, R. C. J. (2007a). Coping in sport: A systematic review. *Journal of Sports Sciences*, 25, 11–31.
- [35]. Nicolas, M., Gaudreau, P., Franche, V. (2011). Perception of coaching behaviors, coping, and achievement in a sport competition. *Journal of sport and exercise psychology*, 33, 460–468.
- [36]. Ntoumanis, N, Biddle, SJH & Haddock, GG (1999). The mediatory role of coping strategies on the relationship between achievement motivation and affect in sport' *Anxiety, Stress, and Coping: An International Perspective*, vol 12, pp. 299 - 327.
- [37]. Roderick, M., (2006), *The Work of Professional Football : A Labour of Love ?*, Abingdon, Routledge.
- [38]. Röger, U., Rütten, A., Zeimainz, H., & Hill, R. (2010). Quality of talent development 432 systems: results from an international study. *European Journal of Sport Society*, 7, 7–433 19.
- [39]. Smith, R.E., Smoll, F.L., & Cumming, S.P. (2007). Effects of a motivational climate intervention for coaches on young athletes' sport performance anxiety. *Journal of Sport & Exercise Psychology*, 29, 39–59.
- [40]. Slimani, H., (2000), *The professionalization of French football: a model of denial*. Doctoral thesis, Nantes, University of Nantes.
- [41]. Tabachnick, B. G., & Fidell, L. S. (2007). *Using multivariate statistics*. Boston: Pearson/Allyn & Bacon.

The Presentation of the Extended Technology Acceptance Model in Sports Organizations

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Abstract- During the recent decades, information technology has almost become a part of different aspects of our life. The use of information technology in different domains has made the analysis of the level of information technology acceptance and rejection a significant factor in the organizations. Among the key factors which lead to the accomplishment of these objectives is the information technology acceptance among the employees of sports organizations. The present paper seeks to explore the structures which account for the intention of sports organizations' employees in using information technology. For this purpose a conceptual model was extended by the structures of the other theories. At the end 8 structures were chosen to explicate the research model, and 17 hypotheses were chosen to describe their relationships. The results indicated the fitness of the model.

Keywords- technology acceptance, sports organizations, employees, user satisfaction

I. INTRODUCTION

Which factor/s make an individual to accept the new technology? Are these factors dependant on the characteristics of technology? Do the characteristics of the individuals affect the acceptance as well? If any of these factors are significant, how and in which ways do they affect technology acceptance? Deciding to use a new idea like information technology as the best action is the acceptance. The acceptance is when one accepts a new idea and practices it (Rogers & Shoemaker, 2001). Considering the fast growth rate of information technology in the organizations, in the last two decades a large part of information management systems studies focused on the various factors which influence the acceptance behavior and the usage of a technology in the organizational environments, especially the educational ones (Wallace & Sheetz, 2014). It has caused the formation of different conceptual models in this domain among which the technology acceptance model can be mentioned as an instance.

Davis designed TAM based on the theory of reasoned action (TRA) to model the user's acceptance of the information systems (Davis, 1993). This model used Ajzen and Fishbein TRA as a framework to explain its components (Bagozzi, 2007; Y.-C. Lee, 2006; Lu, Zhou, & Wang, 2009; Wallace & Sheetz, 2014). TAM illustrates the behavior of people in connection with the usage of computers and various computer technologies.

This model is useful for predicting and explaining users' behaviors and is a model for the individuals (Lu, et al., 2009). Therefore this model 1) investigates the factors for the individuals. 2) It has

been used in different studies in various countries, 3) and has been analyzed in previous studies for its application efficacy (S.-H. Chang, Chou, & Yang, 2010; Sánchez-Prieto, Olmos-Migueláñez, & García-Peñalvo, 2016). Generally speaking, TAM is to provide an explanation for the acceptance of information technology among people, the ability to clarify the user's behavior in the time spent on computer and the number of users, although, it has sometimes been theoretically modified and adjusted (Holden & Rada, 2011; Huijts, Molin, & Stég, 2012). Thus, in the present study this model was used

The base of TAM is formed by two special ideas or views which are among the main factors related to the information technology acceptance (Davis, 1993; Davis, Bagozzi, & Warshaw, 1989): 1) perceived usefulness (PU) is the perception of usefulness of a system which is dependent on information technology in users' minds in a way that the more that system improves their performance in the organization, the more useful and practical it becomes. Usefulness determines the intention to use technology and the attitude toward the usage of technology directly. 2) Perceived ease of use (EOU), is the perception in the minds of users about the ease of using a system which is dependent on information technology in a way that the less the effort it needs, the more practical it becomes. EOU directly determines the usage of technology and the attitude toward its application, and it affects the intention to use technology indirectly through EOU and the attitude toward technology (Surendran, 2012; Wallace & Sheetz, 2014). However, there are other factors to affect the information technology acceptance behavior, one of which is the attitude. Attitude is the positive or negative emotional state of the individual to the behavior

itself. Attitude is the function of a set of beliefs which indicate the level that the employees find using technology attractive, logical, advantageous and pleasant (Leonard, Cronan, & Kreie, 2004). The attitude toward the use of technology is the user's evaluation of the pleasure in using technology. For instance one who finds using internet full of positive consequences, will have a positive attitude toward its usage. The attitude toward using technology is influenced directly by PU and EOU, and indirectly by external variables. Studies show that attitude has a positive and meaningful impact on the intention to use technology (Gumussoy, Calisir, & Bayram, 2007; Guritno & Siringoringo, 2013; Park, Baek, Ohm, & Chang, 2014).

The intention to use refers to "the power of an intention in doing a special behavior" and is expected to lead to the real use of technology. Thus, the intention to use refers to the probability of using or applying technology by the user (Guritno & Siringoringo, 2013; Ratten, 2015). The intention to use information technology, which is a function of positive attitude toward the use of information technology and users' perceptions of its usefulness, plays a significant role in the formation of the final behavior of using information technology. The relationship of the attitude and the intention to use information technology indicate that users intend to do actions or behaviors with positive consequences (Erasmus, Rothmann, & Van Eeden, 2015; Guritno & Siringoringo, 2013; Hsiao & Tang, 2015; Ratten, 2015). The intention to use information technology can be considered as an introduction and a significant factor in using information technology (Erasmus, et al., 2015; Guritno & Siringoringo, 2013; Venkatesh & Davis, 2000).

The external variables directly affect the perceived usefulness and ease of use of technology and indirectly are effective through perceived ease of use of technology on the perceived usefulness (P. V.-C. Chang, 2004; Saadé & Kira, 2006). Among these variables technology self-efficacy, technology anxiety, perceived enjoyment and user satisfaction can be mentioned. Self-efficacy, in Bandura social cognitive theory (Bandura, 1977), is considered as a direct principle in determining the individual's behavior and is defined through the individuals' judgments of their facilities for organizing and performing the solutions needed for the accomplishment of various planned operations. The term self-efficacy quickly became noticed in special domains such as information technology. Technology self-efficacy refers to the users' beliefs toward their capabilities in doing their special duties with the help of technology and is an indicator of the individual's judgment of his/ her own abilities in using technology (Pauli, Gilson, & May, 2011). Ramayah, Aafaqi, & Ignatius findings, about the influence of computer self-efficacy on using computer, showed that computer self-efficacy has a powerful impact on the perceived ease of use and an indirect effect on the perceived usefulness through the perceived ease of use (Ramayah, Aafaqi, & Ignatius, 2004). Some studies showed that self-efficacy can strengthen the attitude toward using technologies like internet. Computer self-efficacy has also a direct effect on the attitude toward computer (Hsiao & Tang, 2015). Generally, about using information technology, it is predicted that high levels of technology self-efficacy lead to having high levels of using information technology (Kripanont, 2006).

Technology self-efficacy is not, for sure, the only effective external factor on technology acceptance. The other factors may be effective on these two variables of TAM. Technology anxiety is one of these variables.

When users interact with computers, they often experience emotional states like failure, distress, anger, anxiety and fear. In the other words, they have technology anxiety. Technology anxiety is a sort of emotional and cognitive reaction which the individual feels while working with information technology, and is mostly because the person finds information technology a threatening issue. Computer anxiety can be defined as the desire of the individual in experiencing a level of discomfiture before using computer (Venkatesh & Davis, 2000). In fact the employees who use new technologies, experience a lower level of anxiety.

From the viewpoint of Saadé & Kira, computer anxiety is a concept specific anxiety, because it is an emotion formed in the interaction of the individual and information technology (Saadé & Kira, 2006, 2009). Some researchers find computer anxiety a key factor which is influential on the attitude toward various forms of technology (Alenezi, Karim, & Veloo, 2010) and using computer (Compeau, Higgins, & Huff, 1999). Some others claimed that the high level of anxiety while using computer causes a decrease in the attitude and the level of using technology (Abubakar & Adetimirin, 2015). Computer anxiety had a direct impact on the attitude toward using information technology and was predictive of negative ease of use. In Saadé & Kira's study, computer anxiety had a direct influence on the perceived ease of use of computer and its perceived usefulness (Saadé & Kira, 2006).

The perceived enjoyment, another significant variable in TAM, is an action in which the individual perceives the use of a computer only for its own sake, not considering the instrumental value, as a personal enjoyment (Davis, Bagozzi, & Warshaw, 1992). Some researchers said that the perceived enjoyment is the key factor in determining the behavioral intention (Davis, et al., 1992; Mun & Hwang, 2003; Teo & Noyes, 2011; Venkatesh, Morris, Davis, & Davis, 2003) and the perceived ease of use and computer enjoyment were basic factors in determining the behavioral intention. Venkatesh indicated that the more direct the users' experiences toward the system are, the more the effect on the perceived ease of use will be (Venkatesh & Davis, 2000). The findings of Venkatesh, Speier, & Morris indicated that enjoyment has no direct effect on behavioral intention through the perceived ease of use and the perceived usefulness of computer. The aforementioned findings express the idea that the perceived ease of use is influenced by the level to which individuals find using systems enjoyable. They also, introduced enjoyment as the determining factor in the perceived ease of use; however, they ignored their relationships (Venkatesh, Speier, & Morris, 2002). Nah, Zhao, & Zhu showed that the perceived enjoyment was the determining factor of the perceived usefulness of using mobiles (Nah, Zhao, & Zhu, 2003). According to the theory of self-efficacy there is a positive relationship between the internal stimulation (for instance the perceived enjoyment) and the ease of use (Bandura, 1977, 1982).

The effect of user satisfaction on his/ her intention to use information technology is among significant issues which has not often been mentioned in studies. User satisfaction refers to his/ her attitude toward information technology in the surrounding environment. Doll & Torkzadeh, defined "user satisfaction as the attitude of the user regarding information technology or a special computer program (Doll & Torkzadeh, 1988)." Moreover, Seddon & Kiew defined user satisfaction as "the satisfaction or dissatisfaction caused by all the advantages which users hope to get while interacting with information systems (Seddon & Kiew, 1996)." User satisfaction is considered as the main factor in intending to use new technologies (Negash, Ryan, & Igbaria, 2003; Yoon, Guimaraes, & O'Neal, 1995). Delone & McLean claimed that user satisfaction will be strengthened if individual, group or organizational performance improve after using the system (Delone & McLean, 2003). In addition, they choose user satisfaction as an attitudinal variable which relates user satisfaction to two variables of the intention to use and the real use (Bhattacharjee, 2001; Cenfetelli, Benbasat, & Al-Natour, 2005; Konradt, Christophersen, & Schaeffer-Kuelz, 2006; Mathieson, 1991). The findings of Yoojung & Hyung and Park, et al have also indicated that the perceived usefulness and user satisfaction have a positive impact on the intention to use information technology (Kim & Lee, 2014; Park, et al., 2014).

Recently TAM was used to explain the process of technology acceptance (Y.-C. Lee, 2006). This model, in domains like trading (Chen, Gillenson, & Sherrell, 2002; Gefen, Karahanna, & Straub, 2003; Wu & Wang, 2005), or the ICTs in the organizations (Hsu & Lu, 2004; Z. Yang, Cai, Zhou, & Zhou, 2005) is popular. However, there are instances in the domains of health (P. V.-C. Chang, 2004; Persico, Manca, & Pozzi, 2014; Sánchez & Hueros, 2010; Stantchev, Colomo-Palacios, Soto-Acosta, & Misra, 2014) and education (Sánchez & Hueros, 2010; Stantchev, et al., 2014). As mentioned in the aforementioned studies, TAM has been examined in different studies. This shows that the capability of this model in interpreting the attitude toward using information systems is better than the others. Many studies consider using information systems as the rate of user acceptance (Erasmus, et al., 2015; Malhotra & Galletta, 1999; Wallace & Sheetz, 2014; Yi-Cheng, Yi-Chien, & Ron-Chuen, 2006). Therefore, the present study seeks to explore the internal relationships between technology self-efficacy, technology anxiety, perceived enjoyment and user satisfaction with structures of TAM in Iranian sports organizations in the conceptual model (Figure 1).

II. MATERIALS AND METHODS

A. Research Plan

The present study has used structural equation modeling by Amos to analyze the causality and examine the hypothesis among the study variables. Data was collected through self-report questionnaire including demographic questions, and standard questionnaires for each variable in the study model.

The Participants and Data Collection Method

Kline suggested that a sample of 200 people or more is needed for complex models. He also, recommended that for multivariate researches (like

SEM) the sample is to be several times (preferably 10 times) bigger than the number of the variables presented in the study (Kline, 2015). Based on Hu & Bentler for each variable in the model 15 people are, at least, needed as the sample (Hu & Bentler, 1999), therefore, the least number for the sample of the present study is 120. Considering the risk of loss and irrelevant data the sample became 350 employees of sports organizations (N=700), 332 of whom could be graded (Table 1).

B. Instrument

To measure the research model appropriately, the adjusted questionnaires, from valid sources, were used (Table 2). The good point of using such scales is that they have a complete face and content validity and provide appropriate theoretical bases for evaluations in research domain. First the questionnaires were translated into Farsi, by an expert of English language, and then someone else who was not aware of the process translated them into English again. Finally, by comparing the original and the translated questionnaires, and detecting and removing the ambiguities, the preliminary study was done on a sample of 50 employees of sports organizations. After applying their comments the final questionnaire of 35 items was designed. There were 8 scales in this questionnaire which were changed to 5 from 1 (completely disagree) to 5 (completely agree) based on experts' ideas.

To determine the face and content validity, the ideas of experts, and to determine the validity, Cranach's Alpha, were used. For data analysis and fitting the model Amos 21 and SPSS 21 were used.

III. RESULTS:

In this part first the descriptive findings and then the fitted model are explained.

The findings of the study in figure 1 showed that the highest direct effect is related to the effect of perceived enjoyment over usefulness ($\beta_s = 0/665$), and the lowest rate is related to the effect of computer anxiety over ease of use that is ($\beta_s = 0/099$).

IV. DISCUSSION AND CONCLUSIONS

The present study was done to analyze the structural relationships of TAM structures like perceived usefulness, perceived ease of use, attitude toward the use, the intention to use information technology with external factors of self-efficacy of using IT, technology anxiety, perceived enjoyment and, the mediator variable, user satisfaction.

The findings indicated the direct and indirect effects of technology self-efficacy, perceived enjoyment, technology anxiety and user satisfaction on the intention to use information technology. The presented model confirms the basic relationships of stimulating variables, psychological and social variables and the significant variables of TAM from different aspects.

The findings showed that self-efficacy has a direct effect on the perceived ease of use. The results of (Jeong & Kim, 2016), (Mun & Hwang, 2003), (McFarland, 2001), (Ramayah, et al., 2004), and (Lopez & Manson, 1997) studies showed that technology self-efficacy is the determining factor of the ease of use with which the results of the present study match.

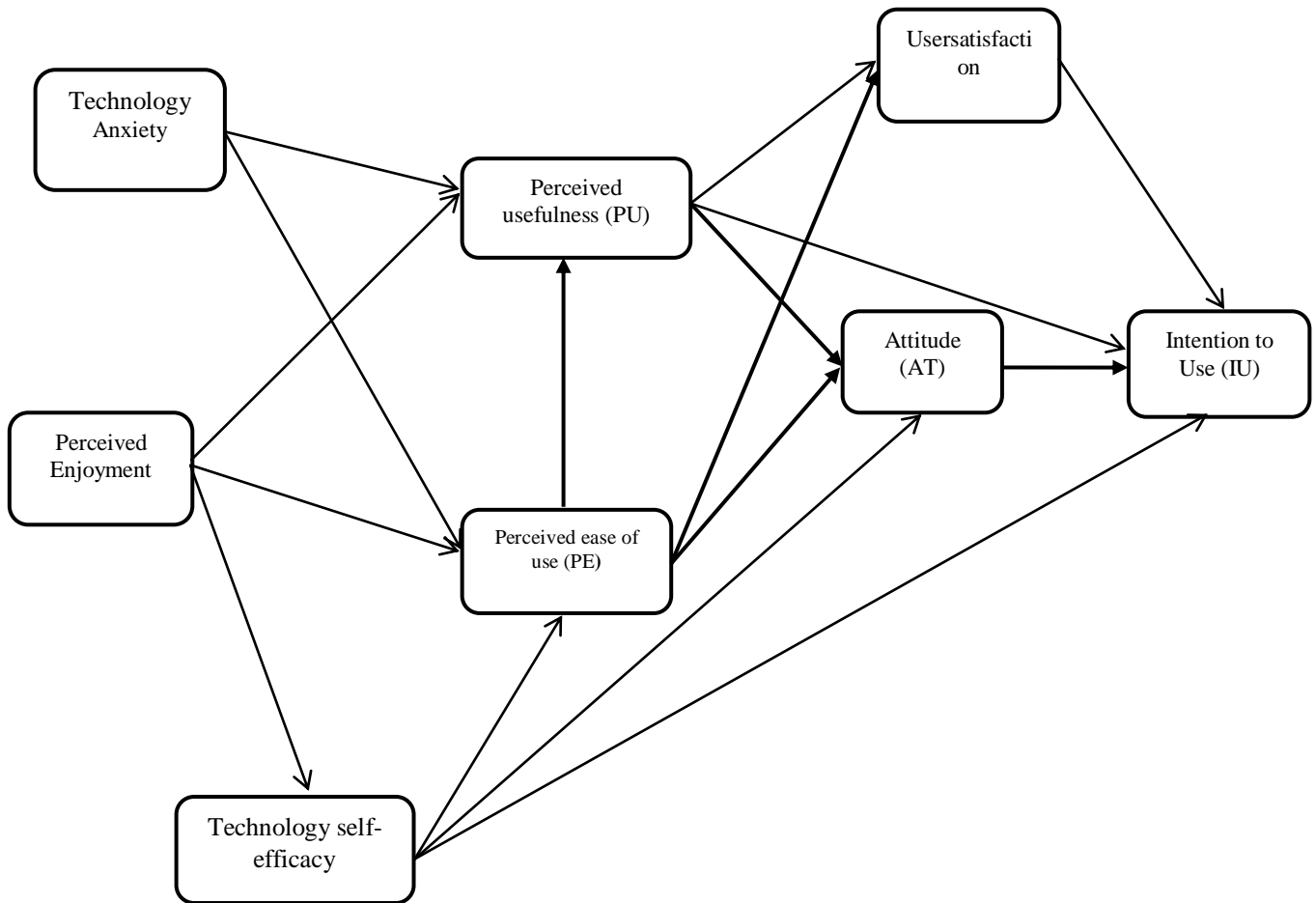


Figure 1. Conceptual model of Extended TAM

The findings indicated the direct effect of self-efficacy on the attitude toward using information technology. These findings go along with Sanchez Prieto, J.C Olmos, Chun-Hua Hsiao, Kai-Yu Tong's (2015) results which showed self-efficacy as a stimulating variable that has an impact on the attitude toward using information technology. They also, stated that self-efficacy is one of the variables which should be considered as a significant one in using technology. These findings are indicative of the fact that the more users' beliefs, toward their abilities in using information technology, is positive, the easier they will understand using information technology, which increases the probability of using information technology.

Thus, the effect of the individuals' judgments of their own abilities while using information technology (through EOU and AT) on their beliefs toward the probability of using information technology, leads to having a better performance.

The findings of the present study showed that the perceived enjoyment has a direct and meaningful effect on the main structures of TAM (EOU & usefulness) and self-efficacy. The direct effect of the perceived enjoyment is also meaningful like Yi & Hwang, and AhmadiDehghotbi studies(ahmadi dehghotbi, et

al., 2010; Mun & Hwang, 2003). Therefore, the more people perceive using information technology useful, regardless of its instrumental uses, the more positive their judgments of their abilities in using computer will be. In (Venkatesh, et al., 2003),(Mun & Hwang, 2003),(Yi-Cheng, et al., 2006),(Sun & Zhang, 2006), (Olmos Migueláñez, García-Peñalvo, & Sánchez Prieto, 2016),(Al-Debei, 2014), (Teo & Noyes, 2011),(Olmos Migueláñez, et al., 2016),(Park, et al., 2014)studies, the perceived enjoyment was the determining factor on EOU and usefulness of information technology. Theoretically speaking, the entertaining feature of information technology used in sports organizations as a main enjoyment factor causes an easier understanding of information technology for users. The innovations of information technology make it more exciting for users. Thus, entertainment, pleasure, and excitement which are enjoyment factors lead to having a higher level of technology acceptance. Also, the excitement and pleasure of information technology provide users with the feeling that they have much control over their activities and they can do things faster and more efficiently and perceive information technology useful.

TABLE I. DEMOGRAPHIC FEATURES OF THE PARTICIPANTS

	Variable	Number	Percent
Gender	Man	124	37/3
	Woman	208	62/7
Age	Lower than 30	30	0/09
	31 – 40	146	0/44
	41 – 50	128	0/38
	More than 50	28	0/08
Education	Associate	26	0/02
	B.A	174	0/52
	M.A & PhD	132	0/40
Work experience	Lower than 5	68	0/21
	6 – 10	90	0/27
	11 – 15	50	0/15
	16 – 20	72	0/22
	21 – 25	44	0/13
	More than 25	8	0/02
Having desktop computer	Yes	220	0/66
	No	112	0/34
How often to use computer	Never	4	0/01
	Sometimes	48	0/14
	Less than once a moth	34	0/10
	Once a week	30	0/09
	Two/ three times a week	142	0/43
	One day off	16	0/05
	Everyday	58	0/17
Hours using computer	Almost none	22	0/07
	Less than half an hour	32	0/10
	5/0 – 1	62	0/19
	1 – 3	78	0/23
	3 – 5	64	0/19
	More than 5	74	0/22

, regardless of its instrumental uses, the more positive their judgments of their abilities in using computer will be. In (Venkatesh, et al., 2003), (Mun & Hwang, 2003), (Yi-Cheng, et al., 2006), (Sun & Zhang, 2006), (Olmos Migueláñez, García-Peñalvo, & Sánchez Prieto, 2016), (Al-Debei, 2014), (Teo & Noyes, 2011), (Olmos Migueláñez, et al., 2016), (Park, et al., 2014) studies, the perceived enjoyment was the determining factor on EOU and usefulness of information technology. Theoretically speaking, the entertaining feature of information technology used in sports

organizations as a main enjoyment factor causes an easier understanding of information technology for users. The innovations of information technology make it more exciting for users. Thus, entertainment, pleasure, and excitement which are enjoyment factors lead to having a higher level of technology acceptance. Also, the excitement and pleasure of information technology provide users with the feeling that they have much control over their activities and they can do things faster and more efficiently and perceive information technology useful.

TABLE II. QUESTIONS AND SOURCES OF THE QUESTIONNAIRE AND VALIDITY

structures	questions	sources	validity
Perceived ease of use (PE)	Using different forms of IT in the organization made ... Learning how to use them easy. It does whatever the employee wants. Doing things easy for the user. The fulfillment of the employee's job needs easy. It easy to become professional in using them. Using IT easy.	(Davis, 1993; Davis, et al., 1989; Park, et al., 2014; Sánchez-Prieto, et al., 2016)	0/85
Perceived usefulness (PU)	I believe that using IT in the organization ... Causes acceleration in doing duties. Causes a better quality. Increase the efficiency. Makes the accomplishing the goals easy. Causes an ease in doing duties. Is useful for doing duties.	)Davis, 1993; Davis, et al., 1989; Park, et al., 2014; Sánchez-Prieto, et al., 2016(	0/90
Attitude (AT)	I believe that using IT ... Is good. Is logical. Is lovely. Is pleasant. Is useful.	)Davis, 1993; Davis, et al., 1989; Park, et al., 2014((Taylor & Todd, 1995))Hsiao & Tang, 2015(Chun-Hua Hsiao Kai-Yu))Tang, 2015(	0/81
Intention to Use (IU)	I want to use IT ... For doing my responsibilities. Permanently. In my office. Even in the future.	)Davis, 1993; Davis, et al., 1989; Park, et al., 2014()Sánchez-Prieto, et al., 2016; Venkatesh, et al., 2003(	0/89
Technology Self-efficacy (SE)	I can use IT for doing my responsibilities. I can use IT as an educational instrument without any help. I can design activities for IT without any help.	)Taylor & Todd, 1995()Sánchez-Prieto, et al., 2016; Tang, 2015(	0/92
Technology Anxiety	Working with IT makes me angry. If I delete a huge amount of information mistakenly, I become angry. If I make a mistake that cannot correct, while using IT, I become angry. IT is somehow anxiety-ridden.	)Sánchez-Prieto, et al., 2016; Venkatesh, et al., 2003(	0/86
Perceived Enjoyment	Using IT is highly enjoyable. Using IT is entertaining. I love using IT. I enjoy all parts of my job which need using IT.	)Venkatesh, et al., 2002()Koufaris, 2002()Teo & Noyes, 2011()W. Lee, Xiong, & Hu, 2012()Mun & Hwang, 2003()Park, et al., 2014(	0/87
User satisfaction	I think I made the right decision that was using IT in the organization. Experiencing using IT is pleasing for me. Generally, I am satisfied with the services of IT in the organization.	)Negash, et al., 2003()Seddon & Kiew, 1996()Kim & Lee, 2014()Park & Del Pobil, 2013()K. C. Lee & Chung, 2009()Park, et al., 2014(	0/83

The findings indicated that technology anxiety had a negative and meaningful effect on the ease and attitude. Therefore, (based on fig. 2) it can be concluded that technology anxiety has decreasing effect on TAM and it seems that it acts as a deterrent to technology acceptance. Higher points in anxiety lead to having negative attitude and lower ease in using information technology. The results of (Alenezi, et al., 2010) and (Adetimirin,

2015) showed high computer anxiety leads to having negative attitude and lower use of information technology as the result. The findings of the present paper affirm the same points. Whenever using computer is accompanied with fear and anxiety, one cannot use technology efficiently, thus, the employees' performance will be lower in the organization.

TABLE III. DESCRIPTIVE FEATURES AND CORRELATION MATRIX OF THE STUDY VARIABLES. IT SHOWS THE DESCRIPTIVE FEATURES AND CORRELATION MATRIX OF THE STUDY VARIABLES. THE HIGHEST AND LOWEST CORRELATIONS FOR USER SATISFACTION AND PERCEIVED ENJOYMENT WERE (R= 0/79) AND THE LOWEST FOR THE INTENTION TO USE WITH

	Perceived ease of use	Perceived usefulness	Attitude	Technology Self-efficacy	Technology Anxiety	Perceived Enjoyment	Usersatisfaction	M ± sd
Perceived ease of use	1							10.13 ± 2.80
Perceived usefulness	.645**	1						8.98 ± 2.89
Attitude	.527**	.485**	1					6.95 ± 2.32
Technology Self-efficacy	.221**	.131*	.305**	1				9.72 ± 2.61
Technology Anxiety	-.086	-.085	-.171**	-.059	1			47.07 ± 7.71
Perceived Enjoyment	.280**	.395**	.318**	.171**	-.144**	1		2.94 ± 1.50
Usersatisfaction	.359**	.408**	.392**	.136*	-.121*	.79**	1	8.68 ± 2.89
Intention to Use (IU)	.598**	.491**	.687**	.474**	.002	.230**	.340**	9.87 ± 2.54

* 05/0 P≤; ** 01/0 P≤

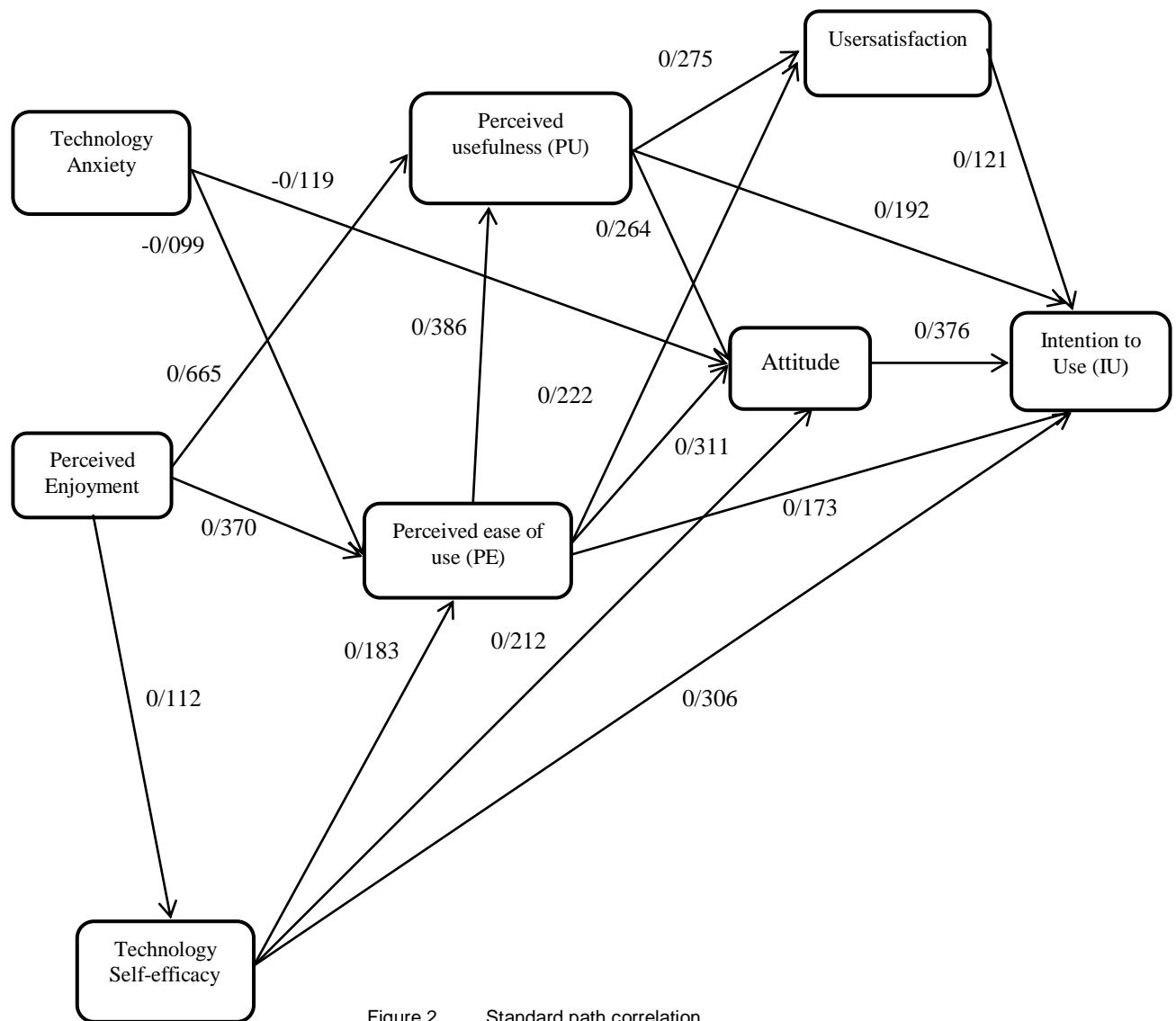


Figure 2. Standard path correlation

TABLE IV. INDICATORS OF THE MODEL FITNESS: IT SHOWS THE INDICATORS OF THE MODEL FITNESS. GFI AND AGFI ARE HIGHER THAN 0/9 AND $\chi^2/DF = 3.657$ WHICH INDICATE THAT THE MODEL HAS AN APPROPRIATE FITNESS.

χ^2	DF	χ^2/DF	GFI	AGFI	CFI	RMSEA	TLI
25.599	7	3.657	0.98	0.91	0.98	0.09	0.94

TABLE V. DIRECT, INDIRECT AND TOTAL EFFECTS OF MODEL 1 NONSTANDARDIZED

Path	Nonstandard		
	Indirect effects	Direct effects	Total effects
Technology anxietyPE →	0/000	-0/036 **	-0/036
Technology anxietyattitude →	-0/012	-0/036 **	-0/048
Technology self-efficacyPE →	0/000	0/197 **	0/197
Technology self-efficacy attitude →	0/066	0/189 **	0/255
Technology self-efficacyIU →	0/152	0/296 **	0/448
Perceived enjoyment technology self-efficacy →	0/000	0/551 **	0/551
Perceived enjoymentPE →	0/108	1/953 **	2/061
Perceived enjoymentPU →	0/818	3/614 **	4/432
PE → PU	0/000	0/397 **	0/397
PEattitude →	0/079	0/259 **	0/338
PEuser satisfaction →	0/109	0/228 **	0/337
PEIU →	0/236	0/155 **	0/391
PUattitude →	0/000	0/199 **	0/199
PUuser satisfaction →	0/000	0/274 **	0/274
PUIU →	0/108	0/168 **	0/276
AttitudeIU →	0/000	0/396 **	0/396
User satisfactionIU →	0/000	0/106 **	0/106

(Saadé & Kira, 2006), findings showed that there is a negative and meaningful relationship between computer anxiety and the ease. However, in (Ifinedo, 2006), and (Rezaei, et al., 2008), the impact of computer anxiety or the ease of use was not meaningful which is a same point with the present study. It seems that feeling threatened in using information technology causes having a negative attitude toward it and one may think s/he is not knowledgeable enough to use information technology and feel not interested in using it as the result. The more people feel anxious about using computer, the more difficult their perception, the less their belief in their abilities, and the less the intention to use technology will be, and vice versa.

The findings of the model indicated that user satisfaction has a great share in predicting and raising the intention to use information technology in a way that (Negash, et al., 2003), (Yoon, et al., 1995), (Park & Del Pobil, 2013), (Park, et al., 2014), (Hadjji & Degoulet, 2016), (Kang & Lee, 2010), (Mohammadi, 2015), (Ofori, Larbi-Siaw, Fianu, Gladjah, & Boateng), showed that user satisfaction has a meaningful impact on the behavioral intention to use communication services in the long term. Lee & Kim claimed that user satisfaction can be considered as the main factor in predicting the intention to use (H. Lee, Kim, & Kim, 2007). Battacherjee also, stated that the satisfaction which is initially formed about information technology has a positive effect on having a permanent intention to use the system (Bhattacharjee, 2001). The findings of Liaw, et al. showed that user satisfaction is to be noticed as a main factor in predicting the intention to use computer. Since the impact of attitude and self-efficacy on the intention to use information technology

is higher than user satisfaction, therefore, these findings need to be confirmed practically in the future studies (Liaw, et al., 2006).

The findings of the model showed attitude, self-efficacy, perceived usefulness, ease of use and user satisfaction have respectively a meaningful effect on the intention to use information technology. The highest effect was related to attitude and the lowest one to satisfaction. Theoretically speaking, attitude is a combination of beliefs and excitements which prepare the individual to observe different phenomena positively or negatively in advance. Attitude summarizes the evaluations of phenomena and therefore is responsible for the prediction and guidance of the future actions or behaviors. In the present study higher points in attitude represent a more positive attitude. Thus, it can be claimed that as far as people have a more positive attitude toward information technology, they will experience beliefs or excitements which make them prepared to perceive information technology positively and have the intention to use it (ahmadi dehghotbi, et al., 2010).

V. LIMITATIONS AND RECOMMENDATIONS

The present model is related to a complex behavioral phenomenon and definitely has shortcomings like any other models. Thus, it is worth it to investigate the extension of the other stimulating variables on the model for the future studies.

Users' reactions were not examined several times, since the study was conducted in a single step. To be more meticulous, more accurate experimental studies are needed in this domain.

The lack of homogenous results and background about the relationships between external variables, especially among technology self-efficacy, technology anxiety and perceived enjoyment with TAM structures and their inner relationships is the other point to be mentioned.

Recently attitude structure has been redefined. In Yang & Yoo study it is recommended to categorize attitude into two subcategories of cognitive and emotional attitudes. This point is better to be considered in the future studies. (H.-d. Yang & Yoo, 2004).

REFERENCES

- [1]. Abubakar, D., & Adetimirin, A. (2015). INFLUENCE OF COMPUTER LITERACY ON POSTGRADUATES' USE OF E-RESOURCES IN NIGERIAN UNIVERSITY LIBRARIES. *Library Philosophy and Practice*, 1 .Adetimirin, A. (2015). An Empirical Study of Online Discussion Forums by Library and Information Science Postgraduate Students using Technology Acceptance Model 3. *Journal of Information Technology Education: Research*, 14, 257-269 .
- [2]. Ahmadi deghotbi, m., moshkani, m., & mohammad khani, A. (2010). The Impact of Computer Self-efficacy and Anxiety on the Structures of Davis' TAM. *The New Prospects of Social Psychology*, 13(1), 51- 71 .
- [3]. Al-Debei, M. M. (2014). The quality and acceptance of websites: an empirical investigation in the context of higher education. *International Journal of Business Information Systems*, 15(2), 170-188 .
- [4]. Alenezi, A. R., Karim, A. M. A., & Veloo, A. (2010). An empirical investigation into the role of enjoyment, computer anxiety, computer self-efficacy and internet experience in influencing the students' intention to use e-learning: A case study from Saudi Arabian governmental universities. *TOJET: The Turkish Online Journal of Educational Technology*, 9(4) .
- [5]. Bagozzi, R. P. (2007). The legacy of the technology acceptance model and a proposal for a paradigm shift. *Journal of the association for information systems*, 8(4), 3 .
- [6]. Bandura, A. (1977). Self-efficacy: toward a unifying theory of behavioral change. *Psychological review*, 84(2), 191 .
- [7]. Bandura, A. (1982). Self-efficacy mechanism in human agency. *American psychologist*, 37(2), 122 .
- [8]. Bhattacharjee, A. (2001). An empirical analysis of the antecedents of electronic commerce service continuance. *Decision support systems*, 32(2), 201-214 .
- [9]. Cenfetelli, R., Benbasat, I., & Al-Natour, S. (2005). Information technology mediated customer service: A functional perspective. *ICIS 2005 Proceedings*, 58 .
- [10]. Chang, P. V.-C. (2004). The validity of an extended technology acceptance model (TAM) for predicting intranet/portal usage .
- [11]. Chang, S.-H., Chou, C.-H., & Yang, J.-M. (2010). The Literature Review of Technology Acceptance Model: A Study of the Bibliometric Distributions. Paper presented at the PACIS.
- [12]. Chen, L., Gillenson, L., & Sherrell, L. (2002). Enticing online consumers: an extended technology acceptance perspective, 39 (8 .719-709 ,(doi: 10.1016. S0378-7206 (01), 00127-00126 .
- [13]. Compeau, D., Higgins, C. A., & Huff, S. (1999). Social cognitive theory and individual reactions to computing technology: A longitudinal study. *MIS quarterly*, 145-158 .
- [14]. Davis, F. D. (1993). User acceptance of information technology: system characteristics, user perceptions and behavioral impacts. *International journal of man-machine studies*, 38(3), 475-487 .
- [15]. Davis, F. D., Bagozzi, R. P., & Warshaw, P. R. (1989). User acceptance of computer technology :a comparison of two theoretical models. *Management science*, 35(8), 982-1003 .
- [16]. Davis, F. D., Bagozzi, R. P., & Warshaw, P. R. (1992). Extrinsic and intrinsic motivation to use computers in the workplace1. *Journal of applied social psychology*, 22(14), 1111 .1132-
- [17]. DeLone, W. H., & McLean, E. R. (2003). The DeLone and McLean model of information systems success: a ten-year update. *Journal of management information systems*, 19(4), 9-30 .
- [18]. Doll, W. J., & Torkzadeh, G. (1988). The measurement of end-user computing satisfaction. *MIS quarterly*, 259-274 .
- [19]. Erasmus, E., Rothmann, S., & Van Eeden, C. (2015). A structural model of technology acceptance. *SA Journal of Industrial Psychology*, 41(1), 01-12 .
- [20]. Gefen, D., Karahanna, E., & Straub, D. W. (2003). Trust and TAM in online shopping: an integrated model. *MIS quarterly*, 27(1), 51-90 .
- [21]. Gumussoy, C., Calisir, F., & Bayram, A. (2007). Understanding the behavioral intention to use ERP systems: An extended technology acceptance model. Paper presented at the 2007 IEEE International Conference on Industrial Engineering and Engineering Management.
- [22]. Guritno, S., & Siringoringo, H. (2013). Perceived usefulness, ease of use, and attitude towards online shopping usefulness towards online airlines ticket purchase. *Procedia-Social and Behavioral Sciences*, 81, 212-216 .
- [23]. Hadji, B., & Degoulet, P. (2016). Information system end-user satisfaction and continuance intention: A unified modeling approach. *Journal of biomedical informatics*, 61, 185-193 .
- [24]. Holden, H., & Rada, R. (2011). Understanding the influence of perceived usability and technology self-efficacy on teachers' technology acceptance. *Journal of Research on Technology in Education*, 43(4), 343-367 .
- [25]. Hsiao, C.-H., & Tang, K.-Y. (2015). Investigating factors affecting the acceptance of self-service technology in libraries: The moderating effect of gender. *Library Hi Tech*, 33(1), 114-133 .
- [26]. Hsu, C.-L., & Lu, H.-P. (2004). Why do people play on-line games? An extended TAM with social influences and flow experience. *Information & Management*, 41(7), 853-868 .
- [27]. Hu, L. t., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural equation modeling: a multidisciplinary journal*, 6(1), 1-55 .
- [28]. Huijts, N. M., Molin, E., & Steg, L. (2012). Psychological factors influencing sustainable energy technology acceptance: A review-based comprehensive framework. *Renewable and Sustainable Energy Reviews*, 16(1), 525-531 .
- [29]. Ifinedo, P. (2006). Acceptance and continuance intention of web-based learning technologies (WLT) use among university students in a Baltic country. *The Electronic Journal of Information Systems in Developing Countries*, 23 .
- [30]. Jeong, H. I., & Kim, Y. (2016). The acceptance of computer technology by teachers in early childhood education. *Interactive Learning Environments*, 1-17 .
- [31]. Kang, Y. S., & Lee, H. (2010). Understanding the role of an IT artifact in online service continuance: An extended perspective of user satisfaction. *Computers in Human Behavior*, 26(3), 353-364 .

- [32]. Kim, Y., & Lee, H. S. (2014). Quality, perceived usefulness, user satisfaction, and intention to use: An empirical study of ubiquitous personal robot service. *Asian Social Science*, 10(11), 1 .
- [33]. Kline, R. B. (2015). *Principles and practice of structural equation modeling*: Guilford publications.
- [34]. Konradt, U., Christophersen, T., & Schaeffer-Kuelz, U. (2006). Predicting user satisfaction, strain and system usage of employee self-services. *International Journal of Human-Computer Studies*, 64 .1153-1141 ,(11)
- [35]. Koufaris, M. (2002). Applying the technology acceptance model and flow theory to online consumer behavior. *Information systems research*, 13(2), 205-223 .
- [36]. Kripanont, N. (2006). Using a technology acceptance model to investigate academic acceptance of the internet. *Journal of Business Systems, Governance, and Ethics*, 1(2), 13-28 .
- [37]. Lee, H., Kim, J., & Kim, J. (2007). Determinants of success for application service provider: An empirical test in small businesses. *International Journal of Human-Computer Studies*, 65(9), 796-815 .
- [38]. Lee, K. C., & Chung, N. (2009). Understanding factors affecting trust in and satisfaction with mobile banking in Korea: A modified DeLone and McLean's model perspective. *Interacting with computers*, 21(5-6), 385-392 .
- [39]. Lee, W., Xiong, L., & Hu, C. (2012). The effect of Facebook users' arousal and valence on intention to go to the festival: Applying an extension of the technology acceptance model. *International Journal of Hospitality Management*, 31(3), 819-827 .
- [40]. Lee, Y.-C. (2006). An empirical investigation into factors influencing the adoption of an e-learning system. *Online Information Review*, 30(5), 517-541 .
- [41]. Leonard, L. N., Cronan, T. P., & Kreie, J. (2004). What influences IT ethical behavior intentions—planned behavior, reasoned action, perceived importance, or individual characteristics? *Information & Management*, 42(1), 143-158 .
- [42]. Liaw, S.-S., Chang, W.-C., Hung, W.-H., & Huang, H.-M. (2006). Attitudes toward search engines as a learning assisted tool: approach of Liaw and Huang's research model. *Computers in Human Behavior*, 22(2), 177-190 .
- [43]. Lopez, D. A., & Manson, D. P. (1997). A study of individual computer self-efficacy and perceived usefulness of the empowered desktop information system .
- [44]. Lu, Y., Zhou, T., & Wang, B. (2009). Exploring Chinese users' acceptance of instant messaging using the theory of planned behavior, the technology acceptance model, and the flow theory. *Computers in Human Behavior*, 25(1), 29-39 .
- [45]. Malhotra, Y., & Galletta, D. F. (1999). Extending the technology acceptance model to account for social influence: Theoretical bases and empirical validation. Paper presented at the Systems sciences, 1999. HICS Proceedings of the 32nd annual Hawaii international conference on.
- [46]. Mathieson, K. (1991). (Predicting user intentions: comparing the technology acceptance model with the theory of planned behavior. *Information systems research*, 2(3), 173-191 .
- [47]. McFarland, D. J. (2001). The Role of Age and Efficacy on Technology Acceptance: Implications for E-Learning .
- [48]. Mohammadi, H. (2015). Investigating users' perspectives on e-learning: an integration of TAM and IS success model. *Computers in Human Behavior*, 45, 359-374 .
- [49]. Mun, Y. Y., & Hwang, Y. (2003). Predicting the use of web-based information systems: self-efficacy, enjoyment, learning goal orientation, and the technology acceptance model. *International Journal of Human-Computer Studies*, 59(4), 431-449 .
- [50]. Nah, F. F.-H., Zhao, F., & Zhu, W. (2003). Factors influencing users' adoption of mobile computing .*Managing E-Commerce and Mobile Computing Technologies Book*, 260-271 .
- [51]. Negash, S., Ryan, T., & Igbaria, M. (2003). Quality and effectiveness in web-based customer support systems. *Information & Management*, 40(8), 757-768 .
- [52]. Ofori, K. S., Larbi-Siaw, O., Fianu, E., Gladjah, R. E., & Boateng, E. O. Y. Factors Influencing the Continuance Use of Mobile Social Media: The Effect of Privacy Concerns. *Journal of Cyber Security*, 4, 105-124 .
- [53]. Olmos Migueláñez, S., García-Peñalvo, F. J., & Sánchez Prieto, J. C. (2016). (Informal Tools in Formal Contexts: Development of a Model to Assess the Acceptance of Mobile Technologies among Teachers .
- [54]. Park, E., Baek, S., Ohm, J., & Chang, H. J. (2014). Determinants of player acceptance of mobile social network games: An application of extended technology acceptance model. *Telematics and Informatics*, 31(1), 3-15 .
- [55]. Park, E., & Del Pobil, A. P. (2013). Modeling the user acceptance of long-term evolution (LTE) services. *annals of telecommunications-Annales des télécommunications*, 68 ,(6-5) .315-307
- [56]. Pauli, K. P., Gilson, R. L., & May, D. R. (2011). Anxiety and avoidance: The mediating effects of computer self-efficacy on computer anxiety and intention to use computers. *Review of Business Information Systems (RBIS)*, 11(1), 57-64 .
- [57]. Persico, D., Manca, S., & Pozzi, F. (2014). Adapting the Technology Acceptance Model to evaluate the innovative potential of e-learning systems. *Computers in Human Behavior*, 30, 614-622 .
- [58]. Ramayah, T., Aafaqi, B., & Ignatius, J. (2004). Role of self-efficacy in e-library usage among students of a public university in Malaysia. *Malaysian Journal of Library and Information Science*, 9, 39-58 .
- [59]. Ratten, V. (2015). A cross-cultural comparison of online behavioural advertising knowledge, online privacy concerns and social networking using the technology acceptance model and social cognitive theory. *Journal of Science & Technology Policy Management*, 6(1), 25-36 .
- [60]. Rezaei, M., Mohammadi, H. M., Asadi, A., & Kalantary, K. (2008). Predicting e-learning application in agricultural higher education using technology acceptance model. *Turkish Online Journal of Distance Education*, 9(1) .(
- [61]. Saadé, R. G., & Kira, D. (2006). The emotional state of technology acceptance. *Issues in informing science and information technology*, 3, 529 .539-
- [62]. Saadé, R. G., & Kira, D. (2009). Computer anxiety in e-learning: The effect of computer self-efficacy. *Journal of Information Technology Education*, 8(1), 177-191 .
- [63]. Sánchez-Prieto, J. C., Olmos-Migueláñez, S., & García-Peñalvo, F. J. (2016). Informal tools in formal contexts: Development of a model to assess the acceptance of mobile technologies among teachers. *Computers in Human Behavior*, 55, 519-528 .
- [64]. Sánchez, R. A., & Hueros, A. D. (2010). Motivational factors that influence the acceptance of Moodle using TAM. *Computers in Human Behavior*, 26(6), 1632-1640 .
- [65]. Seddon, P., & Kiew, M.-Y. (1996). A partial test and development of DeLone and McLean's model of IS success. *Australasian Journal of Information Systems*, 4(1) .(
- [66]. Stantchev, V., Colomo-Palacios ,R., Soto-Acosta, P., & Misra, S. (2014). Learning management systems and cloud file

- hosting services: A study on students' acceptance. *Computers in Human Behavior*, 31, 612-619 .
- [67]. Sun, H., & Zhang, P. (2006). Applying markus and Robey's causal structure to examine user technology acceptance research: a new approach. *JITTA: Journal of Information Technology Theory and Application*, 8(2), 21 .
- [68]. Surendran, P. (2012). Technology acceptance model: A survey of literature. *International Journal of Business and Social Research*, 2(4), 175-178 .
- [69]. Tang, K.-Y. (2015). Investigating factors affecting the acceptance of self-service technology in libraries. *Library Hi Tech*, 33(1), 114-133 .
- [70]. Taylor, S., & Todd, P. A. (1995). Understanding information technology usage: A test of competing models. *Information systems research*, 6(2), 144-176 .
- [71]. Teo, T. (2009). Modelling technology acceptance in education: A study of pre-service teachers. *Computers & Education*, 52(2), 302-312 .
- [72]. Teo, T., & Noyes, J. (2011). An assessment of the influence of perceived enjoyment and attitude on the intention to use technology among pre-service teachers: A structural equation modeling approach. *Computers & Education*, 57(2), 1645-1653 .
- [73]. Venkatesh, V., & Davis, F. D. (2000). A theoretical extension of the technology acceptance model: Four longitudinal field studies. *Management science*, 46(2), 186-204 .
- [74]. Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User acceptance of information technology: Toward a unified view. *MIS quarterly*, 425 .478-
- [75]. Venkatesh, V., Speier, C., & Morris, M. G. (2002). User acceptance enablers in individual decision making about technology: Toward an integrated model. *Decision Sciences*, 33(2), 297-316 .
- [76]. Wallace, L. G., & Sheetz, S. D. (2014). The adoption of software measures: A technology acceptance model (TAM) perspective. *Information & Management*, 51(2), 249-259 .
- [77]. Wu, J.-H., & Wang, S.-C. (2005). What drives mobile commerce?: An empirical evaluation of the revised technology acceptance model. *Information & Management*, 42(5), 719-729 .
- [78]. Yang, H.-d., & Yoo, Y. (2004). It's all about attitude: revisiting the technology acceptance model. *Decision support systems*, 38(1), 19-31 .
- [79]. Yang, Z., Cai, S., Zhou, Z., & Zhou, N. (2005). Development and validation of an instrument to measure user perceived service quality of information presenting web portals. *Information & Management*, 42(4), 575-589 .
- [80]. Yi-Cheng, C., Yi-Chien, L. V., & Ron-Chuen, Y. (2006). Examining factors influencing behavioral intentions to use asynchronous web-based language learning. *PACIS 2006 Proceedings*, 65 .
- [81]. Yoon, Y., Guimaraes, T., & O'Neal, Q. (1995). Exploring the factors associated with expert systems success. *MIS quarterly*, 83-106 .

The Application of some Modern Teaching Strategies as a Guide for the Detection of Excellent 9-10 Years Old Students in the Psychomotor Domain

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Abstract- This research aims to apply some modern teaching strategies as a guide for the detection of 9-10 years old students excellent in the domain of the psychomotor; thus, we assumed that employing competitive and cooperative learning strategy contributes to the detection of excellent students (9-10 years old). As a result, we reached that diversity in the activation of competitive and cooperative teaching strategy does not only contribute to the development of some physical abilities, but also to improve sports achievements. In addition, the use of cooperative teaching strategy helps as a guide for the detection of excellent students (9-10 years old). For this; we recommend the necessity to develop appropriate teaching strategies for the development of talent that enriches the excellent learners. We also suggest the need to apply the competitive and cooperative teaching strategy to increase the awareness of students excelling among themselves and self-learning skills to develop their talents in various sports activities as well as giving training programs for teachers in terms of how to detect excellent learners in physical education

Keywords- Teaching strategy, Excellent Students, Domain of Psychomotor

I. INTRODUCTION

The physical education and sports are regarded as, with all its activities and required needs of the child and its desires, a key factor irreplaceable in all educational aspects of the child; as, cognitive, physical, psychological and social as well as it helps him to integrate into society for the development of psychomotor abilities of the child properly requires the exploitation phase from early childhood through to direct these movements and development and develop sound image to have an important role to play in developing the capacities of the child and the discovery itself and the development of his abilities and his information since it is possible that these movements are growing in the wrong directions improperly and then affect the child and his life and on the strength of many of the defects and deviations of skeleton as well as a weak capacity and motor impairments that may infect children caused by the neglect of this age period of a child's life which makes physical education and sports programs in school and beyond just pick up the pieces and what the most

important treatment for (al-Kholi,1998). In addition, the failure or lack of educational experiences in psychomotor necessary to fine tune, modify and develop the basic motor skills and concepts may lead to random movement and their non-compliance, which could lead to a lack of desire for adventure among children and low self-esteem, which often result in psychological frustrations of adolescence and young adulthood and make it difficult for the individual to succeed and enjoy recreational activities in old age(Rasmus, & Fowler, 19).

In this context mentioned both (Scheffer & Melman,1989), that there is a close relationship between self-esteem and motivation for school achievement since children are often eager to learn and achievement and this desire for good performance called achievement motivation resulted in high achievement motivation and desire to succeed to more perseverance than lead to a desire to avoid failure, but a decrease of motivation for school achievement leads to underachievement. And reasons for the low achievement motivation is low self-

esteem where schoolchildren are believed to be unable to learn and tend to underestimate their abilities and sense of incompetence in assessing academic achievement (Scheffer & Melman, 1989). Thus, the employment of modern teaching strategies is able to achieve the desired goals by the Ministry of Education as it is designed in the educational curriculum and accompanied documents, especially those linked to the development of student capabilities for psychomotor in this important age group (9-10 years), since the next stage is the first adolescence. Since the latter is a body of experience and skills planned and taught to help students achieve goals. This is considered as the attitude which is characterized by the interaction and cooperation between the two parties-student/teachers-exercised their respective roles in order to achieve the desired goals. If this type of teaching has to be achieved, the effective interaction between the teacher and his students should be featured with appropriate performance of pupils in response to it in light of the standards of commitment. On this basis, the teacher should seek to help his students to upgrade them from negativity to positivity and from passiveness to activeness through various teaching processes to the optimal use of appropriate means of teaching. As a result, the role of the teacher is not limited to evaluate that this student is excellent and other is weak, but to work with different students attributed with different knowledge background that lead to the foundation of modern and the better of what they have to prepare for outcome, interaction (Mosston & Ashworth, 2002).

The most important principles in the use of teaching strategies is to exploit the self-activity of the students, so the teacher must engage his students in the lesson using the most appropriate teaching methods as well as providing them with the opportunity to think, create and work with self-reliance. In addition, the teacher should motivate his students in order to create a spirit of mutual cooperation among them. In this case, the will find a way to promote and achieve the desired goals (Willis, 2007). This is shown by many of the previous studies (Goudas & Magotsiou, 2009) ; (Prater & all, 1998); (Hannon & Ratliff, 2004); (Riewald, 2003); (Brady & Tsay, 2010); (rasmus & Fowler, 1998); (Willis, 2007) ; (Mosston & Ashworth, 2002) ; (Cohen, 1994) ; (Allen, 1991) ; (Slavin, 1993) ; (Webb, 1992), The boy Recruitment strategy Padres physical education helps to achieve the desired goals, and especially with regard to the early detection of pupils in this important age group (9-10 years), and in this area is noteworthy (V.jokadif) "that any boy currently has natural growth with regard to elements of physical fitness has a right to get a chance to become a hero, Hence, the importance of this study lies here since it seeks to consolidate the concept of new teaching strategies as an initiative in the development of the lesson plan of physical education in terms of

identifying methods and standards that it depends on. After that, it seeks to identify the role that can be played in teaching strategies in the development of educational practice generally during lessons.

II. METHODOLOGY

Experimental method has been used since it is the most suitable approaches to address the problem of search, The research sample consisted of primary schoolchildren in males (9-10 years old) in size was 30 students divided into two groups, experimental group and control group in which the sample was selected randomly, The human sphere: the research sample included 30 students (9-10 years old) from primary school, Spatial sphere: Physical Education terrain of Mouloud Pharaoh Primary School (province of Saida-Algeria), The time domain: the experiment was conducted in the time period from 26-10- 2014 to 18- 03- 2015.

The field study requires a set of variables to be controlled on the one hand and the isolation of the rest of the other variables, from the other hand., and without that, the results reached by the researcher intractable analysis, classification and interpretation is difficult for a researcher to be exposed to the real causes of the results, Without exercise researcher correct procedures for the setting (Allawi, ratib, 1987). And since the variables that affect the dependent variable which is to be tuned external influences, and influences that due to the experimental procedures as well as effects which relate back to the sample (Taobdi, 1985). In this matter, it has been trying to adjust all associated with a sample search of where sex worker variables, Where we chose only males to females few sample, It has also been adjusting for age (9-10 years) with isolated repeat offenders and pupils involved in sports clubs.

III. RESEARCH INSTRUMENTS

According to Tools and equipment used in the search: stopwatch, a tape measure, signs, measure length bar. Medical weighing scales, sources and references, test and measurement Statistical equipments: in order to make objective evaluation on the subject of research we used the following statistical methods: the arithmetic mean, standard deviation, Pearson simple correlation, coefficient of validity, consistency, test "t" Student. It has also been addressing the results based on SPSS. v .20 Tests of physical and psychomotor abilities, and sport achievement tests that represent the 50 m run from sitting, 1 kg shot put, long jump, it was in 1000 F.A.A (2008).

TABLE I. SHOWS THE RESULTS OF THE POST-TESTS OF THE TWO SAMPLES

Tests	Control sample				T test	Experimental sample				T test
	Pretest		Post test			Pretest		Post test		
	X1	Y1	X2	Y2		X1	Y1	X2	Y2	
25 m Run from the start	5.4	0.52	5.26	0.92	1.78	4.61	0.46	4.19	0.26	*2.87
Bend the trunk from sitting position	14.69	1.03	15.66	0.98	1.03	14.48	0.99	16.33	1.06	*8.85
Long standing jump	1.32	0.56	1.88	0.32	6.64*	1.36	0.22	1.95	0.68	*5.77
Multi jump of 10 steps	3	2.04	3.17	2.06	0.88	3.13	1.85	7	3.78	*7.49
Running winding	8.45	0.35	8.02	0.36	*2.62	8.46	0.57	7.93	0.61	*6.35
Run between cones	18.74	1.06	17.01	1.027	*2.62	18.87	1.15	16.71	0.83	9.5*
Test of 50 m run from sitting position	9,5	2,13	9,73	1,63	0,51	9,05	0,89	8,33	0,41	*2,19
1 kg shot putting	3	0,85	2,69	0,85	0,79	9,25	1,75	11,02	0,68	*6,48
Long jump from running	249	46	246	28	1,11	3,15	1,05	3,55	1,05	*2,19
Test of 1000 m run	9,5	2,13	9,73	1,63	1,43	251	39	226	18	*5.42

T . tabular by 2.045 and this degree of freedom at 29 and the significance level of 0.05
 * Indicates significant differences occurring at the level of 0.05

Through results in the above table shows that the difference within control sample are statistically significant to see the coincidence factor, except for the tests of 25 m run, Multi jumping 10 steps, bend the trunk at sitting, however, at the level of the experimental sample it has been shown that taking place all the difference statistically significant. This emphasizes the importance of follow-up and continuity in the work of cooperative learning strategy and competitive position in the development of some of the capabilities of psychomotor among students (9-10 years old). These results agreed with what Krantz said: "The need to monitor progress on a regular basis and a regular position in any education or training was using appropriate means, because whenever more trained individual to a particular task the greater the mastery of it and thus follow up this development under appropriate amendments" (Miller & Power, 1981)

Through the tables below we note that all the values of 't' calculated in the skills of some of the largest values of 't' which tabular. It shows that there are statistically significant differences, except in the test of winding run, whereas running between the cones are not statistically significant differences because the value of 't' is smaller than the calculated value of the 't' between the posttests of the control group as well as the experimental group. "The play is considered one of the most important means leading to the capacity of building the psychomotor of individuals, especially children and juveniles, also noted that the sports activities of school to help the individual in the overall development of the psychomotor skills and growth of physical and natural strengthening public health and keep it (Rissan, 2000). Asides, illustrate that

School sports activities that aim to give the psychomotor skills, General improve growth and growth of private physical fitness and its various elements Development, and to embody the sense of continuity in the exercise to improve the social qualities and the development of relations through collective games as well as to strengthen the system and cooperation, leadership, self-confidence and take responsibility (Nahed & fahim, 1998). Comparison of the pretests and the posttests Results of the samples for the outcome of digital achievement performance of Athletics for students.

This requires a conversion of raw scores obtained to standard scales so as to get rid of the units, as well as to facilitate the collection process. Thus, the researchers used within the framework of the interpretation of the results on the reference standard which was reflected in the comparison of the experimental sample results of the standard table, which combines a number of events.

Athletics children a generalized tool and nationally accredited by the Algerian federation of school sport and elite sport is designed for the purpose to arrange the junior students and discover the excellent students earlier. Since this standard refers to an acceptable level of performance in the Athletics games for Children which make it easier to arrange and discover the excellent students just as it is seen by Mohammed Nasreddin: "It is an important means for the selection of rookies on the basis of the selection of tuning to achieve a specific level of the degree of difficulty or in accordance with the criteria set" (Radwan, 2006). In addition, It is worth by both "Gauze and Artini" that it should be used when a standard test of the new test

TABLE II. SHOWS THE COMPARISON OF RESULTS OF THE TWO SAMPLES USING TEST SAMPLES SIGNIFICANT DIFFERENCES

Tests	Table shows the results of samples tribal Search				T test Calculated
	Control sample		Experimental sample		
	X2	Y2	X2	Y2	
25 m Run from the start	5.26	0.92	4.19	0.26	*2.10
Bend the trunk from sitting position	15.66	0.98	16.33	1.06	*2.57
Long standing jump	1.88	0.32	1.95	0.68	*4
Multi jump of 10 steps	3.17	2.06	7	3.78	*4.88
Running winding	8.02	0.36	7.93	0.61	0.69
Run between cones	17.01	1.027	16.71	0.83	0.33
Test of 50 m run from sitting position	8,92	0,95	8,33	0,41	*2,06
1 kg shot putting	9,73	1,63	11,02	0,68	*2,63
Long jump from running	2,69	0,85	3,55	1,05	*2,3
Test of 1000 m run	246	28	226	18	*2.17

T . tabular 2 at 58 degrees of freedom and the significance level of 0.05
 * Indicates significant differences occurring at the level of 0.05

TABLE III. SHOWS THE COMPARISON OF THE PRETESTS AND POSTTESTS RESULTS OF THE SAMPLES

Kids athletics									
Test	Test of 50 m run		1 kg shot putting		Long jump from running		Test of 1000 m run		Overall achievement
Statistical measures	Time	Achievement	Time	Achievement	Time	Achievement	Time	Achievement	
Means	8,33	25	11,02	32	3,55	21	226	21	99
Ecart-type	0,41		0,68		1,05		18		
Best result	7,98	28	11,2	33	4,45	32	212	27	120
Maximum achievement	6,4	40	2,56	40	4,85	40	13,2	40	160

depending on specific steps, through the development of forms of identification with the required performance Criteria for acceptance in advance (Farhat,2003), Therefore, these results may have agreed with a number of recent studies as well as they have confirmed in terms of content "on the need for the student excelling discover more neater and predict their findings are used Criteria and levels of specific and easy for everyone and is based on suitable test for their abilities and age ((Ziad,1985) ; (Hassanin,1987) ; (El-Dib, 2007).Also, this result may have agreed with the opinion (Matviv,1976) That "This is subject to future success are many and varied factors, where preliminary tests to discover the excellents is not the boundary of the success of the selection process.The fact that it takes a period of time necessary follow-up care, according to a variety of

strategies designed in advance "(Ali,1999), And therefore we conclude that the diversity in the use of cooperative teaching strategy and competition contributed as a guide to detect the excellent students obtained the standard table for the sample of the talent and excellence of the makings to be a big affair whether benediction due diligence.

IV. CONCLUSION

- 1) The presence of statistically significant differences in the results of the post tests differences for the experimental sample in some capacity psychomotor.
- 2) The diversity in the activation of cooperative teaching strategy and competition contribute to

the development of some of the physical

- 3) The diversity in the activation of cooperative teaching strategy and competition Padres physical education contributes to the development of the sports achievements of students (9-10 years).
- 4) The diversity in the use of cooperative teaching strategy shares as evidence for the detection of talented students (9-10 years old).

It is recognized that superior to the type of physical activity that is appropriate preparations and potential orientation is the basis of his arrival to the high levels of sports in competitive sport, Therefore, the success of any outstanding teaching strategies program depends heavily on the accuracy of their identification, diversity in the use of a number of active strategies of cooperative learning strategy and competition is not playing is prompt and a waste of time at leisure it is advance planning and organization by the teacher prompt for different students developing the capacity of this was confirmed by specialists when they knew playing on it activity prompt or activity free exercised the aim of entertaining children and adults invested in the development of children's personalities and behavior, Through clarity of roles, rules and laws, And goals and Mahkat from behind the various duties kinetic and programmed by the combination with the use of diversity in all of cooperative learning strategy and competition Padres physical education contributed to the development of some capacity kinetics of self among students, Also contributed as a guide for the detection of students excelling, Capacity psychomotor development properly requires the exploitation of childhood through early in directing these movements and development and develop sound image to have an important role to play in developing the capacities of the child and the discovery itself and the development of his abilities and his information.

V. THE EXTENT OF THE CONTRIBUTION OF THIS SUBJECT

It is recognized that superior to the type of physical activity that is appropriate preparations and potential orientation is the basis of his arrival to the high levels of sports in competitive sport, Therefore, the success of any outstanding teaching strategies program depends heavily on the accuracy of their identification, diversity in the use of a number of active strategies of cooperative learning strategy and competition is not playing is prompt and a waste of time at leisure it is advance planning and organization by the teacher prompt for different students developing the capacity of this was confirmed by specialists when they knew playing on it activity prompt or activity free exercised the aim of entertaining children and adults invested in the development of children's personalities and behavior, through clarity of roles, rules and laws and goals and the criteria from behind the various duties kinetic and programmed by the

capabilities of students (9-10 years old).

combination with the use of diversity in all of cooperative learning strategy and competition Padres physical education contributed to the development of some capacity kinetics of self among students, Also contributed as a guide for the detection of students excelling, Capacity psychomotor development properly requires the exploitation of childhood through early in directing these movements and development and develop sound image to have an important role to play in developing the capacities of the child and the discovery itself and the development of his abilities and his information.

REFERENCES

- [1]. Boufaldja Ghiath (1993): Education and requirements. The Office of university publications. Algeria
- [2]. Johnson David, et al (1995), "Cooperative Education", National Schools translation Dhahran, Saudi Arabia.
- [3]. James Russell (1997), new methods in education and Altalm-design and selection and evaluation of small modules. Ahmed Kadhim translation charity. Dar Al Arab renaissance. Cairo.
- [4]. Hassan Hussein Olive (1997): Teaching see in the nature of the concept, a series of pedagogy, i 1 the world of books Cairo.
- [5]. Hassan Shehata (1998): the curriculum between theory and practice, Arab House Book. I 1. Cairo
- [6]. Hanifi Aouad (1999.): Education and community building. Faculty of Arts, Zagazig University, Cairo.
- [7]. Rissan Majid (2000): Action Games, 1st Floor, Sunrise House, Amman.
- [8]. Zaki Darweesh et al. (1984): Athletics. Barriers. Knowledge House. Alexandria.
- [9]. Zaki Darweesh and Adel Abdul Hafiz (1994): Encyclopedia of athletics, shooting and vehicle competitions, Cairo Knowledge House.
- [10]. Afaf Abdul Karim (1994): Teaching to learn in physical education and sports. Knowledge in Alexandria facility.
- [11]. laila Farhat. (2003). Measurement and testing in physical education, (I-2). Cairo: book publishing center.
- [12]. Mohammed Ziad Hamdan (1985): the rationalization of teaching and the principles of modern psychological strategies, Dar Modern Education, Amman.
- [13]. Mohammed Hassan Allawi (1990): knowledge of sports training, Eleventh Edition, Knowledge House, Cairo.
- [14]. Mohammed Sobhi Hassanein (1987): Calendar and Measurement in Physical Education, Dar Arab Thought.
- [15]. Mohammed Mustafa Deeb (2007): Contemporary strategies in cooperative learning, the world of books, Cairo.
- [16]. Musukamostun, Sarah Ashort (1991): Teaching Physical Education. Jamal Saleh Hassan and others translation. Baghdad University.
- [17]. Nahd Mahmoud Saad, Nelly Ramzi Fahim (1998): Teaching Methods in Physical Education. I 1. Book publishing center. Cairo.
- [18]. Herbert. T. Kuehl (1984): the art of teaching. Translation Suad Jadallah. Dar Al Arab Thought. Cairo.
- [19]. Mohammed Saiid Azmi (2004), the development of methods and implementation of the physical education lesson in basic education between theory and application, fulfillment house to a minimum printing and publishing, Alexandria,
- [20]. Mamed Nasreddin Radwan (2006), the entrance to the measurement in physical education and sports (i 1) book publishing center. Cairo

- [21]. Iaila Al-sayiid. Farhat (2003), measurement and testing in Riadih.tabah Education Althanih.mrkz book Nscher.alqahrh.
- [22]. Mohammed Ziad Hamdan (1985), and the rationalization of teaching the principles of modern psychological strategies, Dar Modern Education, Amman.
- [23]. Mohammed Sobhi Hassanein (1987), Calendar and Measurement in Physical Education, Dar Arab Thought.
- [24]. Mohammed Mustafa Deeb (2007), a contemporary strategies in cooperative learning, the world of books, Cairo.
- [25]. Brady, M., & Tsay, M. (2010). A case study of cooperative learning and communication pedagogy: Does working in teams make a difference? *Journal of the Scholarship of Teaching and Learning*, 10(2), 78–89. -Buschner, C. (1994). Teaching children movement concepts and skills: Becoming a master teacher. Champaign, IL: Human Kinetics.
- [26]. CAJA. J, MOURARET.M BENETA(1997): Guide de préparation au brevet d'état d'éducateur sportif. 1er degré. Tronc. Commun. 5ème ed. Ed. Vigot. Paris.
- [27]. Federation algerienne d'athlétisme(2001).direction de la jeunesse,des sports et des loisirs-wilaya d'alger-.ligue algeroise d'athletisme : athletiqua alger,guide technique
- [28]. Frédéric (a.) ,thierry (b.), levicq (s.) (2004): athlétisme.2. les sauts. « de l'école...aux association ».éd.revue.eps.
- [29]. Gallahue, D. (1989). Understanding motor development: Infants, children, adolescents (2nd ed.). Dubuque, IA: Brown.
- [30]. Gérard Goriot (1984): les fondamentaux de l'athlétisme, Editions vigot, paris
- [31]. Goudas M, Magotsiou E (2009). The Effects of a Cooperative Physical Education Program on Students' Social Skills. *J. Appl., Sport Psychol*, 21, 356–364.
- [32]. Hannon, J., Ratliffe, T., (2004). Cooperative learning in physical education. *Strategies*, 17(5), 29–32.
- [33]. Johnson, D. W. & Johnson R. T. (1999). Learning Together and Alone: Cooperative, Competitive, and Individualistic Learning (5th Ed.). Boston: Allyn and Bacon.
- [34]. Miller , B and Power , S.D (1981) : Developing in Athletics Through the process of depth jumping , track and field Quarterly Review , 81,4.
- [35]. Mosston, M., & Ashworth, S. (2002). Teaching physical education (5th Ed.). San Francisco: Benjamin Cummings.
- [36]. Patrick. (1996). l'athlétisme en eps (didacthétisme 2). Paris: Vigot.1
- [37]. Prater, M.A, Bruhl, S., and Serna, L. A. 1998. Acquiring social skills through cooperative learning and teacher-directed instruction. *Remedial and Special Education*19, 160–172.
- [38]. Propy, J. (1986) : Comportement de l'enseignant et la réussite des élèves. Manuel de la recherche sur l'enseignement, . Champaign, NY, Macmillan.
- [39]. Riewald, S. T. (2003). Strategies to prevent dropout from youth athletics. *New Studies in Athletics*, 18(3), pp. 21-26
- [40]. Siedentop.(1986): Physical Education: Stratégies d'enseignement et le curriculum pour les élèves: 6 – 12, Ohio, Mayfield pub, Comp.
- [41]. Weineck (J.) (1986): Manuel d'entraînement, traduit de l'allemand par Michel portmann, édition vigot, paris
- [42]. Willis, J. (2007).Cooperative learning is a brain turn-on. *Middle School Journal*,38(4),4–13



An Analytical study of Spinal Column Injuries for Basketball Players in Jordon

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Abstract- This study aims to define the percentage of spinal column injuries for basketball players in the Jordan clubs and to determine the spinal column points (vertebrae) which are more vulnerable to injuries in addition to know reasons and sources of spinal column injuries for basketball players in Jordon and to explain the diagnosis of these injuries, type of used medical treatment, who burn costs and treatment costs.

The researcher used the descriptive method through using its survey manner. The study population formed of 160 male and female players of basketball players who are registered in the Jordan basketball federation and the Olympic committee. The study individuals were selected by using intentional sample manner. The study sample consisted of 126 male and female players for sportive season 2012-2013 where the study sample represented 80% of the study population. After data analysis it was found that spinal column injuries for females, in general, are more than it for males with little amount. The most pain sources for males were muscles pain where it was for females that bones pain. While the more vulnerable points for injuries for male were the lumbar vertebrae and the cervical vertebrae for females. The most common injuries were the needle prick pain and fatigue. The treatment costs for men were on the club cost while it was personal costs in the female cases. The dominant percentage of the players didn't have diagnosis of injuries while the most used treatment was drug treatment for Jordan basketball players.

In light of the results, the researcher recommends with the necessity to compel the basketball federation to provide health insurance for players in addition to provision of periodical medical inspection for players who are registered in the federation in addition to provide a physician and physiotherapist for Jordan clubs which didn't have professional stuff specialized in this field. The researcher recommends generalizing this study on both Jordan basketball federation and the Olympic committee.

Keywords- sports injuries, spinal column, basketball clubs, basketball players, treatment type, treatment costs.

I. INTRODUCTION

The spinal column is an artistic mechanical piece. It is the mainstay of the motor system where on it bases the weight of both head and body. It has two important and contradictory characteristics in the same time (as it is the wisdom of the creator) which are:

- Solidity: because the whole body weight bases on it,
- Flexibility: because it acts as the body axis.

It is a flexible movable column provides the body with a main axis located exactly in the middle of the

trunk. Its function includes keeping the body balance and connects the trunk with the lower part of the body. It is also connected with other important parts and any disorder in any vertebra, cartilage, ligament or muscle connected to the spinal column leads to negative impact on other parts of the body. (AlKharbotly& Awad, 1993).

AlBasry (1983) indicates that the spinal column is the axis and center of support to all parts of the body, it mostly used in all movements and protect and support the spinal cord which receives brain signals and sends it to all parts of the body.

There is no doubt that basketball is one of team sports which keeps high position and popularity comparing to other sports (either individual sports or

team sports) due to it has a high level in the skills and physical aspects in addition to high level of suspense attracts millions of players and audience to the extent it became the second popular sport worldwide and the first sport in some states.

The global basketball couldn't reach to this level but through the care of those who manage it with the scientific methodology in relation to physical and skill training in addition to other psychological and protective aspect to protect players from injury. All these efforts lead to make this sport in the highest sportive level.

The spinal column injuries represent about 11.5% of total motor system injuries. It is the strongest and most dangerous injuries either in the normal or sportive life because the hard injuries in this region may lead to either disability or death. (Shamus, 2001) (Moreira, 2003)

II. STUDY PROBLEM AND IMPORTANCE

Correlation of sportive injuries generally and spinal column specially with specific sport or a group of sports is one of the main reasons which determine the capability of the player to continue or make achievements in this sport either individually or collectively. It could be a reason for early retirement and give up sportive competitions. In some cases it may be the reason of sudden decrease in the physical, skill or psychological level of the player in comparing with other players who are free of any injuries.

Jordan kingdom is one of states who increasingly care a lot with basketball sport. We could not this through the achievements of Jordan in the field of basketball several times but these achievements followed with fluctuation in the level and the incapability to keep these achievements or part of it due to injuries occurred to the main prominent players. The injuries may due to the player, trainer or the surrounding environment.

In the Jordan kingdom, after classification of spinal column injuries into three main categories, the real status of spinal column injuries are vague and unknown especially for practitioner players (basketball players).

So, this study tries to make a simple calculation to spinal column injuries in general for male and female basketball players in Jordan.

AlSaleh (2005) quotes from Salem (1987) that although all currently used percussions in the sport field to prevent and decrease sportive injuries either during training or competitions, we note that there is a continuous increase in these injuries as a result of strong competitions and excessive enthusiasm to reach the best performance level to achieve the highest sportive champions. These matters make

players in continuous competition either with themselves or with others against time, space, weight or make goals inside limited spaces and different tools of stability and movement. This competition leads to crease a high exposure level to repeated injuries for players than other persons.

The previous points explain the importance of this study because it is the first study done, to my knowledge, in the Jordan kingdom as a way to explain and define spinal column injures in addition to the most exposure vertebrae to injury and its types for basketball players in Jordan.

III. STUDY PURPOSES

This study aims to define and explain the following:

1. Percentage of spinal column injuries for basketball players according to sex and injury region variables.
2. Statistically function differences in spinal column injuries for basketball players according to sex and injury region variables.
3. The most repeated pain sources and injury types for Jordan basketball players.
4. The injury percentage and type of used treatment (physiotherapy, drugs, surgery) to face spinal column injuries for Jordan basketball players.
5. Who bear costs related to treatment of spinal column injuries for Jordan basketball players.

IV. STUDY QUESTIONS

This study seeks to answer the following questions:

1. What is the percentage of spinal column injuries for basketball players according to sex and injury region variables?
2. Are the differences in spinal column injuries for basketball players according to sex and injury region variables statistically function?
3. What are the most repeated pain sources and injury types for Jordan basketball players?
4. What is the percentage of injury diagnosis and type of used treatment (physiotherapy, drugs, surgery) to face spinal column injuries for Jordan basketball players?

5. Who do bear costs related to treatment of spinal column injuries for Jordan basketball players?

V. STUDY POPULATION

The study population consists of all male and female Jordan basketball players (first class) for all clubs who are formally registered in the Jordan basketball federation and the Jordan Olympic committee for year (2012/2013). They totally reached 160 (one hundred and sixty) players (male and female) and they are distributed on twelve (12) clubs. The clubs are distributed as seven for men (the applicable sciences, Aramix sportive, AlWehdat, Orthodox, faculty, AlEthad schools, Hashim Gaza and Kaferyoba clubs) and four for women (sportive, Jordan Nashama, Orthodox and AlMqawelon clubs).

VI. STUDY SAMPLE

The study sample is selected by using the intentional manner. The sample consists of 128 players (male and female) from Jordan basketball players. The study sample represents 80% of the study population. Table No.(1) explains the detailed description of the study sample.

TABLE I. STUDY POPULATION:

No.	Sex	Original number	Sample individuals	Percentage
1	Male	96	84	87.5%
2	Female	64	44	68%
3	Total	160	128	80%

VII. DATA COLLECTION TOOL

The researcher designed a questionnaire prepared specifically for spinal column injuries and its reasons. We added some data related to vertebral column, to achieve study purposes, in appendix (1). This questionnaire was arbitrated by some specialized persons in this field. The researcher also used with the questionnaire the personal interview for all sample individuals.

VIII. METHODOLOGY

A. Validity of data and information collection

This study was designed after reviewing literatures, scientific studies, books and specialized works in this field. The researcher designed of the spinal column and its vertebrae where he thought that it could benefit in achieving study purposes and showed it to some of experts in these fields:

(Sportive injuries, sportive medicine, physiotherapy, functional qualification, sportive training, anatomy, physiology and rehabilitation fields).

The experts were eight persons to ensure its suitability and validity. They agreed that it is valid with percent (97.5%), appendix (2).

B. Test Stability

The researcher ensured form test stability by using test application and reapplication equation (test -retest) on some individuals of the original study population reached to ten male and female players which called (rationing sample) then they were excluded from the study sample after arbitration by some experts before distributing it formally on the study sample with period of 16 days (3-19/11/2013) between the first and second application of the test. The researcher used Pearson correlation factor between the two applications to find the stability factor of the questionnaire which reached (96.4%).

IX. RESULTS AND DISCUSSION

A. Results and discussion of first and second questions:

- What is the percentage of spinal column injuries for basketball players according to sex and injury region variables?
- Are the differences in spinal column injuries for basketball players according to sex and injury region variables statistically function?

TABLE II. PERCENTAGES, REPETITIONS, CHI2, FOR SPINAL COLUMN ACCORDING TO SEX AND INJURY REGION

No.	Content Percentage of spinal column injuring in	Male %	No.	Female %	No.	Total	Chi2	Significance level
1	Cervical vertebrae	23.7	14	42.6	26	40	3.60	0.058
2	Thoracic vertebrae	16.9	10	19.7	12	22	0.18	0.670
3	Lumbar vertebrae	59	35	37.7	23	58	2.48	0.115
4	The general percentage of spinal column injuries	49.2	59	50.8	61	120	0.03	0.855

Table chi2 at significance level $\alpha < 0.05 = 3.84$

Through this table we found that values of repetitions, percentages and chi2 that the general percentage of the spinal column injury for Jordan basketball players is statistically insignificant. The percentage of male was 49.2% and for females was

50.8% which means that the injury of females are higher than males. This could be attributed to the effort they bear is higher in addition to pressures of training intensifying, high doses, neglecting warm-up and decrease of discussions. This leads to make them unfamiliar to training and competitions pressures. There are other factors as long rest periods among competitions and their body unfamiliar to the efforts where they do high level of all efforts in one. Males show contraire manner where they continue in subsequent champions and have continuous training.

The table also explains values of repetitions, percentages, Chi2 and significance level through these values we could see that Chi2 value was statistically insignificant for injury region where the calculated Chi2 was (3.84) less than the table value. The highest injury value for males was in the lumbar vertebrae with (59%) due to the huge pressure on this region of the human body and it bears the body's weight in addition to several sudden movement of the trunk while the highest percent for female was that related to cervical vertebrae with (42.6%).

B. Results and discussions of the third question

What are the most repeated pain sources and injury types for Jordan basketball players?

TABLE III. PERCENTAGES, REPETITIONS, CHI2, FOR PAIN SOURCE AND REASON ACCORDING TO SEX AND INJURY REGION

No.	Content	Male %	No.	Female %	No.	Total	Chi2	Significance level
1	Pain reason and bone source	3.5	2	27.3	12	14	7.14	0.008
2	Nervous	7	4	18.2	8	12	1.33	0.248
3	Muscular	89.5	51	54.5	24	75	9.72	0.002
4	Percent of inflammation injuries	8.5	5	19.7	12	17	2.88	0.090
5	Rupture	10.2	6	19.7	12	18	2	0.157
6	Retraction	71.1	1	23	1	2	0	1.00
7	Breaks	0	0	6.5	4	4	4	0.046
8	Erosion of vertebrae	1.7	1	1.6	1	2	0	1.00
9	Disc injuries	1.7	1	0	0	1	1	0.317
10	Needle pick pain and fatigue	6.8	4	29.5	18	22	8.90	0.003

Table chi2 at significance level $\approx <0.05 = 3.84$

Through this table we found that values of repetitions, percentages and chi2 were statistically significant on reason and source of the muscular pain with percentage (9.72) and in favor of males with percentage (89.5%). The reason and source of bone pain are significant with percentage (7.14) and it was

in favor of females with (27.4%). This could be attributed to excessive roughness among males in different competitions in addition to use muscular force, rush, crash and fall due to high level of competition among this group of players. So, there are high pressure on muscular system and working muscles. For females injuries could be attributed due to fall and clash with tools in addition to the high effort they do as a result of training intensification, high doses of training and bad warmup. These results are compatible with that in both (AlSaleh, 2005) and (Mahmoud, 2005).

For types of injuries in the vertebral column, the type of injury was statistically function for needle pick pain and fatigue with percentage (8.90). The researcher attributes this to fact that most of spinal column injuries in various vertebrae lead to needle pick pain and fatigue in limbs and other region in the body. So, it is natural for this type of injuries to have the first degree then breaks with percent (4.00) due to fall and clash with solid ground of basketball playground in addition to clash with plate carrier or hard and strong clash with other players.

C. Results and discussion of the fourth question

What is the percentage of injury diagnosis and type of used treatment (physiotherapy, drugs, surgery) to face spinal column injuries for Jordan basketball players?

TABLE IV. PERCENTAGES, REPETITIONS, CHI2, FOR SPINAL COLUMN INJURIES' DIAGNOSIS AND TYPE OF USED TREATMENT ACCORDING TO SEX AND INJURY REGION

No.	Content	Male %	No.	Female %	No.	Total	Chi2	Significance level
1	Diagnosis percent with yes	83.6	46	8.69	30	76	3.36	0.066
2	Diagnosis percent with No	16.4	9	30.2	13	22	0.72	0.394
3	Physiotherapy percent	35.2	41	57.8	26	67	3.35	0.067
4	Drugs treatment percent	46.8	36	42.2	19	55	5.25	0.022
5	Surgical treatment percentage	0	0	0	0	0	0	0

Table chi2 at significance level $\approx <0.05 = 3.84$

Through this table we found that values of repetitions, percentages and chi2 that the general percentage of the spinal column injury diagnosis was statistically insignificant. Injury diagnosis for males was (83.6%). The researcher attributes this to care of players to know the extent of injury seeking to rapid recovery to contribute in the subsequent competitions and champions while absence of diagnosis for females was (30.2%).

Values of repetitions, percentages and chi2 of the spinal column injury were statistically significant for treatment type which is drug treatment with (5.25) and for males with (46.8%). The attributes this to the fact that players know about the rapid and efficient impact of drugs in rapid recovery from injuries for players and that physiotherapy takes more time for recovery. These results are compatible with both (Tawfiq, 2004) and (Roshdy, 2003).

D. Results and discussion of the fifth question

Who do bear costs related to treatment of spinal column injuries for Jordan basketball players?

TABLE V. PERCENTAGES, REPETITIONS, CHI2, FOR COSTS OF TREATMENT FROM SPINAL COLUMN INJURIES ACCORDING TO SEX AND INJURY REGION

No.	Content Percentage of treatment cost	Male %	No.	Female %	No.	Total	Chi2	Significance level
1	Personal	30.8	16	80	32	48	5.33	0.021
2	club	69.2	36	20	8	44	17.81	0.000
3	Federation	0	0	0	0	0	0	0

Table chi2 at significance level $\alpha < 0.05 = 3.84$

Through this table we could see that values of repetitions, percentages and chi2 that it was statistically function for club treatment costs with (17.81). It was for males (69.2%) while personal treatment costs were (5.33) and for females with (80%). The researcher attributes this to fact those male champions in the Jordan federation for basketball more than it for females. So, the club is committed to bear treatment costs to avoid retardation of male players on the coming champion while in the case of female there are only one or two champions. So, they have little care with female players who bear more treatment costs.

X. CONCLUSIONS

In light of the previous results we could explain the following conclusions:

- 1) In general spinal column percentage in Jordan for female basketball players are more than male players with a little amount.
- 2) The sources and reasons of pain in spinal column injuries for male basketball players is the muscular pain while for female was the bone pain.
- 3) The most exposure region of spinal column injuries for males Jordan basketball players were the lumbar vertebrae while it were the cervical vertebrae for females.

- 4) The most repeated spinal column injuries for Jordan basketball players were needle pick pain and fatigue.
- 5) Treatment cost for Jordan male basketball players borne by the club while it was personal costs in the case of female players.
- 6) The highest percentage of the players doesn't have diagnosis of the injuries while the most used treatment was drug treatment for Jordan basketball players.

XI. RECOMMENDATIONS

In light the previous conclusions researcher introduces the following recommendations:

- 1) It is necessary to compile the Jordan basketball federation to provide health insurance for male and female players.
- 2) It is necessary to make periodical medical inspection for players who are registered in the federation.
- 3) Provide a physician and physiotherapist for clubs which couldn't have qualified persons in this field.
- 4) It is necessary to coordinate cooperation between basketball federation and the national centre for sportive medicine to diagnose and treat injuries.
- 5) Generalize results of this study on both the Olympic committee and Jordan basketball federation.
- 6)

REFERENCES

- [1]. AlShatanawy, Mo'tasem. An analytical study for sportive injuries for team sports' players in Mo'ta University, Assiut University, part two, Egypt, (2003).
- [2]. El-Saleh, Majed Saleem, An analytical study for reasons of sportive injuries for sportive teams' players according to periods of the Jordan sportive season, Drasat magazine, education sciences magazine, No.43, (2007).
- [3]. Eric Shamus and Jennifar Shnus, Sports Injury, prevention & rehabilitation, medical publishing division, New York(2001).
- [4]. Hayat Awad & Safaa AlKharbotly. body fitness and sportive massage, faculty of physical education, Alexandria University(1993).
- [5]. Morerra , Paulo and Danical Gentil and Cesar Deolivera ,Prevalence of sport injuries of basketball national team during 2002 Season, rev bas med sport volume 5. (2003)
- [6]. Roshdy, Mohamed & Brika, Mohamed. Mechanics of spinal column injuries, AlMaarif publication institution, Alexandria, (1997),
- [7]. Rushdy, Mohamed Adel, The scientific research and athletics injuries, Alexandria, AlMaaref for publication and distribution (2003).
- [8]. Saleem, Mahmoud. An analytical study of sportive injuries for basketball players in Jordan (2005).

- [9]. Tawfiq, Farag Abd ElHameed, , chemistry of muscular injury and the athletes' physical effort, sportive biology encyclopedia, first part, first edition, Egypt, AlWafaa publication house (2004).
- [10]. <http://www.sehha.com/>
- [11]. <http://www.coolware.com/health/medical,reporter/scoliosis.com>
- [12]. <http://www.photovault.com/link/Health/Anatomy/Muscles/HAMVolume01.html>
- [13]. <http://search.yahoo.com/search?p=human+muscles&skeleton&nerves> .

Antinociceptive Activity of the Alcoholic Extract of *Trachyspermum Ammi* (L.) (Ajwain) in Rats

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Abstract- In Iraq traditional medicine ,the decoction of *Trachyspermum ammi* is claimed to possess antinociceptive activity.The aim of this study was to investigate the antinociceptive potential of alcoholic extract of *Trachyspermum ammi* in rats, using three algiesometric methods and different doses.The result showed that the extract possesses marked and significant ($p<0.05$) antinociceptive action.The antinociceptive action of the extract had a quick onset and a moderately long duration of action. The antinociceptive action of the extract was blocked by metoclopramide and atropine. Moreover, the extract has no sedative activity. The extract contained a wide range of chemical constituents of which alkaloids, flavonoids, steroids, and polyphenols which may have contributed to antinociceptive action. The antinociceptive action is likely to be mediated via dopaminergic and cholinergic muscarinic mechanisms. The results also showed that the extract is effective against neurogenic and inflammatory pains. In conclusion, this study show, for the first time, that *Trachyspermum ammi* possesses moderately strong antinociceptive activity, justifying its therapeutic claim in traditional medicine as a pain killer.

Keywords- *antinociceptive activity, alcoholic extract of Trachyspermum ammi (L.) (Ajwain) ,dopaminergic mechanisms, muscarinic mechanisms, pain impairment, , toxicology*

I. INTRODUCTION

Inflammation or phlogosis is a pathophysiological response of living tissue to injuries that leads to the local accumulation of plasmatic fluid and blood cells. Although it is a defense mechanism, the complex events and mediators involved in the inflammatory reaction can be induced, maintain or aggravate many diseases [1]. However, studies have been continuing on inflammatory diseases and the side effects of the currently available anti-inflammatory drugs pose a major problem during their clinical use [2]. Therefore, development of newer and more powerful anti-inflammatory drugs with lesser side effects is necessary .

Trachyspermum ammi (L.) (Ajwain) belongs to the family Umbelliferae and is a popular spice in the Indo-Pak region. It is a small, egg shaped fruit, grayish in color, the fruit pods , the phytochemical studies on *Trachyspermum ammi* (L.) seeds have demonstrated the presence of many constituents, including an aromatic volatile essential oil and a crystalline substance, stearoptene, crude thymol ,the seeds contain essential oil that has thymol [3]. Alcoholic extracts of *Trachyspermum ammi* contain a highly hygroscopic saponin, from the

fruits, a yellow, crystalline flavones and a steroid-like substance have been isolated [3- 8]

Preliminary pharmacological studies of the oil indicated that it had a parasympathomimetic effect, and the drug also seems to possess some anti-diuretic effect . Its seeds are used in small quantities for flavouring numerous foods, as preservatives, in medicine and for the manufacture of essential oil in perfumery. In Indian system of medicine, ajwain is administered as a stomach disorders, a paste of crushed fruits is applied externally for relieving colic pains; and a hot and dry fomentation of the fruits applied on chest for asthma. T. ammi has been shown to possess antimicrobial , hypolipidaemic, digestive stimulant, antihypertensive,hepatoprotective,antispasmodic, broncho-dilating,diuretic, galactogogic, antiplatelet-aggregatory, antiinflammatory, antitussive effects, gastroprotective .

Ajowan is much valued for its stimulant, tonic and carminative properties and often recommended for cholera it is a potent antimicrobial agent [4– 12] .

However, as yet, its analgesic potential of alcoholic extracts of Ajwain has not been scientifically evaluated. The present study is an

attempt to address this issue. The objective of this study was to scientifically investigate the effectiveness of the decoction made from leaves of this plant as an oral antinociceptive agent. In Iraq traditional medicine decoction made from Ajwain is recommended as an antinociceptive.

II. MATERIAL AND METHODS

A. Plant collection and identification

Plant material was collected from local market and authenticated at the National Herbarium of Iraq Botany Directorate in Abu-Ghraib.

B. Preparation of the extract

The alcoholic extract of *Trachyspermum ammi* (L.) (Ajwain) was prepared by cold maceration of 250 g of the shade dried, coarse powder in 600 ml of ethanol (95%) for 5 days. The extract was filtered, concentrated, dried in vacuo (yield 15 g) and the residue stored in a refrigerator at 2–8°C for use in subsequent experiments (250, 500, 1000, and 2000 mg/kg) [9].

C. Experimental animals

Experimental animals Healthy adult crossbreed male rats (weight 200-250g) were used in study. The healthy animals were kept in plastic cages under standardized animal house conditions (temperature: 28-31°C, photoperiod: approximately 12 hours natural light per day, and relative humidity: 50-55%) with free access to pelleted food and clear drinking water. Except at the time of experimental procedure the animals were handled only during cage cleaning. The experiment was conducted in accordance with the internationally accepted laboratory animal use and care.

D. Evaluation of antinociceptive activity

- 1) Hot Plate and Tail flick tests Thirty six male albino rats were randomly selected and fasted for 24 h before the experiment with free access to water and separated into six groups (n=6 per group) and treated orally in the following manner: Group 1: with 1mL of distilled water, Groups 2, 3, 4, and 5: with 1mL of 250, 500, 1000, 2000 mg / kg of freeze-dried aqueous extract, respectively, and Group 6: with 1mL of 15mg / kg of morphine sulphate (Pharmachemie B.V., Harlem, Netherlands), the reference drug of opioid receptor agonistas a positive control. One hour before treatment (pretreatment) and then at hourly intervals for 6h post treatment, these rats were subjected to hot plate and tail flick tests [13]. The aqueous leaf extract treated rats were observed for

elicitation of struab's tail reaction [14]. In the hot-plate test, each rat was placed on enclosed hot plate which maintained at 50°C and then the time taken to lick either hind paw or to jump up (reaction time) was recorded. Rats showing a pre-treatment reaction time greater than 15s in the hot-plate test were not selected for the experiment. A cut of time of 20 sec was used so as to avoid tissue damage [15]. In the tail-flick test, time taken to flick the tail (the reaction time) when the tail was immersed (5-6cm from the tip) in a water bath at 55°C was recorded using a stopwatch. Rats showing a pre-treatment reaction time greater than 5s in the tail flick test were not selected for the experiment. A cut off time of 5s was set to avoid tissue damage [15].

- 2) Formalin test twelve rats were randomly divided into two groups and treated orally in the following manner. Group 1: with 1mL of distilled water, Groups 2: with 1mL of 2000 mg / kg of freeze-dried alcoholic extract. Three hours after administration, each of these rats was subcutaneously injected with 0.05 ml 2.5% formalin solution (BDH Chemical, Poole, UK) into the sub plantar surface of the left hind paw. The rats were then observed for 30 min and the numbers of licking of hind paw, flinching, lifting and time spend on licking of the injected paw were recorded in two phases: first phase 0-5 min and second phase 20-30 min [15].

E. Evaluation of the mechanism of antinociceptive activity

- 1) Investigation for dopamine receptor mediation Twelve male rats were randomly divided into two groups. Those in group 1 were intraperitoneally injected with 1.5 mg/kg of metoclopramide (AivitaPharma Pvt Limited, Gujarat, India), a dopamine receptor antagonist, and those in group 2 with isotonic saline. 10 mins later, the rats in both groups were orally administered with 2000mg/kg of freeze-dried alcoholic extract. These rats were subjected to the hot plate test one hour before treatment, 1h and 3h after post treatment [15].
- 2) Investigation for muscarinic receptor mediation Twelve male rats were randomly divided into two groups. Those in group 1 were intraperitoneally injected with 5 mg/kg of atropine sulphate (Harson Laboratories, Borada, India), a muscarinic receptor antagonist, and those in group 2

with isotonic saline. 10 min later, the rats in both groups were orally administered with 2000mg/kg of freeze-dried alcoholic extract. These rats were subjected to the hot plate test before treatment, 1h and 3h after post treatment [15].

- 3) Investigation for opioid receptor mediation Twelve male rats were randomly divided into two groups. Those in group 1 were intraperitoneally injected with 1ml of 1.5 mg/kg of naloxone hydrochloride (Samarth Life Sciences Pvt. Ltd, Mumbai, India), an opioid receptor antagonist, and those in group 2 with 1ml of isotonic saline. After 45 min, the rats in both groups were orally administered with 2000mg/kg of freeze-dried alcoholic extract. These rats were subjected to the hot plate test one hour before treatment, 1h and 3h after post treatment [15].

F. Evaluation of effects on muscle coordination and strength

Twelve rats were randomly divided into two groups. Those in group1 were orally administered with 1ml of 2000 mg / kg of freeze-dried alcoholic extract and those in group 2 with 1ml of distilled water. After 3h, these rats were subjected to the bar holding test (to evaluate muscle strength) and Bridge test and righting reflex test[16] (to evaluate muscle coordination) and their respective latencies (in second) were measured.

G. Evaluation of sedative activity

Twelve male rats were randomly divided into two groups. Those in group1 were orally administered with 1ml of 2000 mg / kg of freeze-dried alcoholic extract of T.ammi and those in group 2 with 1ml of distilled water. After 3h, each of these rats were tested for sedative activity in the rat hole-board test [17]. Each of these rats were individually placed at the center of the standard rat hole board apparatus and observed for 7.5 min. During this period, number of rearing, number of crossing, number of head dipping, cumulative time spend on head dipping were recorded.

H. Statistical analysis of data

The data were expressed as the mean \pm SEM. Statistical comparisons were made by one-way analysis of variance (ANOVA) using Minitab 13.0 version statistical package. Significant values were set as $P \leq 0.05$.

III. RESULTS

- 1) Hot Plate and Tail flick tests The results obtained are summarized in Table 1. As shown, a 250 mg/kg dose of alcoholic extract

of T.ammi caused a significant ($p \leq 0.05$) prolongation of the reaction time in the hot-plate test from the first hour to the sixth hour compared with the control (first hour by 70%, second hour by 78%, third hour by 66%, forth hour by 49%, fifth hour by 42% and sixth hour by 28%) and the first and second hour compare with the own pre-treatment value (first hour by 59%, second hour by 61%). A 2000 mg/kg dose of the alcoholic extract of T.ammi used a significant ($p \leq 0.05$) prolongation of the reaction time in the hot-plate test from the first hour to the fifth hour compared with the control (first hour by 88%, second hour by 61%, third hour by 80%, forth hour by 55% and fifth hour by 37%) and from the first hour to the forth hour compare with the own pre-treatment value (first hour by 93%, second hour by 59%, third hour by 66%, forth hour by 34%). A significant prolongation of the reaction time was also evident with 500 mg/kg (with control: second hour by 62%, third hour by 68%, forth hour by 34% and sixth hour by 29%, with own pre-treatment: second hour by 50%, third hour by 45%) and 1000 mg/kg (with control: first hour by 42%, second hour by 49%, forth hour by 66%, fifth hour by 47% and sixth hour by 41%, with own pre-treatment: forth hour by 43% and sixth hour by 42%). Morphine caused a huge and significant ($p < 0.05$) increase in the reaction time up to fifth hour post-treatment compared with the control (first hour by 102%, second hour by 152%, third hour by 106%, forth hour by 64% and fifth hour by 19%) and to forth hour post treatment compared with its own pre-treatment (first hour by 85%, second hour by 121%, third hour by 69% and forth hour by 26%). In contrast, in the tail flick test, there was no significant alteration ($p > 0.05$) in the tail-flick reaction time in rats treated with any of the alcoholic extract of T.ammi compared with control rats (data not shown). Furthermore, none of the alcoholic extract T.ammi of treated rats exhibited characteristic Straub's tail reaction.

- 2) Formalin test The results of the formalin test shown in Table 2 indicate that oral administration of 2000mg/kg dose of the alcoholic extract of T.ammi significantly ($p < 0.05$) impaired the number of licking (first phase by 27% and second phase by 23%), licking time (first phase by 46% and second phase by 69%), cumulative time spent per licking (first phase by 25% and second phase by 60%) and total cumulative time spent on licking (by 54%). However number of flicking, number of lifting were not significantly ($p < 0.05$)

TABLE VI. EFFECT OF ORAL ADMINISTRATION OF THE ALCOHOLIC EXTRACT OF T.AMMI ON HOT PLATE REACTION TIME.

Dogse mg/kg	Reaction Time (Sec) Mean \pm SEM						
	P-T	1 hr	2 hr	3 hr	4 hr	5 hr	6 hr
Control	6.73 \pm 0.67	67.8 \pm 0.4	6.6 \pm 0.5	6.18 \pm 0.93	5.8 \pm 0.8	5.9 \pm 1.2	6.2 \pm 0.9
250	7.32 \pm 1.35	11.63 \pm 1.6#*	11.78 \pm 2.6#*	10.2 \pm 3.1#	8.7 \pm 1.7#	8.4 \pm 1.7#	7.9 \pm 1.1#
500	7.13 \pm 1.10	7.28 \pm 2.1	10.7 \pm 11.9#*	10.3 \pm 1.2#*	7.7 \pm 1.3#	7.4 \pm 2.2	8 \pm 1.6 #
1000	6.75 \pm 1.12	9.73 \pm 3.1#	9.83 \pm 3.2#	9.6 \pm 3.9	9.6 \pm 2.7#*	8.7 \pm 1.9#	8.8 \pm 1.6#*
2000	6.7 \pm 1.29	12.92 \pm 1.6#*	10.52 \pm 1.9#*	11.1 \pm 2#*	8.9 \pm 0.9#*	8.1 \pm 1.8#	7.8 \pm 1.4
Morphine	7.52 \pm 1.27	13.9 \pm 0.95#*	16.62 \pm 1.2#*	12.7 \pm 1.8#*	9.5 \pm 1.1#*	7.1 \pm 1.6	6.7 \pm 0.9

Values are significant at P<0.05 (# = compared to control , * = compared with paracetamol) PT= pretreatment

TABLE VII. EFFECT OF ORAL ADMINISTRATION OF ALCOHOLIC EXTRACT OF T.AMMI ON FORMALIN TEST.

Treatment	First phase			Second phase			Total Cumulative Time Per Licking	No. Of flicking	No. Of Lifting
	No. of licking	Licking time (s)	Cumulative time per licking	No. of licking	Licking time (s)	Cumulative time per licking			
Control	14.0 \pm 1.79	109.6 \pm 14.6	7.84 \pm 0.71	49 \pm 9.01	532 \pm 88.6	10.9 \pm 0.81	10.21 \pm 0.68	6.83 \pm 2.79	5.33 \pm 2.73
	10.17 \pm 1.84*	59.0 \pm 9.38*	5.87 \pm 0.71*	37.5 \pm 7.42*	163.6 \pm 28.8*	4.41 \pm 0.42*	4.6 \pm 0.29*	8.00 \pm 2.97	7.83 \pm 3.66

Values are significant at * = P,0.05 compared with respective controls.

TABLE VIII. EFFECT OF IP INJECTION OF METCLOPROMIDE ON HOT PLATE REACTION TIME OF ALCOHOLIC EXTRACT OF T.AMMI 2000MG/KG

Treatment	Hot plate reaction time (S) Means \pm SEM		
	Pretreatment	First hour	Third hour
Saline + extract (n=6)	6.97 \pm 1.15	13.9 \pm 1.88	11.82 \pm 3.3
Metoclopramide	7.03 \pm 1.65	7.73 \pm 1.43 *	8.15 \pm 1.17*

Values are significant at * P<0.05

TABLE IX. EFFECT OF IP INJECTION OF ATROPINE ON HOT PLATE REACTION TIME OF ALCOHOLIC EXTRACT OF T.AMMI 2000MG/KG .

Treatment	Hot plate reaction time (S) Means \pm SEM		
	Pretreatment	First hour	Third hour
Saline + extract (n=6)	6.97 \pm 1.15	13.9 \pm 1.88	11.82 \pm 3.3
Atropine	6.57 \pm 1.34	12.97 \pm 3.63 *	6.73 \pm 1.10 *

Values are significant at * P<0.05

impaired by highest dose of the alcoholic extract of T.ammi .

- 3) Investigation for dopamine receptor mediation As shown in Table 3, with the hot plate technique, intraperitoneal administration of metochlopramide significantly ($p \leq 0.05$) impaired the prolongation of reaction time induced by 2000mg/kg of the alcoholic extract of T.ammi in first and third hour compared with control.
- 4) Investigation for muscarinic receptor mediation As shown in Table 4, with the hot plate technique, intraperitoneal administration of atropine did not significantly ($p>0.05$) impair the prolongation of reaction time induced by 2000mg/kg of the alcoholic extract of T.ammi at first hour. However intraperitoneal administration of atropine significantly ($p<0.05$) impair the prolongation of reaction time induced by 2000mg/kg of alcoholic extract of T.ammi at third hour.
- 5) Investigation of opioid receptor mediation Intraperitoneal administration of naloxone did not significantly ($p>0.05$) impair the prolongation of reaction time induced by 2000mg/kg of alcoholic extract of T.ammi (naloxone + ALE vs. saline + ALE: at first hour 14.27 \pm 3.71 sec vs. 14.40 \pm 4.14sec, at second hour 16.20 \pm 1.27sec vs. 13.77 \pm 2.97sec).
- 6) Muscle strength and coordination None of the latencies of these tests were significantly ($p>0.05$) altered by a 2000mg/kg dose of alcoholic extract of T.ammi (control vs. treatment: bar-hold test, 6.94 \pm 5.47 sec vs. 4.88 \pm 2.88 sec; Bridge test, 5.52 \pm 3.32 sec vs. 7.80 \pm 2.86 sec; righting reflex test, 1.15 \pm 0.17 sec vs. 1.11 \pm 0.14 sec).
- 7) Sedative effect In the hole-board test, none of the parameters were significantly ($p>0.05$) altered by a 2000mg/kg dose of alcoholic extract of T.ammi (control vs. treatment: number of rears, 4.83 \pm 2.64 vs. 6.17 \pm 2.64; number of crossing, 9.67 \pm 5.24 vs. 9.50 \pm 2.74; number of head dipping, 5.33 \pm 3.67 vs. 2.67 \pm 1.21; dipping time, 6.42 \pm 3.92 sec vs.

4.41 \pm 2.80 sec; time per dip, 1.29 \pm 0.25 sec vs. 1.67 \pm 0.55 sec).

IV. DISCUSSION

The results convincingly show, for the first time that, alcoholic extract of T.ammi possesses antinociceptive activity in rats, when given orally (in doses acceptable in rat models), and evaluated in the hot plate (in terms of prolongation of reaction time) and the formalin (in terms of shortening of measured parameters) algesiometric tests. However, antinociceptive action was not evident when assessed on the tail flick test: these tests are scientifically validated widely used standardized methods employed in the evaluation of potential antinociceptive agents. Compared to morphine, alcoholic extract of T.ammi was less efficacious in eliciting the antinociceptive action. Further, alcoholic extract of T. ammi neither induced motor deficits (as reflected from bar test and unimpaired locomotory activity in the rat hole-board test) nor nervous incoordination (as judged by bridge and righting reflex tests). Thus, the results obtained are reliable, valid and meaningfully interpreted. The positive results in the hot plate test suggest that alcoholic extract of T.ammi is effective against transient phasic pain which is centrally mediated at the supra spinal level: hot plate technique predominately measures supra spinal reflexes [18].

On the other hand, impairment of different parameters, namely, number of licking, licking duration, cumulative time spent on licking (on both phases of the test) suggest that alcoholic extract of T.ammi is effective against peripheral pain of both neurogenic and inflammatory origins [19]. This may result from ALE included impairment of inflammatory mediators such as cytokines, prostaglandins, bradykinin, serotonin or histamines[20], possibly via phenolic and steroidal phytoconstituents present in the extract. Continuous inflammatory pain is one of the most common types of pathological pain in clinical practical and persistent pain is known to have a

major impact on the quality of life [21]. Conversely, a lack of an effect of alcoholic extract of *T. ammi* on tail flick test suggests that spinal mechanisms are not involved in its antinociceptive action [18].

The antinociceptive activity of alcoholic extract of *T. ammi* had a quick onset (within 1 hour) and moderately long duration of action (up to six hour). This is presumably due to fast absorption of the active phytoconstituent/s and its/their quick transport to the final site/s of action. Having a rapid onset of action of antinociceptive action is a much sought feature of a pain killer. Food restriction imparts antinociception in rats [22], but such a mode of action is unlikely to be operative here, as food was available through the study period and there was no apparent hypophagia. Stress is known to provoke antinociception [23]. But, this mechanism of antinociceptive can be ruled out, in this study, as there were no signs of exophthalmia, fur erection, diarrhea or aversive behaviors. Sedation is implicated with antinociception [24], and several sedatives have shown to possess marked antinociceptive activity [25]. Albeit, this mechanism too is unlikely to be operative in this study as none of the parameters (number of crossings, number of level dippings, number of rears, dipping time and time per dip) was impaired. Naloxone, the universal opioid receptor antagonist, failed to block alcoholic extract of *T. ammi* induced antinociception.

This indicates that opioid mechanisms are unlikely to be operative in this study. This notion is further reinforced by the fact that alcoholic extract of *T. ammi* failed to elicit characteristic Straub's tail reaction which is characteristic of opioid receptor mediated drugs [14]. On this context, it is worth noting that alcoholic extract of *T. ammi* contained alkaloids and several plant alkaloids which are known to induce antinociception via opioid mechanisms [25,26]. Although it was not the case in this study. This discrepancy may be attributed structural differences between alkaloids. Dopamine is now recognized to play an important role in pain modulation and dopamine receptor blockers and known to suppress pain [27]. In this study, alcoholic extract of *T. ammi* induced antinociception was inhibited (both at 1st and 3rd hours) by metaclopramide, a dopamine recapture (D2 type) antagonist. This is indicative of dopamine D2 receptor mediation in alcoholic extract of *T. ammi* induced antinociception. Cholinergic mechanisms are also now linked with pain [28]. In this study, alcoholic extract of *T. ammi* induced antinociception was blocked by atropine, a well-known muscarinic cholinergic receptor antagonist at 3rd hour but not at 1st hours. This suggests the involvement of muscarinic cholinergic mechanisms, at least, at the 3rd hour (mid period) of alcoholic extract induced antinociception.

However, an absence of a synergetic antinociceptive action at 3rd hour, compared to the 1st hour, argues against this mode of action. Interestingly, even with daily sub chronic administration of a high dose of alcoholic extract of *T. ammi*, there was no morbidity, motility or overt signs of clinical toxicity (in term of salivation, diarrhea, excessive urination, yellowing of fur, loss of fur, postural abnormalities, behavioral change, impairments of food and water intake),

V. CONCLUSION

This study, shows for the first time, that alcoholic extract of *Trachyspermum ammi* can act as a natural safe, orally active, moderately strong antinociceptive. The results also justify the therapeutic claim in Iraq traditional medicine that alcoholic extract of *Trachyspermum ammi* has painkilling activity.

REFERENCES

- [1]. Sosa S, Balic MJ, Arvigo R, Esposito RG, Pizza C, Altinier G, et al. "A Screening of the topical Anti-inflammatory activity of some Central American plants". *J Ethnopharmacol* ;8:211-215, 2002.
- [2]. Kayaalp SO. Medical pharmacology, in terms of rational treatment (Rasyonel tedaviyonunden tibbi farmakoloji), Ankara: Ha-cettepe-Tas Ltd.Sti; 1998.
- [3]. Ali R. M., Khan A. R., and Feroz Z., "Evaluation of antiepileptic activity of the methanol extract *Trachyspermum ammi* (L.)", *Arch. Biol. Sci., Belgrade*, 65 (3), 815-819, DOI:10.2298, 2013.
- [4]. Dwivedi S. N., Mishra R. P., and Alava S., "Pharmacological studies and Traditional benefits of *Trachyspermum ammi* (Linn.) Sprague", *Int. J. of Pharm. & Life Sci. (IJPLS)*, Vol. 3, Issue 5, 1705-1709, 2012.
- [5]. Aggarwal S., Goyal S., "In Vitro antimicrobial studies of *Trachyspermum ammi*", *Int J Pharm Bio Sci*, 3(4): (P) 64 – 68, 2012.
- [6]. Javad I., Iqbal Z., Rahman Z. U., Khan F. H., Aslam B. M., and Ali A., "Comparative antihyperlipidaemic efficacy of *Trachyspermum ammi* extracts in albino rabbits", *Int J Pharm Bio Sci*, 3(4): (P) 64 – 68, 2012.
- [7]. Apte A. A., Khot K., Biradar N. S., and Path S. B., "Antihelmintic activity of *Trachyspermum ammi* extract", *International Journal of Pharmacy and Pharmaceutical Sciences* ISSN- 0975-1491 Vol 6 suppl 2, 2014.
- [8]. Ijaz Javed I., Rahman Z. U., Khan M. Z., Muhammad F., and Aslam B., "Antihyperlipidaemic Efficacy of *Trachyspermum ammi* in Albino Rabbits", 229–236, 2009.
- [9]. Umar S, Asif I M, Sajad M, Ansari M, Hussaain U, Ahmad W, Siddiqui S A, Ahmad S, and Khan H., "Anti-inflammatory and antioxidant activity of *Trachyspermum ammi* seeds in collagen induced arthritis in rats", *International Journal of Drug Development & Research*, Vol. 4 | Issue 1 | ISSN 0975-9344, 2012.
- [10]. Ramaswami S., Sengottuvelu S., Haja sherief S., Jaikumar S., saravanan R., Prasadkuma C., and Sivarkumar T., "Gastro protective activity of ethanolic extract of *Trachyspermum ammi* fruit", *International Journal of Pharma and Bio Sciences*, V1(1), 2010.
- [11]. Dwivedi S.N., Mishra P.R., and Alava S., "Phytochemistry, pharmacological studies and traditional

- benefits of *Trachyspermum ammi* (Linn.) Sprague “ , Int. J. of Pharm. & Life Sci. (IJPLS), Vol. 3, Issue 5 , 1705-1709 , 2012
- [12]. Apte A. A. , Khot K. , Biradar N. S. , and Path S. B. , . “ Antihelmintic activity of *Trachyspermum ammi* extract “ , International Journal of Pharmacy and Pharmaceutical Sciences ISSN- 0975-1491 Vol 6 suppl 2, 2014 .
- [13]. Langerman, M.I.Zakouski, B. Piskoun, G.J. Grant, Hot plate versus tail flick evaluation of acute tolerance to continuous morphine infusion in the rat model, J PharmacolToxicol Methods, 34, 1995, 23-28.
- [14]. A.W.Bannon, A.B.Malmberg, Model of nociception: hot-plate, tail-flick, and formalin tests in rodents, Curr. Protoc, Neurosci, 41, 2007, 8-16.
- [15]. N.S.Vasudewa, D.T.U.Abeytunga, W.D.Ratnasooriya, Antinociceptive activity of *Pleurotus ostreatus*, an edible mushroom, in rats, Pharm Biol, 45, 2007, 533-540.
- [16]. S.A.Deraniyagala, W.D.Ratnasooriya, C.L.Goonasekara, Antinociceptive effect and toxicological study of the aqueous bar extract of *Barringtonia racemosa* on rats, J Ethnopharmacol, 86, 2003, 21-26.
- [17]. W.J.Mortin, N.K. Lai, S.L.Patriott, K. Tsou, J.M.Waltier, Antinociception action of cannabinoids following intra-ventricular administration in rats, Brain Res, 629, 1993, 300-304.
- [18]. N.R. Farnsworth, Phytochemical Screening (Chicago: University of Illinois College of Pharmacy, 1996) 1-8.
- [19]. C.H. Wong, P. Day, J. Yamush, W. Wu, U.K. Zbuzek, Nifedipine-induced analgesia after epidural injections in rats, AnesthAnalg, 79, 1994, 303-306.
- [20]. H. Farsam, M. Amanlou, A.Z. Dehpour, F. Jahaniyani, Anti-inflammatory and analgesic activity of *Biebersteinia multifida* DC, Root extract, J Ethnopharmacol 71, 2000, 443-447.
- [21]. R. Vinegar, W. Schreiser, R. Hingo, Biphasic development of carrageenan oedema in rats, J PharmacolExpTher 166, 1969, 96-103.
- [22]. J. Croow, E. Rideout, G. Browne, The prevalence of pain complaints in a general population, Pain, 18(3), 1984, 299-314.
- [23]. R.F. McGivorn, C. Berka, G.G. Bernston, J.M. Walker, C.A. Sandman, Effect of naloxone on analgesia induced by food deprivation, Life Sci 25, 1979, 885-888.
- [24]. H.P. Rang, M.M. Dale, J.M. Ritter, Pharmacology (Edinburgh: Elsevier Ltd, Churchill Livingstone, 2003) 325-365.
- [25]. R. Nadeson, C.S. Goodchild, Antinociceptive properties of propofol: Involvement of spinal cord γ -aminobutyric acid A receptors, J PharmacolExpTher, 282, 1997, 1181-1186.
- [26]. D.R. Lawrence, P.N. Bennett, Clinical Pharmacology (Edinburgh: Elsevier Ltd, Churchill Livingstone, 1997) 300.
- [27]. E. Elisabetsky, T.A. Amador, R.R. Albuquerque, D.S. Nunes, C.T. Carvalho Ana do, Analgesic activity of *Psychotria colorata* (Willd. Ex R. & S.) Muell Arg. Alkaloids, J Ethnopharmacol 48, 1995, 77-83.
- [28]. J.R.W. Menzies, S.J. Paterson, M. Duwiejua, A.D. Corbett, Opioid activity of alkaloids extracted from *Picralima nitida* (Fam Apocynaceae), Eur J Pharmacol 350, 1998, 101-108.
- [29]. British National Formulary, Anonymus (London: The British Medical Association and the Royal Pharmaceutical Society of Great Britain, 2000) 571.

Effect Of Plyometric Training On Vertical Jump Performance And Neuromuscular Adaptation In Volleyball Player

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Abstract- The purpose of this study was to examine the effectiveness of 8-week plyometric training on vertical jump performance (Vj), maximal surface EMG, M-wave amplitude, Mwave latency, and nerve conduction velocity (NCV) in men volleyball player. Thirty junior high school volleyball players' volunteers (age: 17.53±0.74; Height: 177.67±3.14; Weight: 61.31 ± 5.32) were divided into plyometric training [PT] (n=15) and control group [c] (n=15). PT group trained so.w' but C group didn't participate in this training. Both groups were pre and post tested in EMG, M-wave parameters, NCV and Vj test.

Tow way ANOVA (group*time interaction) and Bonferroni post hoes test demonstrated significant differences (P<0.05) in PT group of pre to post test in VJ performance (9.67 %) and in M-wave latency 16.55 % t ; nerve conduction velocity 14.19 % t ; there is no significant differences in IEMG (4.6 5 % J,) and M-wave amplitude (20.91 % t), but there is no significant improvement during this period in control group. Comparison between groups after 12wk showed that there was a significant improvement in Latency (16.74 % J,) and NCV (19.10% t) in PT group during the course of the study than C group (P<0.05). based on the results of this study, it is possible to conclude that coaches and trainers consider PT as a strategy for increasing volleyball players' explosive performance that this may have taken place in neuromuscular responses such as; optimizing motor unites (MU) pattern, optimizing MUs recruitment, augmentation in nerve conduction velocity, decrement in reflex excitability of the motor pool.

Key word: *plyometric training, EMG, M-wave amplitude, nerve conduction velocity*

I. INTRODUCTION

Successful sporting performance at elite levels of competition often depends heavily on the explosive leg power of the athletes involved. Many team sports also require high levels of explosive power, such as Volleyball, Basketball, Football, and Rugby. Volleyball player rely heavily upon anaerobic energy system to supply energy demands during a match. Successful participation in the volleyball sport requires athletes be able to propel themselves into the air during both offensive and defensive maneuvers. These movements include the jump serve, spike, and block. During the execution of a jump serve or a spike, the player jumps high into the air and strikes the ball at the highest point of their jump in an effort to propel the ball rapidly down towards the opposing side of the net. Defensively, front row players defend against spikes by jumping into the air with their hands raised in an effort to impede

the offensive attack (Tillman et al. 2004). Thus, some portion of volleyball training program should be included a training methods for developing muscular power, thereby, plyometrics are a training technique which utilize the stretch-shortening cycle (SSC) to produce energy (Bobbert et al 1996, Cronin et al 2000) for dynamic muscle contraction, and has been shown that to be a vital to the optimal development of explosive performance (Adams, et. al., 1992; Baur, et. al., 1990; Fatouros, et. al., 2000).

Basically a SSC consists of a plyometric muscle action in which an eccentric action immediately precedes a concentric action. The mechanisms involved in concentric enhancement may include: use of elastic energy, a stretch reflex, optimizing muscle length, optimizing muscle activation and muscle activation patterns (Bobbert et al. 1996, Bobbert 2001).

One of the most important issues existing in physiology and sport medicine is adaptation to exercise which includes adaptations among different body's systems; respiratory system, cardiovascular system, and nervous system, etc. It seems that the most important cases of above is neuromuscular response to exercise. As we know, central nervous system (CNS) controls muscle force by motor unit (MU) recruitment and MU firing rate modulation (rate coding). These two mechanisms differ based on the different body's muscle. The possibility of investigation CNS control strategies by surface electromyography (EMG) signal analysis was addressed in previous researches (Walshe et al. 1998; Hakkinen et al. 2003; Aagaard et al. 2000). EMG is considered as a suitable index for illustrating the level of reflex excitability of the motor pool, which, in turn, is dependent on the facilitation of the transmission between the Ia fibers and a - motor neuron. Ikai and Fukunaga (1970) have been reported that increase in voluntary power at exercised organ relation to non-exercised organ may be related to nervous adaptation.

Previous researches has been shown that EMG to be a significantly higher in endurance performance than anaerobic sports (Rochcongar et al. 1979; Perot et al., 1991; Casabona et al. 1990). This result may be related to recruit a large portion of the whole motor pool in response to the electrically elicited Ia afferent volley. Also has been shown that reflex excitability is decreased by plyometric training in the rat (AlmeidaSilveira et al. 1996) which induces a decrease in type I soleus fibers, thereby suggesting a relationship between reflex excitability and muscle properties.

Viitasalo and Komi (1981) clearly pointed out that the rise in motor unit activation as measured by EMG is associated with a rise in muscle force. Thus, the rate of force development is largely a function of the nervous system's ability to activate muscle. Typically, high rates of force development are necessary for success in "explosive and high power activities" such as sprinting, throwing and weightlifting.

In the research carried out by Kamen et al. (1984), motor nerve conduction velocity (NCV) of ulnar and posterior tibial nerves were studied in totally 91 athlete and nonathlete individuals that results showed NCV was significantly higher in weightlifters than marathon runners and non-athlete. They concluded that both genetic and environmental factors play important role in determining NCV.

Also, in the research carried out by Westgaard and De Luca (1999) confirmed that motor unit substitution and alternation occurs during

submaximal isometric contractions. They speculated that efferent neural command patterns must have knowledge of the previous activation history and temporal variation in recruitment activity and that this substitution phenomenon protected motor units from excessive fatigue during sustained submaximal isometric contractions.

Although, in relation to enhance VJ performance, plyometric training have been helpful (Adams, et al. 1992; Luebbers et al. 2003, Rahimi & Behpur, 2005), but the effects of such training on neuromuscular responses have already received less attention from researchers. Because there is no specific research on the efficacy of plyometric training on neuromuscular responses, the purpose of this study was to examine the effects of plyometric training on vertical jump performance and neuromuscular adaptation in volleyball player.

II. METHODS

A. Subjects

Thirty men-volleyball player (age: 17.53 ± 0.74 ; Height: 177.67 ± 3.14 ; Weight: 61.31 ± 5.32), how had a minimum two-years volleyball training, volunteered to participate in a 8-week plyometric training program. Following a detailed explanation of the tests involved and training programs, the subjects signed a human subject's informed consent form before participating in this study and had completed a medical history questionnaire in which they were screened for any possible injury or illness spatially neuromuscular illness, then subjects based on vertical jump height divided into plyometric training (PT) - ($n=15$) and control (C) - ($n=15$) group. PT group participates in 8-week plyometric training, so.w' , but C group didn't participate in plyometric training, also both groups had same volleyball training in this period that performed after plyometric training protocol.

Training Program.

Plyometric training program performed in four station each station included 5sets*6repetitions specific plyometric training with medicine ball (MB) and recovery between sets and station was 2-minute. MBs used in this study were selected based on 5% of body weight for each athlete in 1-6 week and increased to 6% of body weight in the next 6-week. First station: instructed to subjects hold MB between thighs and performed vertical jump (VJ) and subsequently throw MB with flexion in thigh then get it an flight time with hands, immediately after their foot's contacts to the earth again performed another VJ and touch hands to target tools (VJMB). Second station: trainer throws MB and subjects get it and performed a pivot (P),

immediately, performed tow VJ with MB (PVJMB). Third station: Subjects performed depth jumps (OJ) from box (70 ern) with MB on hands. Forth station: subjects performed depth jumps(OJ) form a box (70cm), trainer throw MB for subject while his on flight time get it with hands and after contact foots to earth immediately performed a vertical jump (OJMB). All subjects were instructed that performed VJ and OJ with their maximum power and try to decrease ground contact time to minimum as possible.

B. Maximum voluntary contraction

The isometric force exerted by the gastrocnemius muscle was measured in a dynamometer previously described. The subjects lay down in the apparatus with hip and knees extend and foot in 125° of dorsi- flexion. A strap attached to the dominate foot in distal to metatarsus phalangeal joint (Wilson, 1994). Subjects instructed to prevent inversion/eversion of foot and flexion of thigh and leg. This test was performed before and after the training period, after determining maximal voluntary contraction (MVC), 50% of MVC was selected to purpose the load used in EMG measuring (Rich, & Cafarelli, 2000). Subjects are required to give a maximal effort over 3 or 4 s periods. Maximal isometric strength tests have particularly high test-re-test reliability (Viitasalo et al. 1980).

C. EMG measurements

Surface Electromyography activity during unilateral isometric contraction (50 % MVC) of the gastrocnemius muscle was recorded from subjects' dominant leg, when the skin over the muscle had been prepared by shaving, scrubbing and wiping with alcohol, then Bipolar silver-silver-chloride electrodes (1.0 cm diameter, NIHON KOHDEN, Germany) were fixed to the skin with an adhesive patch. Active stability, reference, and the ground electrode's were respectively placed in muscle belly, on junction of the tendon to the gastrocnemius, and one end of ground electrode placed on ankle and the other to the leg table. Electrodes' position were marked on the skin by small ink tattoos, this dotes measured the same electrode positioning in each test over the 12-week experimental period. Ultimately, waves representing contraction of the motor unit's displayed on the monitor (NIHON KOHDEN, Germany) were amplified, band-pass filtered and sampled at 1000 Hz before being stored (Hakkinen et al. 1998).

D. M wave measurements

Subjects were examined under lay down on the table, with extension on the hip, knee and ankle

joint. As in EMG test, active electrode was placed on muscle belly, reference electrode on the junction of the tendon to gastrocnemius muscle, and stimulating electrode was placed on the tibial nerve dominate leg, then tibial nerve was stimulated by using a cathode ball electrode with supper maximal stimulation; the time base was adjusted to 20 ms, sensitivity to 2.0 mV and filters to 10-500 Hz. The signals were amplified and filtered before being stored in a personal computer for later off-line analysis. Then the maximum peak-to-peak amplitude (mV), latency (ms) and NCV (m/s) were used for statistical evaluation. Nerve conduction velocity (NCV) was evaluated by using this formula: $NCV = d(m)/t(s)$, d-distance between stimulating and active electrode (mm), M-wave latency (ms). Electrodes' position were marked on the skin by small ink tattoos, this dotes measured the same electrode positioning in each test over the 12week experimental period. Ultimately, waves representing contraction of the motor unit's displayed on the monitor were saved and after performing needed measurements were printed.

E. Vertical jump measurement

Vertical jump height was measured by the stand and reach test (Chu, 1996). A vertical jump test was completed from a 2-foot standing position without a step into the jump. The subjects were allowed to use their hands as they desired. Three test jumps were completed, and the highest of these was recorded. This test was selected because it has high validity (0.80) and reliability (0.93) coefficients (Safrit, 1990) and because it allows arm movement and a squat motion before the jump, such as those performed in sports.

F. Statistical analysis

Data are expressed as mean \pm SO. Statistical evaluation was performed with SPSS 12.0 for windows and tow way ANOVA (group*time interaction) with Bonferroni post hoes and independent samples t test were used for analyzing data. The alpha level was set at 0.05 in order for a difference to be considered significant.

III. RESULTS

Independent sample t test showed that there is no significant differences between group at pre tests ($P < 0.05$). As has been shown in table 1., tow way ANOVA showed significant differences between pre and post test plyometric training group in M wave parameters: Latency (ms) [$P = 0.014$, 16.55 % J.], Nerve conduction velocity (m/s) [$P = 0.013$, 14.19 % r] and vertical jump height [$P = 0.01$, 9.67 %1'], but there is no significant difference in IEMG (mV/ms) [$P = 0.586$, 4.6 % J.] and Amplitude (mv) [$P = 0.068$, 20.91 % r

]; and also this test showed that there is no significant differences between pre and post test control group in : IEMG ($p=0.559$, 2.06% r), Latency ($p=0.934$, 0.66% r), Amplitude ($p=0.825$, 2.23% J,) and Nerve conduction velocity ($p=0.551$, 3.25% J,).

But after training period more significant differences in Latency ($p=0.015$, 16.74% J,), NCV ($p=0.002$, 19.10% 1') and VJ height ($p=0.02$, 11.29% 1') observed in PT group than C group, also there is no significant differences in Amplitude ($p=0.109$, 17.40% r) and IEMG ($p=0.789$, 2.57% J,) between two groups observed ($P<0.05$), (table 1).

IV. DISCUSSION

It is known that exercise cause structural change in skeletal muscle as well as an increase in excitability of motor units (Hoppeler, 1988), it is appear that plyometrics are the most important for increasing neuromuscular activity due to use of SSC (Kilani et al. 1989). Also it is a popular form of training for improving explosive performance (Adams, et al. 1992; Luebbbers et al. 2003) and anaerobic power (Fatouros et al. 2000). However, to our knowledge no studies have addressed for the effects of plyometric training on neuromuscular response in volleyball player.

Our results showed that 12-week plyometric training increased vertical jump performance, this change may have taken place in muscular and/or in neural levels. in this study motor units activation were measured by EMG and results showed 4.6% decrement in IEMG during isometric contraction (50% MVC) in gastrocnemius muscle after this training program, this training increases the force output of the whole ensemble of the motor units, thereby compensating for the lower efficacy of the reflex transmission between the Ia spindle afferent input and a motoneuron (Maffiuletti et al. 2001) and also may be related to FT motor units excitability level that are not easily excited by Ia afferent volley. This in line with previous research (Casabona et al. 1990; Almeida-Silveira et al. 1996), that reported power training decrease the relative number of MNs activated by electrically evoked Ia afferent volley. It is known, that power trained athletes have a predominance of fast-twitch or type II muscle fibers (Clarkson et al. 1980) and has been shown that fast motor units are less easily excited by the Ia afferent volley than are slow motor units (Almeida-Silveira et al. 1996), therefore, this findings support that PT have caused decrement in MUs recruitment by altering in MUs activation pattern in the end resultant increase explosive performance by

increasing more fast-twitch muscle fibers activation, and 11.29% augmentation in vertical jump height in PT group is confirmed this findings. In the present study significant decreases (16.55%) was observed in M wave latency after 12-wk plyometric training, it can be concluded that this training have had positive effects on the reflex excitability that is in accordance with previous studies (Casabona et al. 1990; Perto et al. 1991). They reported that reflex excitability decrease after explosive training. Also, decrement in M wave latency is accompanied by an augmentation in vertical jump height, which may be accompanied by muscle activation, attributed to the rapid stretch of interfusar muscle fibers and the resultant a - afferent activation; the latency of the reflex response determines the augmentation to improved VJ height is the result of direct contribution to the motor pool. The improvement observed in explosive performance during the present PT indicate that considerable training-induced changes may have taken place in the voluntary and/or reflex induced rapid neural activation of the motor units of the trained muscles. Results showed that this training is caused significant increase in nerve conduction velocity (14.19%) that is accordance with result obtained by Kamen et al (1984) that clearly pointed out that the rise in NCV is related to specific mode of training used, for example athlete was involved in resistance training had significantly higher NCV than endurance athlete. Thereby improvement in VJ performance in PT group may be due to NCV augmentation.

Although, there is no significant difference in M wave amplitude but results showed that PT results in 17.4% increase in amplitude, this finding is accordance with previous research (Moritan and Devries, 1979).

For many sports, the ability to produce force rapidly may be more important than maximum force production. Rate of force production is a change in force/ change in time. As previously noted, the rate of force development is primarily a function of the rate of increase in muscle activation by the nervous system (Viitasalo and Komi 1981). The mechanism(s) by which concentric force can be augmented by a previous stretch is not completely clear but involves several possibilities including: a) muscle elastic properties, b) a myotonic reflex, c) returning the muscle to its

TABLE X. INDEPENDENT SAMPLE T TEST SHOWED THAT THERE IS NO SIGNIFICANT DIFFERENCES BETWEEN GROUP AT PRE TESTS (P<0.05)

Jump	Vertical	and	Parameters	Wave	M	EMG,	for	Post-training	and pre-	Between	SEs	±	Means	1.	Table
													Performance.		
	Vertical		IEMG (mV/ms)	Amplitude (mV)				Latency			NCV				group
	Jump(cm)							(ms)			(m/s)				
	56 ± 3		38.11 ± 15.47			5.86 ± 2.27		4.53 ± 1.39			37.05 ± 8.33	Pre	Plyometric		
	62 ± 4*11		36.33 ± 10.52			7.41±2.6		3.78 ± 0.75*11			43.76 ± 807*11	Post			
	54± 4		36.52 ± 11.58			6.26 ± 2.75		4.51 ± 1.19			36.63 ± 7.99				
	55± 211		37.29 ± 8.83			6.12±1.49		4.54 ± 0.8411			35.40 ± 5.1311	Post			

Significant differences between pre and post Plyometric group (P<0.05). 11 Significant differences between Plyometric and Control group (P<0.05).

optimum length or d) optimizing the muscle activation pattern (Bobbert 2001). As indicated earlier, volleyball players need a high anaerobic capacity to supply energy demands during a match. Therefore, some portion of the training program of this athlete must involve plyometric training in order for him to improve his performance.

Based on the results of this study, it is possible to conclude that coaches and trainers considered PT as a strategy for increasing volleyball players' explosive performance that this may have taken place in neuromuscular responses including: optimizing motor unites (MU) pattern (intra-muscular activation), optimizing MUs recruitment, augmentation in nerve conduction velocity, decrement in reflex excitability of the motor pool.

* Significant differences between pre and post Plyometric group (P<0.05). 11 Significant differences between Plyometric and Control group (P<0.05).

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REFERENCE

- [1]. Adams, K., J.P. O'shea, K.L. O'shea, & M. Climstein., (1992). The effect of six weeks of squat, plyometric and squat-plyometric training on power production. J. Appl. Sport Sci. Res., 6, 36-41.
- [2]. Aagaard, P., E. B. Simonsen, J. L. Andersen, S. P. Magnusson, J. Halkjaer-Kristensen, and P. Dyhrepolson, (2000) Neural inhabitation during maximal eccentric and concentric quadriceps contraction: effect of resistance training. J. Appl. Physiol. 89: 2249-2257.
- [3]. Aleida-Silveira M. I., Perto, C., and Goubel F., (1996) Nerumascular adaptations in rats trained by muscle strength shirtening. Eur. J. Appl. Physiol. 72: 261-266.
- [4]. Bauer, T., R.E. Thayer, & G. Baras., (1990). Comparison of training modalities for power development in the lower extremity. J. Appl. Sport Sci. Res., 4, 115-121.
- [5]. Bobbert, M.F. (2001) Dependence of human squat jump performance on the series elastic compliance of the triceps surae: a simulation study. Journal of Experimental Biology 204(pt 3): 533-542.
- [6]. Bobbert, M.F., Gerritsen, K.G., Litjens, M.C. and Van Soest A.J. (1996) Why is countermovement jump height greater than squat jump height? Med. Sci. Sport & Exer. 28:1402-1412.
- [7]. Casabona A., Polizzi M. C., and Perciavalle V., (1990) Differences in H-reflex between athletes trained
- [8]. Chu, D.A. (1996). Explosive Power and Strength. Champaign, IL: Human Kinetics.
- [9]. Clarkson P. M., Kroll W., and McBride T. C. (1980) Plantar flexor fatigue and muscle fiber type in power and endurance trained athletes. Med. Sci. Sports Exerc. 12: 262-267.
- [10]. Cronin, J. B., P.J. McNair and R.N. Marshall. (2000) The role of maximal strength and load on initial power production. Med. Sci. Sport & Exer. 3:1763-1769.
- [11]. Fatouros, I. G., Athanasios Z. J., D. Leontsini, Kyriakos T., N. Aggelousis, N. Kostopoulos, & P. Buckenmeyer., (2000). Evaluation of Plyometric Exercise Training, Weight Training, and Their Combination on Vertical Jumping Performance and Leg Strength. J. Strength Condo Res., 14(4), 470-476.
- [12]. Hakkinen K., M. Alen, W. J. Kraemer, E. Gorostiaga, M Izquierdo, H. Rusko, J. Mikkola, A. Hakkinen, H Valkeinen, E. Kaarakainen, S. Romu, V. Erola. J. Athianen, and L. Paavolanien, (2003) Neuromuscular adaptation during concurrent strength and endurance training versus strength training. Eur. J. Appl. Physiol. 89: 42-52.

- [13]. Hakkinen K., Kallinen M., Izquierdo M., Jokelainen K., Lassila H., et al. (1998) Change in agonist/antagonist EMG, muscle CSA and force during strength training in middle-aged and older people. *J Appl. Physiol.* 84: 1341-1349.
- [14]. Hoppeler H. (1988) Exercise-induced structural changes of skeletal muscle. *Atlas Sci. Biochem.* 2: 247-255.
- [15]. Ikai, M. and T. Fukunaga, (1970) A study on training effects on strength per unit cross-sectional area of muscle by means of ultrasonic measurement. *Eur. J. Appl. Physiol.* 28: 173-180.
- [16]. Kamen, G., Taylor, P., and Beehler P. J., (1984) Ulnar and posterior nerve conduction velocity in athletes. *Int. J. Sports Med.* 5(1): 26-30.
- [17]. Kilani, H. A., S. S. Palmer, M. J. Adrian, and J. J. Gapsis. (1989) Block of the stretch reflex of vastus lateralis is during vertical jump. *Hum. Mov. Sci.* 8:247-269.
- [18]. Lubbers, P. E., Jeffrey A. P., Mathew W. H., John P. T., Michael J. C., & Robert H. L., (2003) Effects of Plyometric Training and Recovery on Vertical Jump Performance and Anaerobic Power .. *J. Strength Cond., Res.*, 17(4), 704-709.
- [19]. Moritan, T. and H. A. Deveries, (1979) Neural factor vs hypertrophy in time course of muscle strength gain. *Am. J. Physiol. Med. Rehabil.* 58: 115-130.
- [20]. Maffiuletti, N. A., A. Martin, N. Babault, M. Pensini, and M. Schieppati. (2001) Electrical and mechanical H- to M max ratio in power and endurance -trained athletes. *J Appl. Physiol.* 90: 3-9. Perto, C., Goubel, F., and Mora, I., (1991) Quantification of T and H responses before and after a period of endurance training. *Eur. J. Appl. Physiol.* 63: 368-375.
- [21]. Rahimi, R., & Behpur, N. (2005). The effects of plyometric, weight and plyometric-weight training on anaerobic power and muscular strength. *Physical Education and Sport*, 3 (1), 81-91.
- [22]. Rich, C. and E. Cafarelli. (2000) Submaximal motor unit firing rates after 8 wk of isometric resistance training. *Med. Sci. Sports Exerc.*, 32, No.1, pp. 190-196.
- [23]. Rochcongar P., Dassonville J. and Le Bars R. (1979) Modification of the Hoffmann reflex in function of athletic training. *Eur. J. Appl. Physiol.* 40: 165-170.
- [24]. Safrit, M.J. (1990). *Introduction to Measurement in Physical Education and Exercise Science* (2nd ed.). St Louis: C.V Mosby Company, Tillman M. D., Chris J. Hass, Denis Brunt and Gregg R. Bennett. (2004) Jumping and landing techniques in elite women's Volleyball, *Journal of Sports Science and Medicine* 3, 30-36.
- [25]. Viitasalo J.T. and P.V. Komi. (1981). Interrelationships between electromyographic, mechanical, muscle structure and reflex time measurements in man. *Acta Physiologica Scandinavica* 111: 97103.
- [26]. Walshe, A. D., G. J. Wilson, and Gertjan J. C. Etmma. (1998) Stretch-shortening cycle compared with isometric preload contributions to enhanced muscular performance, *J. appl. Physiol.* 84(1): 97-106.1998.
- [27]. Westgaard RH and De Luca CJ. (1999) Motor unit substitution in long-duration contractions of the human trapezius muscle. *J Neurophysiol* 82: 501-504.
- [28]. Wilson, Greag, (1994) *Strength and power assessment. Applied Anatomy and Biomechanics in Sport.* Blackwell Science.