



IMPACT OF PLYOMETRIC SESSIONS ON SOME MINERALS AND PHYSICAL ABILITIES FOR SOCCER PLAYERS

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Abstract :

The study aimed to determine concentration of the minerals and some physical abilities level, And to Identify the differences between measurements and tests of the level of concentration of minerals and physical abilities before and after implementation of the training exercises. (22) players with (age=18.06±0.8 years) participated in The training exercises period, Players were tested during rest before doing any effort, And they were tested after doing efforts immediately, The pre-test started by measuring height, weight, age, 40 yards speed run, long jump, zinc, sodium, magnesium and calcium. Minerals measurements included (Zinc, Magnesium, Sodium and Calcium), Physical abilities included (Speed, power). The plyometric training exercises lasted (8) weeks in the Specific preparation period, Each week contains (5) training sessions plus a friendly match with one day rest a week, plyometric sessions exercises were implemented within (3) sessions per week, Sessions take (90-120) minutes, In total of (40) training sessions including (24) plyometric sessions. Total of training sessions times is (73) hours. The study showed a slight decrease in sodium, Zinc and Magnesium. Increase in calcium, Significant Improvements in speed and power.

Keywords: Training, Minerals, Physical abilities, Soccer.

Introduction :

Due to the different quality of performance in soccer and the association with the playing position as well as the duties associated with the playing plans, the individual differences and the differences of abilities between the players of the



team is particularly important in the process of numbers and planning for the training season and sessions and periods. "They also advocated for a health-related focus, de-emphasizing peer comparisons, and putting testing into an overall perspective of planning and monitoring progress towards personal fitness goals".(PRUSAK III et al., 2013)."Plyometric training is one of the modern training methods, which includes explosive exercises. It consist to two phases, first one is eccentric contraction of muscles by stretching vibers rapidly, then the second phase is concentric contraction by shortening vibers to produce high explosive power"(Shareef, & Digham, 2022). A rapid stretch and shortening activity may lead to sensitivity of the muscle spindles and desensitization of the golgi tendon organs during eccentric loading (Swanik et al., 2002). Soccer contains about 1350 activities by 220 high speed running which needs change of body position and direction (Mcmillan et al., 2005). Players have to cover long distances as well as a high number of accelerations and deceleration, physical contacts, sprints, direction changes, throwing, catches, passes and kicks (Hoff, 2005). As a result of soccer games with strong and fast performance that requires maximum strength characteristic of speed, usually appears in rapid attack and shifting from defense to attack and vice versa. Since this game lasts for a long time it requires the player to maintain fitness level consistently throughout the game.

The importance of research is reflected in the exploitation of the most appropriate methods in training that do not lead to increased training loads in the players, as well as in the hands of the coaches for the purpose of identifying the biochemical and functional variables that occur in the player, and the extent to which they relate to some basic skills of football and how these indicators are related to the performance of skills, and how weaknesses and strengths are detected in the player, as well as the impact of the training on them, so coaches can use them at the lowest costs to be parallel to the possibilities Materialism and humanity and the advancement of the game forward properly, which calls for the legalization of training to develop sports achievement and achieving better levels in the soccer game, as well as to create more necessary information that benefits the trainers. The study of mineral is one of the most important indicators that indicate the validity of the training plyometric exercises, as well as there is a lack of intake of mineral by players despite of its importance in sports activity, as well as when training on the characteristics and duties of playing soccer.

**Considerations :**

Before beginning any form of plyometric training program, there are some factors that must be looked into to avoid complications to occur during the training. Such factors are age, body weight, strength prerequisite, sports requirements, experience, previous injury, jumping surface, warm-up, progressions, recovery and frequency (Jensen & Ebben, 2007).

Method:

The players of Al-Bat'ha football club have recruited to be the sample of this study, (22) players with (age= 18.06 ± 0.8 years) participated in The plyometric exercises training for (8) weeks in specific preparation period, Each week contains (5) training sessions plus a friendly match with one day rest a week, plyometric sessions exercises were implemented within (3) sessions per week, Sessions take (90-120) minutes, In total of (40) training sessions including (24) plyometric sessions. Total of training sessions times is (73) hours. The sample was tested pre-post tests before and after training plyometric exercises to detect variables and changes of values. The pre-test started in 13 Sep 2021 to measure height, weight, age, 40 yards speed run, long jump, zinc, sodium, magnesium and calcium. Players were tested during rest before doing any effort, and they were tested after doing efforts immediately. The plyometric exercises was applied in 22 Sep 2021, General preparation period took (9.3) weeks, each week contains (5) training sessions and each session takes (120) minutes. The equivalent of (43) training sessions. Specific preparation period took (8) weeks, each week contains (5) training sessions, each one takes (90-120) minutes equivalent to (40) training sessions including friendly matches. Total of training sessions times equivalent to (73) hours for the specific preparation period. the sessions formed of warm up for 15 minutes, main part which includes (physical, skills and tactical) for (70-100) minutes, and cooling down for 5 minutes. The post-test was applied after specific preparation period with same pre-test situations .

Results :

Table (1)

Sodium	Pre-effort	Post-effort	Std. Dev.	Std. error	Calculated t.	Table t.	Fr.deg	Result
	M	M						
Pre-plyometric exercises	148.00	141.25	1.764	0.509	13.251	2.20	11	Sig.
Post-plyometric exercises	147.75	138.75	1.858	0.960	16.774			

Table (2)

Variable	Pre-plyometric exercises	Post-plyometric exercises	Std. Dev.	Std. error	Calculated t.	Table t.	Fr.deg	Result
Sodium	Post-effort	Post-effort	2.393	0.960	3.619	2.20	11	Sig.
	M	M						
	141.25	138.75						

Table (3)

Calcium	Pre-effort	Post-effort	Std. Dev.	Std. error	Calculated t.	Table t.	Fr.deg	Result
	M	M						
Pre-plyometric exercises	3.37	4.16	0.246	0.0711	11.13	2.20	11	Sig.
Post-plyometric exercises	3.35	5.14	0.417	0.120	14.87			

Table (4)

Variable	Pre-plyometric exercises	Post-plyometric exercises	Std. Dev.	Std. error	Calculated t.	Table t.	Fr.deg	Result
Calcium	Post-effort	Post-effort	0.390	0.112	8.66	2.20	11	Sig.
	M	M						
	4.16	5.14						



Table (5)

Zinc	Pre-effort	Post-effort	Std. Dev.	Std. error	Calculated t.	Table t.	Fr.deg	Result
	M	M						
Pre-plyometric exercises	4.741	4.082	0.348	0.100	6.54	2.20	11	Sig.
Post-plyometric exercises	3.935	3.175	0.432	0.124	6.08			

Table (6)

Variable	Pre-plyometric exercises	Post-plyometric exercises	Std. Dev.	Std. error	Calculated t.	Table t.	Fr.deg	Result
Zinc	Post-effort	Post-effort	0.462	0.133	6.79	2.20	11	Sig.
	M	M						
	4.082	3.175						

Table (7)

Magnesium	Pre-effort	Post-effort	Std. Dev.	Std. error	Calculated t.	Table t.	Fr.deg	Result
	M	M						
Pre-plyometric exercises	19.34	16.47	3.063	0.884	3.246	2.20	11	Sig.
Post-plyometric exercises	17.081	14.694	2.801	0.808	2.952			

Table (8)

Variable	Pre-plyometric exercises	Post-plyometric exercises	Std. Dev.	Std. error	Calculated t.	Table t.	Fr.deg	Result
Magnesium	Post-effort	Post-effort	1.247	0.360	4.95	2.20	11	Sig.
	M	M						
	16.47	14.69						



Table (9)

Variables	Pre-plyometric exercises	Post-plyometric exercises	Std. Dev .	Std. error	Fr.deg	Calculated t.	Table t.	Result
	M	M						
40 yards run/sec	15.79	13.19	0.399	0.115	11	12.11	2.20	Sig.
long jump/cm	228.33	248.16	9.92	2.86		6.92		

Discussion:

Sodium :

Tables (1,2) shows sodium level is in the normal limits of (138-149 ml.gr/l) which indicates that training plyometric exercises contributed to retention of sodium concentration level despite of loads which accompanied by a slight decrease in sodium and therefore the training has an impact on rise of working muscle temperature by increasing the metabolic processes associated with sweating during physical effort which must increase or maintain sodium concentration and despite From the activity of the distroon enzyme could notice a slight decrease in sodium due to an uncontrolled removal of the body, while the centers which controlling sodium ion are more than 12 such as adrenal gland."Maintaining sodium concentration is related to exercise intensity and duration in the case of normal heat conditions, safety of vital organs and high fitness"(J.E, 1982). "losing fluid through sweating leads to the permanent secretion of a large amount of dosterone from the adrenal glands so that the excessive increase of dosterone produces all the enzyme ban, the transfer of all types of sodium absorption to intestinal epithelial cells, which leads to an increase in the preservation of sodium and this effect produced by dosterone in the infectious way is the same effect that the enzyme activates in renal sperm, which also maintain sodium and water in the body when athletic misses some fluids"(Gaeton, 1997).

**Calcium :**

Table (3,4) shows the control comes by an effective transport through the outer membrane and the hewi network, which indicates that the training plyometric exercises contributed to the players' response to physical effort and their adaptations in maintaining calcium concentration and accompanying the high concentration in blood, this occurred as a result of the release of an amount of calcium to the liquid outside the cells and therefore this increase led to the activate thyroid hormone, which in turn draws an amount of bone calcium to suit the body's need and with this increase also an increase in the process of emptying with faeces. "Thyroid hormone is one of the main controlling of calcium so that when the level of this hormone increases, it leads to an increase in calcium reabsorption as well as increased plasma phosphates concentration leading to an increase in calcium reabsorption"(Gaeton, 1997,102). The training plyometric exercises gave many biochemical and physiological variables that indicate the presence of a real effort on the heart muscle, circulatory system and other organs by filling the body's need for oxygenated blood to increase metabolic processes within muscle fibers and that increased sweating associated with training load led to the loss of an amount of water, which increased calcium concentration after physical load. The player's occurrence within the normal limits due to the harmony of the organs responsible for calcium with the performance of physical loads, which indicates the continued activity of calcium electrolyte in the physical load of the process of contraction and relaxation as well as the participation of most vital and enzyme events that occur in the body and there have been no changes far from the normal limits and therefore this result supports the validity of measurement of calcium concentration and hence its role in the electrical and mechanical work of the heart muscle physiologically despite Performance of physical load(Musallam, 2001).

Zinc :

Tables (5,6) shows no changing in all measures, the values were within the normal limits (2.8-5.9 microgram) indicating that the training contributed to the retention level of concentration of zinc despite being exposed to training load, which accompanied by a slight decrease in zinc concentration by raising the temperature of the working muscles as a result of the loss of some fluids because of exercises which helped to stimulate and need the body to release the Carbon hydrase enzyme found in red cells, which is responsible for the rapid union of carbon dioxide with water in the red blood cells of the surrounding capillaries blood, as



well as the rapid release of carbon dioxide from the blood of pulmonary capillaries to the capillaries to be released out of the body."Zinc is very important for human health and the imbalance in its proportion leads to disorders, muscle decay, decrease in body weight and weakness in the nervous system and muscles"(Fattah, A. E., & Allawi, 2014). "Zinc is a useful element in the body because it helps to perform motor activity because it stimulates all the muscles working in performance and helps to produce energy"(Naser, 2019). "zinc normal level helps to resist fatigue caused by training load where it accelerates recovery"(Becker et al., 2015). Zinc stability at a normal limits is due to the training which contributed to the stability of PH blood as it delays the appearance of fatigue because zinc is one of the components of lactic hydrogen depreciation and thus it is important for inter-shifts between peruvic and lactic to delaying the fatigue.

Magnesium :

Although there were significant differences in all measurements shown in tables (7,8) where the values were within the limits of (11.3-20.2 gr.) indicating that training contributed to keeping level of magnesium concentration in normal value, where it maintained the stability of blood pressure as well as contractions and relaxing of muscle naturally as well as the delivery of nerve signals quickly, which led to the stability of magnesium, thus obtained stability in calcium level because it is linked with magnesium as well as helped to release thyroid hormone and keep its level. Magnesium in the blood leads to higher blood pressure as well as muscle contractions and non-delivery of nerve signals to working muscles as well as some heart attacks and disorders leading to increased magnesium which affects calcium in terms of increase and decrease. The training contributed to the non-penetration of the magnesium of body despite high temperatures and sweating during training for a long time as well as due to physical load and not to block the amount of fluids inside the bladder, which in turn affect calcium due to the deficiency, and also helped to maintain the metabolic reactions that feed muscles powered by ATP, which led to preservation pre status in parallel with the physical effort exerted. "Magnesium helps to complete some interactions involving ATP, while excessive it impairs function of the central nervous system and heart propulsion"(Hossiny, 2022).



Physical Abilities :

Speed :

"Studies on the relation between physical activity and health-related quality of life reveal a positive finding when participation in physical activity, even at a minimal level, is compared to non-participation"(ÖZCAN & SARAÇ, 2021). Significant differences were shown in tables (13) Due to training which led to an rising in the level of achievement, "Speed must be trained by working extremely to develop special speed of soccer players"(Al-Rubaidi, 2011). "speed is linked by explosive power as well as the method of training used to develop speed leads to develop neuromuscular compatibility and enhance rapid motor units to provoke high speed, improve range of joints motion helps to gain high speed and thus the expansion of the step which reflects on speed"(Hussein, 2013). "Increasing training period to 120 minutes while reducing rest periods leads to the development of the tolerance of the internal organs of the individual and thus the player's tolerance to perform a full match without feeling tired"(Sen, 1999). flexibility training by giving focused exercises to develop motor range develops all kinds of speed.

Power :

Table (9) shows significant differences in pre-post measures due to adaptation of muscles that had ability to form and release (ATP) in the working muscle, "when observing the time of performance of this test does not exceed (1-2) seconds as this time falls within basic ATP system stored in muscle"(Jensen & Ebben, 2007). That means this time is within the time of the controlling (ATP) system which made the differences appear in post test, "If muscular work of any test or performance during the time (1-4 sec) the dominant energy system is phosphagenic system and energy sources to perform muscular work are from (ATP) stock in muscles"(Fattah, 1998). Since the soccer player needs the anaerobic capability because most of movements perform in a fraction of a second. Plyometric exercises are considered one of the types of exercises that contribute to improving some special physical abilities, the most important of which is muscular strength(Ela, 1997). "Focusing on players training while determining their duties on the field as well as focusing on skill leads to adaptation of heart and respiratory system to work more economically with satisfactory results"(Majid, 2016). "Deep jumping training leads to the development of nervous system and responds strongly and quickly during movements requiring a muscle range, and



thus leads to the rapid response of muscles as reflex reactions by muscle spindles, which in turn reflects the extent of neuromuscular compatibility that includes motor unit and the recruitment of nerve pathways for the purpose of working between that muscle that contracts during the opposite performance in which it is a state of elevation which works to develop the ability of the muscle working high efficiency" (Ali, 1997).

Conclusions :

Biochemical tests and measurements indicate the health integrity of the sample, so the plyometric training exercises was applied on all members of the sample without exception, Although all Biochemical measurements mentioned were within normal limits. The ability of antibiotics to maintain blood vitality despite physical effort. A maintain minerals in pre-post tests after physical effort within normal minimums and possibly due to exercises in high temperature. There is a progress in the status of a speed and sprinting in the members of the research sample. There is an improvement in the explosive power, The application period of the training plyometric exercises was 4.5 months, It was sufficient for positive changes to the study variables of sample.

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