

# INFLUENCE OF INSTANTANEOUS TORQUE EXERCISES ACCORDING TO ABSOLUTE ANGLES FOR CERTAIN BODY PARTS IN SOME OF THE VARIABLES BIOMECHANICS TO TACK OFF TO VAULT AND JUMPING EVENTS OF ATHLETICS

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## Abstract

Training according to the momentary plucks the absolute angles to the working body parts jumpers horizontal and vertical jumps with Athletics taking place have in raising a modern training trends which turn out researchers to apply empirically since the moment the upgrading is one of the most important stages in all competitions jump and jump and to prepare training plucks according to absolute angles of body parts moving when upgrading to these events and to identify the effect of these exercises in developing real-time and instantaneous torque force to working muscles as pay and performance when upgrading. Applied research on a number of horizontal and vertical jumps Iraqi youth and measured instantaneous horizontal and vertical ampules their reliability as well as traffic, by device (Dina foot) and measuring the efficiency of real-time ampules according to the ratio of instantaneous torque and linear, as well as measure performance according to the ratio between flying angle and mechanical energy, a positive development emerged in the instantaneous ampules stability and movement as well as the development of efficient real-time ampules and performance.

**KEYWORDS: Mechanical Energy. Tack off. Instantaneous torque.**

## 1. INTRODUCTION

The strength training method according to the angular ranges which is called moment of performance take two sides, the first to achieve the relative angle ranges that associated with the movement of two body parts that joined in one joint and in this kind the muscular work is common for both body parts and the second to achieve angular ranges for one part of the body and fixing the other parts according to its angular movement on the vertical or horizontal coordinates and this so-called the ranges of absolute angles traveled by that part, as the angular work according to these angles may be related with achieving overcome moments of resistance that must be overcome by the working muscles of that part. Often these moments of resistance is an external resistance fixed by a distance from the axis of rotation of this part of the body and on this basis can develop instantaneous moment that associated with the movement of the body part; instantaneous movement (explosive) or instantaneous movements frequent (quick power) and the result also can be the development of the efficiency of pushing and performance efficiency. In our research, we decided to go in intraday moments exercises according to the absolute angles of the working body parts of the horizontal and vertical jumpers that occur during the upgrading stage to show the importance of these exercises in the development of intraday pushing when performing the pushing from a plateau or movement, as well as the development of the intraday pushing when performing pushing from approaching (the movement) and the associated pushing and performance efficiency. Considering that moment of upgrade is one of the most important technical stages in all competitions of jumping.

The training of muscular moment depends on the amount of applied muscular force and the length of the lever arm (whether lever, arm or leg or trunk) and the amount of the used resistance (which may be the weight of the same part or addition an external resistance to it or medium resistance such as water for example) and this means that the moment of the force of that body which causes its absolute movement in accordance with the calculated angular ranges according to the angular axes was linked to a hinge (spindle) which is located in the same intersection point (Johnson 1999, 137). The basis of the training is according to the absolute angles either by changing the amount of resistance or by changing the resistance arm. (1996, 145, Moravece tal (et al)) as "The most important note in the system of levers in the human structure is the muscular effort which is very high in proportion to the fixed moment which is produced against certain resistance" (Al-Fadhli 2010,9). The moments of strength training means the conversion of the resistance with the same weight of the body through the use of added variable weights to the body weight or body part and this gives resistance training for the muscular groups that implement any movement reversal to the Earth's gravitational movement of both arms or legs and even the muscles of the trunk. So the principle of changing the force during the range of absolute movement represents a fundamental goal of muscular

development. (Al-Fadli: 2012) and this study is an attempt to demonstrate the importance of training in accordance with the absolute angles in intraday pushing and instantaneous moments during upgrading and their efficiency.

The research aims to prepare the training of moments according to the absolute angles of the moving parts of the body for raising events of jump (vertical and horizontal). And identify the impact of these exercises in the development of real-time power and intraday torque of the muscles working and efficiency of pushing and performance during upgrading of the jumping events.

## 2. MATERIAL AND METHODS

The experimental method has been used with design of one experimental group.

Research sample: The research sample included (8) hopper players (2 high hopper, 3 long hopper, 2 triple hopper and 1 Zana hopper), sprains coefficient was calculated as shown in table 1

**Table 1: shows the specifications of the sample members**

Variables	Unit of measurement	M	SD	med	SK
Age	year	17.57	0.534	18	0.374
Training age	year	2.857	0.899	3	0.353
length	meter	170.7	5.089	170	0.955
Mass	kg	64.00	11.31	60	1.265
Leg length	meter	0.902	0.041	0.90	1.307

From the results of table 1 note that the research sample is homogeneous in anthropometric and this is shown by the torsion coefficient values which are all confined between ( $\pm 2$ ).

Measurements of the special measures: the instantaneous pushing is measured (in newton) by using a device (Dina foot) after fixing it in the feet and as follows:

- The instantaneous pushing from the vertical and horizontal stability: Through the long jump and the vertical jump from stability.
- The vertical and horizontal pushing from suitable approaching distance.
- Instantaneous moment of the leading leg during intraday horizontal and vertical pushing from approaching has been measured from photography and video analysis using the following kinetic and mechanical law:

Moment = (leg mass  $\times$  square radius  $\times$  angular speed)  $\div$  instantaneous time of moment (Net.M.sec.)

- measuring the efficiency of horizontal and vertical pushing through the following law:

Performance Efficiency = (intraday moment  $\div$  intraday pushing)  $\times$  100 (%)

- The efficiency of performance through the following law:

Performance Efficient = angle of departure  $\div$  mechanical energy decreasing (degree / Gol / kg)

Note that the mechanical energy decrease = (kinetic energy of the body during stability moment + its situation Energy during stability moment) - (kinetic energy of the body during pushing moment - energy situation during pushing moment)  $\div$  body mass

Tribal tests was conducted on (08/29/2014) on Al-Shaab stadium. The researchers filmed the video for the research sample during performing vertical and horizontal jumping movements from stability.

Trainings of special force according to moments: weights or special belts added to the body parts that move according to the absolute angle which is angle of arms and angles of the legs and the angles of the trunk and the weight is added to these parts (the resistance  $\times$  length of the segment that responsible for movement) whether the part is the arm or leg or trunk, so that during the movement of the part that loaded with ,the other part that is associated with this part of the same joint is fixed , the change in resistance is done through the addition of a new weight during the implementation of training performance according to what the experience require to bring the desired development, the training is done by (3) training unit per week and the way of repeating and periodic training of high intensity to develop its own capacity, and it was the time of the exercises in the part of the main part within the section of the training unit ranges between (30-40) minutes. The exercises was applied in on Monday (04/09/2014) until Saturday (10/27/2012). The exercises included (24) training unit in the days (Saturday and Monday and Wednesday) every week since the application of the exercises took 8 weeks for special preparation and included (20) units. The added weights identified according:

The real weight of the body part = body weight  $\times$  the relative weight of the body part.

Posteriori tests: After the completion of the exercise of the research group, a posteriori tests were conducted on the date (30/10/2011) taking the same temporal and spatial conditions that took place by the tribal tests.

### 3. RESULTS AND DISCUSSION

Showing the tribal and posteriori means of the intraday pushing (horizontal and vertical), fixed and mobile and their discussion:

**Table 2: the statistical parameters of the two tests tribal and posteriori of the intraday pushing (horizontal and vertical), fixed and mobile**

Variables	Unit of measurement	Tests	M	SD	M D	T	Level of error	Sig.
Stable horizontal intraday pushing	Newton	Tribal	1630.3	464.2	86.47	5.368	0.028	significant
		Posteriori	2094.5					
Stable vertical intraday pushing	Newton	Tribal	1739.40	622.37	124.85	4.985	0.006	significant
		Posteriori	2361.77					
Moving horizontal intraday pushing	Newton	Tribal	3234	530.44	91.27	5.812	0.021	significant
		Posteriori	3764.44					
Moving vertical intraday pushing	Newton	Tribal	3763.36	48.187	6.983	6.90	0.000	significant
		Posteriori	3811.547					

Significant at error ratio  $\leq (0.05)$  and with degree of freedom (7)

The development of intraday pushing from fixed and mobile whether horizontal or vertical of the research sample was due to exercises that have had a significant impact on increasing the intraday pushing (vertical and horizontal), as the exercises of moments in accordance with the absolute angles that achieved by the body part, whether the leg or a trunk or arms have an impact absolutely on the development of the working angular work of the muscles on these parts and in rotatory manner according to the goal of the movement as the values of these angles are 90 allowing it to overcome the biggest torque of resistance facing the connective muscles of that segment with less time, and this increases the horizontal or vertical pushing and with high efficient whether pushing from stability or approaching and with less time to push, as there is a need to increase the intensity and the amount of the work for the development of the intraday pushing, with an emphasis on the size of the used resistance, attention to its amount and a point of its impact and its direction and the amount of longitudinal tension of the muscle as well as the point of junction between the muscle and the bone and its relationship with the joint (Stein, 1991,4-8) (Wilkie, 1998,85-86) and this is what happen to the negative muscular work which requires a non-central contraction by elongation of the muscle at work (as preparation) as a result of the added weight through the effect of gravity on the body part, the researchers used a variety of exercises for all types of muscular contraction of the contributed muscles to raise the efficiency in order to make the muscle effective in its efficiency.

Showing the tribal and posteriori means of the intraday moment (moving vertical and horizontal) and the pushing efficient and efficiency performance and discussed it:

**Table 3: Statistical parameters of the tribal and posteriori tests for the instantaneous horizontal and vertical moment and pushing efficient during pushing from approaching**

Variables	Unit of measurement	Tests	M	SD	M D	T	Level of error	Sig.
Horizontal intraday moment	Net. Meter	Tribal	2301	1063.44	213.2	4.987	0.004	significant
		Posteriori	3364.44					
Vertical intraday moment	Net. Meter	Tribal	2313.06	1340.24	241.9	5.541	0.000	significant
		Posteriori	3653.28					
Efficiency of horizontal performance	%	Tribal	0.711	0.182	0.05	3.898	0.032	significant
		Posteriori	0.893					
efficiency of vertical pushing	%	Tribal	0.614	0.344	0.07	4.755	0.002	significant
		Posteriori	0.958					
Efficiency of horizontal performance	Min.gol.kg	Tribal	2.344	10.216	2.64	3.87	0.01	significant
		Posteriori	12.56					
Efficiency of vertical performance	Min.gol.kg	Tribal	2.541	12.799	3.04	4.21	0.002	significant
		Posteriori	15.34					

Significant at error ratio  $\leq (0.05)$  and with degree of freedom (7)

Results in the table (3) show that the exercises of moments that have adopted the absolute angles in their application has influenced in the development of the intraday moment for the leading leg and the intraday pushing of it and the exercises used which were similar to the movement of the rudder and the movement of the two legs during the upgrade was a great influence in the development of the intraday pushing that is similar to the pushing during upgrade so that the muscle in an extension state to prepare for the production of large muscular work with less time . The muscle can give a greater push in the main section (Fadhli 2010.279).

This is consistent with what was said by (Ahmed Pasha and others) saying "training with exercises help for the development of nervous and muscular strength of the players including the special exercises and with the use of similar muscular groups and at the same general trend of the performance of the game itself to reach to the high level "(Ahmed and others , 2005.78), so that the researchers attribute the development of moments as a rotational muscular groups contributed to the development of the intraday pushing both during the horizontal or vertical upgrading according to the kinetic performance and therefore its positive impact on the development of intraday pushing efficiency that result from the ratio between the moment and the intraday pushing during pushing from approaching as a result of the effectiveness of used exercise which relied entirely on scientific bases in the exercise like stresses, repetition , and using resistance exercises either gravity or body weight, as training with additional weights and with certain proportions from the body weight is considered of the means and methods of training with high impact in the development of muscular groups that work in the performance and the use of the body weight with the addition of weights to increase the resistance is one of means of muscle strength development (Hilmi and Braiquea, 1997, 15), especially muscular strength, which have the privacy character in performance as force pushing or moment in the various muscle groups in the body in accordance with the primary goal of performance (Hossam Al-Deen, 1994.214), the performance of the sample members of the exercises with different intensities for all the duration of the application of the special exercises with frequencies led to an improvement in the ability of muscles under the research and this is consistent with what was said (Owen 2000) in the training of continuous and intensive repetition for exercise helps to improve compatibility, and help to improve the ability in the working muscular groups which serves the skill of performance in proper form. (Peter Thompson, 2014.113-114).

The use of the principle of training depending on the moments of strength to the working muscles of the two legs and the trunk as well as in accordance with the absolute angles led to a positive increase in the development of the moments of force in legs causing this movement, as "The training by using light weights which is characterized by high power especially affects in different parts of the curves of strength, speed, also the main objective of the training on light weights is to increase the instantaneous pushing production rate "(Michael, 2001,86), although the muscle when trains with its full strength to overcome the little resistance in a short time and rapidly increasing its capacity (Hussein, 1985.61), and this had an effect on the development of the starting angle when performing pushing from movement and reduced mechanical energy and these two factors contributed to the development of performance efficient during vertical and horizontal pushing from movement and as the results appeared in table (3) above for this variable.as that one of the most effective forms in the development of pushing from stability or from the movement, which are based on strengthening the muscles of the legs and trunk, and works in conjunction with a good technique to provide the level of achievement of various sporting events "(Bstaiwis 1999, 117).

Researchers agree with what it says (Bollok) that "The intraday pushing has the primary importance to perform the rapid movements and to overcome the inertia from stability" (Bollok, 1990,69). As well as the muscular strength is the foundation for all other physical abilities of the player because they significantly affect the speed of movement in the activity which is linked to the speed and endurance and flexibility)) (Billat, V, L; & oralsztein, 1999,151-152).

#### 4. CONCLUSION

1. Special strength exercises achieved in accordance with the theory of moments a positive impact on the development of variable value (intraday horizontal and vertical pushing) with the research sample.
2. The special strength exercises (moments) in accordance with the absolute angles of the body parts have had a positive impact on the instantaneous moments during pushing from approaching either for the horizontal or vertical jumps.
3. The research sample made clear progress in the level of intraday pushing efficiency which expresses the ratio between the instantaneous moment and intraday pushing when performing pushing from approaching vertically and horizontally.
4. Also a positive impact of moments training for body parts that contributed in the intraday pushing appeared in the development of efficient performance that reflects the development of the starting angle and decreasing the mechanical energy during approach and departure.

#### 5. REFERENCES

1. Ahmed Fouad Pasha and others: Biophysics, Cairo, Dar Al Fikr Al-Arabi 2005

2. Amaal Jaber and Mohammed Braiquea: biomechanical principles and their applications in the field of sports, Dar Al-Wafaa for printing and publishing, Alexandria, 1997
3. Bastawisi Ahmed; track and field competitions - Education - Technique - Training edition 1: (Cairo, Dar Al Fikr Al-Arabi, 1997)
4. Petr. J. Thompson: Guide to train athletics.) Translation by Sareeh Al-Fadli . Najaf. Dar Al-Diaa for printing 2014
5. Sareeh AbdAl-Karim Al-Fadhli: dynamic and athletic biomechanics, for students of Physical Education, Baghdad. Dar Al Ghadeer for Printing 2012
6. Sareeh Abd Al-Karim Al-Fadhli : applications of biomechanics in sports training and motor performance, Oman, Dar Dijla 2010.
7. Talha Hussain Hussam Al-Din: the foundations of motor and functional athletic training, Cairo, Dar Al-Fikr Al-Arabi 1994
8. Qassim Hassan Hussein, Abd Ali Nassif, science of sport training, printing house for publication and distribution, Mosul, 1990
9. Bollok,, J: Speed Strategy and Running Tactics in Middle and long Distance Events, IAAF, RDC.CAIRO, 1990
10. Billat, V, L; & Oralsztein,;. Higashi Y, Yoshizumi M. New methods to evaluate endothelial function: method for assessing endothelial function in humans using a strain-gauge plethysmography: nitric oxide-dependent and -independent vasodilation. J Pharmacol Sci 1999
11. Michael, .N: Intra-Race Position for Medal Winners in the Track Edurance Events at the 2008 olympic Games.NSA.by, IAAF.
12. Stein Moat: Athletics Coach. Scientific journal issued by the British Union for the Athletics, 1991
13. OWEN. P, R; Biomechanics of distance running. Champaign.II.human kinetics .2000
14. Johnson, BH and Nelson, JK: practal measurements for evaluation in physical education. Minnesota, Buryess publishing compuny, 1999
15. Wilkic, 1998,85-86) Aram patzis, A; Bruggemann, G, P: mathematical high bar-human body model for analyzing and interpreting mechanical-energetic processers on the high bar, Journal of biomechanics.31; 1998,
16. Moravece tal (et al), Time analysis of the 100m meteres eventsat 11 world championship, (in Athena) 1996,

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