



**SPORTS UNIVERSITY OF TIRANA
FACULTY OF SCIENCE OF MOVEMENT
DEPARTMENT OF SPORTS**

SUMMARY DISSERTATION

THEME

**PERFORMANCE EVALUATION OF TESTS THROUGH VERTICAL JUMP SJ,
CMJ, DJ. FORCE, POWER LOWER EXTREMITIES AND EFFECTS OF TRAINING
TO YOUNG VOLLEYBALL. THE APPLICATION OF PLIOMETRIKE EXERCISE
DURING TRAINING TO VOLLEYBALL.**

Candidate

ENKELEIDA LLESHI

Scientific Leader

Prof.As.Dr.DHIMITRAQ PRIFTI

TIRANA December 2015

THANKFULNESS

For the realization of this paper would like to thank first of all my leader Prof.As.Dr.Dhimitraq Prifti for his guidance, support and encouragement you gave me throughout the research process.

Special thanks go to the Council of Professors of UST for understanding and support for sharing, discussions, criticisms and recommendations.

Other warm thanks go to my colleagues and especially to my family.

TABLE OF CONTENTS

I.HYRJA

- 1.1. Hypothesis, the study goal
- 1.2. Methodology. Subjects and Methods.

II. THEORETICAL PART

CHAPTER 1

- 1- Specific indicators of jump

CHAPTER 2

- 2.1. PLYOMETRI CONCEPT as a method of training volleyball
- 2.2. Training methods plyometric

CHAPTER 3

- 3.1. General terms of muscle strength
- 3.2. Muscular contractions

- 3.3. Strength structural factors

CHAPTER 4

- 4.1. Specific test standard
- 4.2. Programm training plyometri

III. Experiment and Results

IV. Discussion and Analysis

V. Conclusions

VI. Bibliography

1.INTRODUCTION

Activity in derivative and my work in the field of volleyball deepen pushed me more knowledge in terms of the sport. Studies have consistently been based on the sport of volleyball in the new age of 15-18 years old. To reach the high levels of contemporary required a big deal of study, a scientific research work to develop and perfect the physical performance in different sports. Are important trends in world volleyball, besides improving the height of players is the increased level of vertical jump. Perfection well as a vertical jump training achieved a certain order to increase the height of the jump, the high degree of muscular activity to achieve a specific training program. The ability to realize vertical jump of sportsman to raise the center of gravity of his body with the help of dynamic muscle work of the lower extremities. Physiological studies on this discipline have shown that as a volleyball player should possess and increase, by training the ability to develop explosive strength, explosive and elastic energy reuse.

PURPOSE OF STUDY

The basic aim of this study is:

- To determine the effects of a training plyometric performance vertical jump in volleyball Young, to determine the phase relationship between the contact times with the time of flight of volleyball.
- To verify effects of a training program free weight plyometric 24 training sessions about on improving the ability of vertical jump in volleyball young Albanian who participated in this study.

HYPOTHESIS STUDY

H1: additional training program is more effective than the basic training program to increase vertical jump performance in jump-dropping drop-DJ 40 cm to volleyball.

H2: additional training program is more effective than the basic training program to increase vertical jump performance in jump-dropping drop-DJ 60 cm to volleyball.

METHODOLOGY

SUBJECTS AND METHODS

Volleyball Teams of young men participating in the National Volleyball Championships in Albania are the subjects of this experimental study.

- Association of Youth "Volley TIRANA" randomly was selected as the Experimental group (EK).
- Association of Youth "Volley FARKA" randomly was selected as Control group (KO).

Protocol Test and Training

- All subjects were young volleyball clear explanations for participation in the study was 12 weeks with two training sessions in the program lasts 90minuta and confirmed their participation. They were excluded from the volleyball training program that had serious injuries to extremities downstream. All volleyball players involved were described and were informed about the procedures of the respective programs of study development.
- Volleyball considered experimental group came to the premises of the Sports University of Tirana to develop the 12-week training program set out in this study.
- Volleyball two groups Experimental / Control in the study participated in vertical jump performance tests on tests SJ, CMJ, CMJK, DJ 40-60cm that will be presented continuously.
- First measurement was before training for both the second January 2014. Testing of April 2014 _Pas 12 weeks for both groups.
- Experimental Group developed a training program free weight plyometric determine and control group develop technical program tactic ball under their coach. Volleyball both groups perform early anthropometric measurements in these parameters;

TOOL USED

For performance evaluation tests of vertical jump in volleyball obtained in the study used the contact platform Leonardo® Plate Ground Reaction Force (GRFP-Novotec, Medical, Pforzheim, Germany). On this platform are developed tests SJ, CMJ, CMJK, DJ40cm and DJ60cm. This platform is located in the premises GRFP Laboratory Sports

biomechanics at the University of Tirana (UST). GRFP used _PRE _POST and training program of 12 weeks of volleyball participants in this study to conduct these tests. The volleyball team was instructed that they should develop testing dancing in their maximum possible performance.

BOSCO TEST PROTOCOL

Tests protocol that we used in this experiment was designed to assess the capacity of all parameters of vertical jump height. These tests called Bosco tests describe the method used to measure the power, the strength of the lower extremities. Tests were conducted on the apparatus platform Leonardo® GRFP.

Squat Jump test - SJ; Fig.1. Vertical jump from the crouching position without the aid of the arms SJ is jump that starts from the position of the legs folded sportsman in 90° angle, hands supported groin (upper body) on the platform of GRFP force. This protocol aims explosive force without reuse of elastic energy (Bosco, C. 1992). The test provides a measure of capacity height of "non plyometric" and basically the ability to develop strength fast in a very short time (explosive) of the lower extremities.



Fig.1.

Countermovement Jump test - CMJ; Fig.2. Jump against action (move) without the aid of the arms CMJ is similar to SJ, but the athlete begins testing position at attention and takes off refractive limbs bottom up to 90° degrees with hands placed on hips (waist) in platform GRFP. This test assesses the strength of the energy reuse explosive elastic (G & D., Cometti2009).



Fig.2.

Countermovement jump test with the help of Arm-CMJ; Fig.3. Jump against action (move) without the aid of the arms CMJ is similar to SJ, but the athlete begins testing position at attention and takes off refractive limbs bottom up to 90° with the help of the wings to pick up momentum to jump in platform GRFP. This test assesses the strength of the energy reuse explosive elastic (G & D,.Cometti 2009).



Fig.3.

Drop Jump test - DJ; Fig.4. Test drop jump the cube without the help of arms DJ offers a progressive increase of the height of the cube to fall from 20cm, 40cm, 60cm and 80cm near GRFP a force platform (Plyometric specific indicator). This test evaluates the limbs explosive strength downstream. The test represents "Explosive –Reactive –Ballistic Force" and in particular, neuromuscular capacity to develop very high values of force during the stretch-meeting cycle (G & D, .Cometti2009).



Fif.4.

In this way the force GRFP platform makes it possible to record the height of the fall by which optimal athlete takes \ earns maximum jump and the connection between the height of the fall, the time of contact and flight time.

II. THEORETIC TREATMENT

CHAPTER 1

1. *Specific indicators of Jump*

Physical performance attributes of a volleyball player are his fundamental basis. Jump performed during a game, back and forth sideways movements are significant moves in volleyball game. All the movements are combined in the report itself strength, power, speed, and is therefore of extreme importance in the rapid development of force to achieve in a sportsman. With the use or access of modern equipment we come to appreciate the vertical jump completely dependent on the ability of the explosive strength of the lower extremities volleyball to set the higher center of gravity his body. So we can say that the most important report on all activity is the ratio of a volleyball strength and speed displayed on the player. Strength quick to jump in volleyball displayed in a specific form through rapid explosive force volleyball and in practice is defined by the term "jump".

CHAPTER 2

2.1. *PLYOMETRI concept as volleyball training methods*

Word Plyometri (plyometric) as a term derived from the Greek; "Plyo" which means "more" (large, long) and "Metric" is to measure (evaluate, compare). Plyometri is a method of training the athletes especially applied in volleyball. It is a method that is used to improve athletic performance, increased strength, speed or power of sport during a vertical jump (G.Cometi 2009). Based on this concept plyometric we have also implemented a training program in our experiment developed for this study with youth volleyball for 12 weeks. Plyometri exercises contain rapid movements of persistent eccentric and concentric to increase muscle strength of the lower extremities in the development of dance.

2.2. *Training methods plyometric*

Working methods (G & D, Cometti., 2009) for the development of dance training to sportsmen are; 1- method horizontal steps, 2- method vertical jumps, 3- method session mixed, 4- method rebounds in repeated sessions.

CHAPTER 3

3.1. General aspect muscle strength

Stretch-shortening cycle training is characteristic plyometric. Maximum strength is a muscle that can take place during a rapid eccentric contraction. However, one must understand that muscles seldom perform one type of contraction in isolation during sports movements.

3.2. Contractions muscle

We have these types of contractions;

Dynamic contractions; if contraction results in changing the length of the muscle and joints movement or the contraction is called dynamic.

Static contractions; this type of contraction is more known as isometric contraction. Most contractions with which we are dealing in sports are dynamic.

Isometric contraction; produced in muscle tension, no change in muscle length. Static contraction has not been conducted in articulation movement.

3.3. Structural strength factors are composed of:

- a) cross section of muscle (muscle mass) The more muscle fibers to be developed as more volume is muscle and the greater will be opportunities to produce power, especially in its maximum display.
- b) Improving coordination Inter Intra muscular under sportsman understands ability to coordinate in separate groups during special muscular organized physical-motor, by rotating chains or specific body parts and intra muscular
- c) The composition of muscle fibers (skeletal muscles) are constructed of fibers that are visible characteristic morphological differences and physiological. Addressing the general classification by time of contracting fibers of fiber classify as fast and slow.

CHAPTER 4

4.1. Specific standard tests

Jump performance tests are often studied for their reliability and validity. Vertical jump ability is the key element for success in volleyball for men and for women because playing a game that is oriented around a certain height of the net in volleyball. Specific driving patterns related to vertical jump in volleyball characteristic type squat jump, countermovement jump and drop jump. In this way it is possible to determine optimal height of the fall by which athlete takes\ earns maximum jump and the connection between the heights of the fall, the time of contact and flight time.

4.2. Program plyometric training

Increasing the load should be done gradually adapting preparing volleyball. Demand growth should be gradual adapting volleyball players. Volume preparation and intensity of exercise materialized performing certain exercises for the task given. One of the essential tasks in preparing the team coach is to develop a training plan that will include the main objectives and specific and benefit the team or athlete

Group Experimental volleyball youth men taken in this study is approached at the premises of the UST in gym Fitness to develop the training program plyometric 12 week (Monday, Wednesday). Control Group Youth volleyball has developed a total of 10 total hours of technical training tactical ball under their coach training session duration of 90 minutes.

III. EXPERIMENT AND RESULTS

The program includes intensive application loads such as horizontal jumps up to jumps over obstacles and jumps in depth. Higher intensity exercises are carried out with a foot. Escalating intensity is used not only within a training session but also from week to week. Another component that increases the intensity of training load it and use the heights of buildings or vehicles used which comes under the principle of progressivity where early dances were given only to disconnect from the field and gradually increase the amount of vehicle



IV. DISCUSSION and ANALYSIS

To assess changes in both study groups received up to 12 weeks, according to data in tables and graphs above are derived from reliable GRFP. The main purpose of the test to dance with CMJ setbacks to young volleyball players get in our study was to determine the reliability of the measurement of key performance measures commonly used to determine the amount of power qualities of CMJ from GRFP data. Comparison homogeneous members of a group allows us to observe the entity level and stimulated physiological qualities that vary in function of changes required in other members of the group. According to a previous report (Lleshi, E., 2012) the results of the first to get on the ground from the National Team players aged 16-18 years old in Albania tested Muscle lab Jump (Ergo test Technology) (CMJ-SJ) X100 / CMJ) can be concluded the capacity to reuse the energy accumulated as a result of elastic withdrawal preceding muscle contraction (the percentage of elasticity) of the lower extremities volleyball. The relationship observed between enhancing the ability of dance and improvements in strength and power qualities of dance by the country SJ supports previous studies of training have been shown to volleyball players are useful for improving the vertical jump (Newton, RU et al 2006). It reported (Sheppard et al. 2007) that the strong correlation between the performance many of jumping SJ (0.85, P # 00:01) and CMJ (0.93, P # 00:01). This connection is also observed in both our groups' study that tested the platform GRFP, suggesting that the quality of the force and power affects the performance of the vertical jump as it depends on the development and capacity of a sportsman and the specific training carried out by them. By statistical methods Pearson correlation between the two tests SJ and CMJ is strong and positive, but variables between test _Pre and _Post plyometric training are at value <0:05. But if we do compared to what references received from foreign literature young volleyball players are in low levels jumping and values obtained from the training of force and maximum power which has not been implemented training program. Height of Jump (JH) is calculated from the acceleration-force size and weight of the individual impulse formula calculated from GRFP. Odds and reliability for time and strength variables were within the range of $r = .68$ to $.98$. One-way ANOVA statistical analysis (Scheffé post-hoc test) was statistically the main methods used to assess the significance of differences between the two groups volleyball obtained in the study (Experimental / Control). According to the force platform and the GFRP Software transducer connected to the computer, which enable direct measurement of characteristics gave the

following results from the test experimental group where the difference in $f_{max} \text{ CMJ_Pre} \pm 0.3$, $P_{max} \pm 0.1$ and $0.1 \pm V_{max}$ at the height of the jump shift the center of gravity are similar values to the control group. Power at any point in time is calculated as a product of GRFP. Power and speed are set as the highest values during concentric phase. The minimum speed is defined as the lowest value during the eccentric phase. This means that power is determined as the average power output between the time following; a) the concentric phase began and b) the concentric phase ends. Test CMJ _Post training plyometric of the experimental group was obtained difference in the values of $f_{max} 1.90 > 1.75$, $P_{max} 3.70 < 3.71$, $V_{max} 2.64 < 2.72$ and height of the jump displacement of the center of gravity $12:43 > 12:41$ with the control group that developed the only exercise technical -tactics.

These values were not statistically significant in vertical jump performance at CMJ test to have visible differences between the two groups which actually affect gender, volleyball experience in their sporting experience in time and their training in teams. The results of this study suggest that the ability of the jump in volleyball is highly related to the application of jumping with action against CMJ and SJ a chance; however it does not support the cause and effect. Results of this study support our objective that the ability to perform at the vertical jump as high volleyball players have to produce a power / strength as higher realized a training program defined by the trainers and this was evident in the results of the experimental group with that of the control group in tests by the country jump setbacks SJ and CMJ. Results of statistical analysis descriptive of the dependent variable of time and time of contact "TA / TC" presented in the tables showed evident progress in increasing the performance in this test to develop the two groups after attending training plan concerned. Plyometric training in measuring _Post is an increase averaging 12:18 seconds where to average both groups in the study is $(1.85 \pm 00:41)$ measuring seconds compared to $(1.67 \pm 00:37)$ Training _Pre seconds plyometric measurement. To control measuring group of 12 weeks training _Pre an increase of $(1.68 \pm 00:38)$ to $(00:35 \pm 1.82)$ the end of their training plan based. In the experimental group differences were observed higher than the control group (1.66 ± 0.4) in measuring _Pre in $(1.88 \pm 12:48)$ in measuring training _Post plyometric with defined training program.

From analysis Control of normality distribution test Kolmogorov-Smirnoff (sig. = 0.2) showed that the dependent variable "TA / TC" has infringements acceptable normal distribution of data taking into account the small size of choice volleyball in the study (N = 20) (Lleshi E., 2015).

Further test results Leuven based on the average, sampled homogeneity variance. Results of analysis of variance (ANOVA) with repeated measurements with two degrees of freedom are corrected with Greenhouse-Geisser ($F(1,18)=7.8$, $p=0.12$) as evidenced a statistically significant difference between the two measurements, ($\text{sig} . <0.5$) bringing us to the hypothesis Conclusion H1- H2 accepted and applied training plans were effective in increasing the performance of volleyball in the vertical jump test jump heights Drop 40cm-60cm. Analysis 2 repeated measurements ANOVA showed statistically significant differences between the comparison of averages "TA/TC" between measurements _Pre / _Post to both groups. According to the amendments to the two groups in stage TA / TC ratio between them appears to significantly higher from the beginning of the training program by the end of 12 weeks plyometric training. These results indicate that practical experiences suggest that the training of volleyball with the use of exercise drop-jump-drop type Drop Jump be realized using a progression volume by lower growing, able monitor able, so performance bouncing realized correctly to reduce the risk of damage that characterizes these type of activities.

V. CONCLUSION

- The results of this study show that the methodology used here is accurate and helps to compare the performance of the high and weaknesses that help trainers to program training plyometric without weights for developing the ability popup to volleyball Young under conditions that are.
- The results of this study support our objective that the ability to perform in the vertical jump high as volleyball players have to produce a power / strength as higher realized a training program set by the coach.
- Vertical jump can be reached to assess not only the height of its development, not only by body height and length of the wing or detachment from the ground to touch the object, but also the stage of stay in the air where possible by GRFP.
- Hypothesis H1 accepted and applied training plans were effective in increasing the performance of vertical jump of volleyball in the application of drop-jump-jump drop test Drop Jump height 40cm.
- Results of analysis of variance (ANOVA) with repeated measurements with two degrees of freedom are corrected with Greenhouse-Geisser ($F (1, 18) = 7.8$,, $p = 0.12$) as

evidenced a statistically significant difference between the 2 measurements (sig. <0.5) bringing us to the hypothesis H2 Conclusion accepted and applied training plans were effective in increasing the performance of volleyball in vertical drop jump height 60cm.

- Plyometric as other forms of training usually takes only two or three times a week. These exercises should be performed after resistance training or aerobic endurance sports.
- A good rule to follow up implementation of the program is to restrict plyometric group not to carry no more than 10 repetitions.
- It is extremely important that plyometric supervised exercises. Volleyball should focus on proper execution of dance technique.
- Descriptive statistical analysis results for the dependent variable "TA/TC" showed evident progress in increasing the performance in this test to develop the two groups after attending relevant training plan.
- From the Control Analysis of normality distribution with Kolmogorov-Smirnoff test (sig. = 0.2) showed that the dependent variable "AC / RC" has infringements acceptable normal distribution of data taking into account the size of the small selection of volleyball in the study (N = 20).
- From Control normality analysis shows that the two groups control / experimental distribution acceptable (to the limits of acceptable Kolmogorov-Smirnoff test) normal.
- First of all, this study confirmed that peak power, peak power and peak speeds are more reliable measurements and calculated using a force plate and GRFP.
 - From statistical methods Pearson correlation between the two tests SJ and CMJ it is strong and positive but _Pre variables between test and training _Post plyometric is at p value <0:05.
- Two groups of volleyball as Experimental / Control there are individuals who have been improvements during their training but Experimental group shows an increase in vertical jump performance values obtained from GFRP.
- Comparisons between test CMJ and SJ test showed that training that includes CMJ has a major effect on the development of explosive force, but it should take place regularly in the training team.

- The correlation coefficient shows that reliability is very high up the Dance ($r = 0.95-0.99$). Odds and reliability for time and strength variables were within the range of $r = 0.68$ to 0.98 .
- According to the strength platform GFRP group CMJ _Pre Experimental test where the f_{max} difference ± 0.3 , $P_{max} \pm 0.1$, $0.1 \pm V_{max}$ and the height of the jump shift the center of gravity are similar values to the control group.
- Analysis of ANOVA 2 repeated measurements for maximum Force as dependent variable and group (Experimental / Control) as independently resulted in value statistically not significant (sig. <0.05) as the test Drop test jump 40cm and 60cm Drop Jump.
- Analysis of ANOVA 2 repeatable measurements for maximum power as the dependent variable and group (experimental / control) as independently resulted in values statistically not significant (sig. <0.05) as the test DJ 40cm and test DJ 60cm.
- The correlation between the tests was measured by Pearson product moment. The results showed a high correlation coefficient ($r = 0,924$) and statistically significant (sig. <0.0005).
- Correlation linear between tests "Drop Jump 40" and "Drop Jump 60" as a rating intuitive would be the link that exists between the similarity of the test with a drop-jump-dropping DJ from a height 40 cm and the DJ 60 cm and results They showed a high correlation coefficient ($r = 0,924$) and statistically significant (sig. <0.0005).