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Evaluating the Muscle Balance Ratios by Using Isokinetic Dynamometer (Biodex3) According to the Athletic Achievement Level for the Karate "Kumite" Players as a Determinative Factor for the Training Programs.

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Abstract

The research aims to evaluate the Muscle Balance Ratios by using Isokinetic Dynamometer (Biodex3) according to the athletic achievement level for the Karate "Kumite" players as a determinative factor for the training programs. Twenty-four Kumite players were included in the main sample which participating in the Republic Open Championship for juniors and youth, by selecting (3) players obtained in the first, second, and third position in the following weights (61 Kg, 68 Kg, 76 Kg, and above 76 Kg).Also, twelve players who had not achieved any position in the championship were selected from the same weights. The most important results were: There are statistical significant variances between the players obtaining positions, and the players not obtaining positions in the same weight in favor of the players who obtained position in some variables of the Muscles' Balance in the knee joint; including Peak Torque of Flexion, Acceleration Time of Flexion, Peak Torque of Extension, and Deceleration Time of Extension. Also in some variables of the Muscles' Balance in the trunk joint, including Agonist/Antagonist Ratios, Peak Torque of Flexion, Acceleration Time of Flexion, and Peak Torque of Extension and Also in some variables of the Muscles' Balance in the elbow joint, including Agonist/Antagonist Ratios, Acceleration Time of Flexion, Deceleration Time of Flexion, Peak Torque of Extension, and Deceleration Time of Extension in favor of the players who obtained position. There are not statistical significant variances between the players obtaining positions and the players not obtaining positions in the same weight in some variables of the Muscles' Balance in the knee joint, including Agonist/Antagonist Ratios, Deceleration Time of Flexion, and Acceleration Time of Extension, Also in some variables of the Muscles' Balance in the trunk joint, including Deceleration Time of Flexion, Acceleration Time of Extension, and Deceleration Time of Extension And also in some variables of the Muscles' Balance in the elbow joint, including Agonist/Antagonist Ratios, Acceleration Time of Flexion, Deceleration Time of Flexion, Peak Torque of Extension, and Deceleration Time of Extension in favor of the players who obtained position , There is a direct relationship between the Muscles' Balance Rations and the Athletic Achievement Level, which can be considered as a determinative factor for the training programs for "Kumite" Players.

Key words*: The Muscles' Balance, Kumite.*

Introduction:

Sport training is considered an organized educational process, subject to the scientific basis, in order to help the players reach upper levels of achievement. So, professionals in the sports training field seek to learn about the modern methods of sports training and the accompanying scientific theories. Sports' training is a science that always tries to change for the better, so as to ensure a better physical and technical level in order to reach the highest levels in sporting achievements.

Ahmed Mahmoud Ibrahim (1995) refers to karate as one of the individual fighting sports that is characterized by rapid change for each of the attack and defense situations. It requires the player to choose quickly among various motor skills (defensive, offensive, and counter-attack) through a good reaction, with a high degree of motor control (1:15).

Abdel Rahman Zaher (2005) believes that the muscles are the main part of the musculoskeletal system and that they work according to the signals received through the nerves. The contraction of those muscles affects the movement of the body in all its parts. Also, Mohamed Sobhi Hassanein (2001) adds that the muscles are the source of the movement in the body, because they are the source of power causing movement and (allow) the joints to move(11:53), (16: 196).

Also, both of Mohammed Allawi and Abul-Ela Abdel Fattah (2000) state that the muscle does its main function through the muscle contraction or the muscle relaxation and, as a result of that, the bones of the body related to these muscles move to cause different movements to occur or to set up the body when taking certain situations, depending on the type of muscle contraction (14: 105).

Also, Abdul Aziz Tiger and Nariman al-Khatib (2007) confirm that the performance in all sports activities

depends on how you move your body. The muscles control the movement of the body, either by contraction or by relaxation, in order to move the body's parts. The stronger the muscles are, the more effective the contractions and the better the movements are (12:53).

Both researchers believe that the competitive performance of the actual karate "Kumite" fighting requires the ability of motor balance and muscle balance. Also, it requires a harmony between the muscles' contraction and relaxation, which appears while doing punches or kicks against the competitor. So, it has an effective and efficient role in the results of the matches. In this context Mahmoud Rabie Alepeshahy (2005) and Kollenbet (2003) refer to that the actual fighting (Kumite) means an optimum utilization of the capabilities of the player and a good behavior in various rapid situations against his competitor, either defense or attack during the game time, under the framework of the international karate rules (17:11).

Zaki Mohammed Hassan indicates (2007) that when we think of balance, we must consider two factors in our mind: the balance of different body parts, and the balance of the counter muscles. The balance of joints and muscles and their relationship to the parts of the body is an influential factor in controlling the movements and the sports performance (8: 92).

Also, Atef Rashad (1999) and Dan Wathen (1993) explain that the muscle balance expresses the limits of the muscular power in agonists and antagonists muscles on the same joint; such as comparing quadriceps muscles with hamstrings (10: 5).

Both Sean Cochran and Tomhouse (2000) refer that the muscular balance requires equivalence between the power of the working muscle and the counter muscles. This requires a balance in strength between the two sides of the body, between the upper and lower sides of the body, and between the muscular groups on the same joint (27: 26).

Also, both Aneta Baini (2004) and Gluckman, g. (2008) confirm the importance of designing the training and resistance programs for athletes through the concept of Muscle Balance. This will improve the performance and protect from injury (6:14), (21).

In Addition, El-Said Abdel-Maksoud (1997) explains that the muscular imbalance appears mainly from focusing on some specific kinetics tracks. El-Sayed Abdel-Maksoud (1997) adds that the muscular imbalance is due to loading too much on a specific muscle, as well as neglecting the training of some muscular groups, or improper training (5: 392 395).

Mackenzie (2008) confirms that the muscular balance helps in developing speed and improving the muscular performance. Talha Hussain (1994) agrees with him in that the muscular balance is one of the main factors; and if it is neglected, it will lead to the end of improvement in the sports level (26), (9: 181-183).

Both Kemp and Boynes (2000) confirm that any athlete needs to assess his static or dynamic muscular balance where there is a relationship between the force and the length of the muscles around the various joints, and the muscular balance process (24: 4-6).

Also, both researchers add that the recent modifications in the International Karate "Kumite" Rules are considered to be an indicator as to the importance of the balance of the working muscle groups in punches or kicks. This is confirmed by Ahmed Mahmoud Ibrahim (2002) that the current modifications in the International Karate "Kumite" Rules lead to a change in the nature and characteristics of the game through the increase of quantitative and qualitative methods of performance during the game (2:22). Ahmed Mahmoud Ibrahim (2008) adds that any coach needs to achieve a complementary preparation (3: 69).

Both researchers see that a natural athletic performance of Karate "Kumite" is characterized by a strong competition and friction between the players(,) which requires many motor skills during defense or attack by doing punches or kicks through the use of the feet, arms, trunk, and head. If the coaches don't focus on the balance of the muscle groups and counter muscle groups, it will affect the athletic performance as a result of (a) lack of muscular balance between the flexor and extensor muscles in the performance. Some previous studies of Ali Yusuf Hussain, Omar Mohammed Abdul Razzaq (2005) (13), Hatem Fathallah Mohammed (2007) (7), Najia Abdel Fattah Shawki (2009) (18), Ashraf Mustafa Abdel Hafez (2009) (4), and Mohammed Zakaria Islands (2010) (15) focused on improving the muscular balance through the training programs without knowing the balance ratios of the working muscular groups in the joints of the body and its role in winning and athletic achievement. So, it pushed both researchers to identify the Muscles' Balance Ratios according to the level of athletic achievement of the Karate "Kumite" players as an indicator to design the training programs.

Research Objectives

The research aims to evaluate the Muscle Balance Ratios by using Isokinetic Dynamometer (Biodex3) according to the athletic achievement level for the Karate "Kumite" players as a determinative factor for the training programs.

Methods :

Research Methodology:

Both researchers used the "descriptive approach" due to its suitability to the nature of the research.

Research Sample

The sample was selected by using The Purposive Sampling Technique from karate "Kumite" players participating in the Republic Open Championship for juniors and youth in the (season 2013/2014). It was in the Covered Hall in the Cairo Stadium in the period from 02/13/2014 till 02/17/2014. The size of the sample was twenty-six players. Twenty-four players were included in the main sample as (92.31%), by selecting (3) players obtained in the first, second, and third positions in the following weights (61 Kg, 68 Kg, 76 Kg, and above 76 Kg). Also, twelve players who had not achieved any position in the championship were selected from the following weights: 61 Kg, 68 Kg, 76 Kg, and above 76 Kg (by selecting three players from each weight). Two players (weight 55 Kg) were selected to be represented in the Exploratory Study as (7.69%). The exploratory study was applied on Thursday, 20/02/2014. The main study was applied from Monday 24/02/2014 until Thursday, 27 /02/ 2014. (6) Players per day.

Sample Homogeneity

Heterogeneity among the research's members was found in the variables of growth (height, weight, age), and the training years as in Table (1). The equality between the main sample in the variables of growth (height, weight, age), and the training years appears in Table (2).

Table (1)
Homogeneity of the Total Research Sample (Main - Exploratory) in the Variables of Growth (Age – Height - Weight) and the Training Years No.=26

Variables	Measuring Unit	M ± SD	Coefficient of Skewness
Age	Year	18,17 ± 0,442	1,54
Height	Cm	162,12± 4,63	0,78
Weight	Kg	64,64± 6,13	0,65-
Training Years	Year	10.43 ± 1.65	0.32

It's clear from Table (1) that the values of Coefficient of Skewness ranges between (-0.65, 1.54), which is located between +3. So, it's an indication for the moderation and homogeneity of the research's sample.

Table (2)
Equality of the Main Sample in the variables of Growth (Age - Height - Weight) and the Training Years

Variables	Measuring Units	Players Obtained Positions	Players did not Obtained Positions		"T" Value
		M 1 ± SD1	M 2 ±	SD2	
Age	year	18.10± 1.00	18.30± 0.75		0.42
Height	Cm	162.2± 3.99	162.5± 4.14		0.53
Weight	Kg	64.56± 14.40	65.08 ± 13.98		0.37
Training Years	Year	10.23 ± 0.62	10.16 ± 0.52		0.61

"T" Value from the table at the level of 0.05 and degree of freedom 22 = 2.07

It's clear from Table (2) that there aren't any statistical variances the players who won positions and who did not win in the variables of growth (Age - Height - weight) and the training years. The values of calculated (T) range between (0.37, 0.61), which is less than the tabulated value of (T) at the significant level of (0.05). The degree of freedom 22 is = 2.07, which indicates that the two samples are equal in the variable of growth (age - height - weight) and the training years.

Research Tools

1. *Rastameter* device to measure the height to the nearest 1 cm,
2. *Medical scale* to measure the weight to the nearest kg.
3. *Biodex3* (Iso Kinetic Dynamometer) device to measure the proportions of muscular balance. This device is at the Faculty of Physical Therapy, Cairo University.
4. Registration Form for collecting data from the players in the growth variables (age - height - weight), the training years, and the variables ratios of the muscular balance.

The Exploratory Study

The researchers conducted the exploratory study on (2) players (weight 55 Kg). They were selected to be represented in the Exploratory Study as (7.69%). The exploratory study was applied on Thursday, 20/02/2014. Both researchers used the Biodex3 device during the exploratory study in order to identify the degree of resistance, determine the motion range of the different joints, identify the variables that will be measured, identify the difficulties that may face the researchers during the study, identify the time to measure the proportions of muscular balance, and divide the main sample into groups in different days.

The Results of the Exploratory Study

1. Determining the degree of resistance to work on a Biodex3 device: (60°), and the method of use this device: Isokinetic Unilateral.
2. Identifying the motion range to work on a Biodex3 device: (Extension - Flexion).
3. Determining the joints that will be tested (Elbow Joint – Trunk Joint - Knee Joint), and the variables ratios of the muscular balance (Agonist/antagonist ratios, Peak torque flexion, Acceleration time flexion, Deceleration time flexion, Peak torque extension, Acceleration time extension, Deceleration time extension).

The Main Study

Twenty-four players were included in the main sample as (92.31%), by selecting (3) players obtained in the first, second, and third positions in the following weights (61 Kg, 68 Kg, 76 Kg, and above 76 Kg). Also, twelve players who had not achieved any position in the championship were selected from the following weights: 61 Kg, 68 Kg, 76 Kg, and above 76 Kg (by selecting three players from each weight). The main study was applied from Monday 24/02/2014 until Thursday, 27 /02/ 2014. (6) Players per day.

Statistical Treatments:

Both researchers used the appropriate statistical treatments to the nature of the research, using the SPSS program (10) (Statically Package Social Science) as represented in: Mean, Median , Standard Deviation , Coefficient of Skewness , Coefficient of kurtosis, The Percent , (T) Test

The Results:

Table (3)
Means, Standard Deviation and "T" Values between the Players in the Knee Joint

Variables	Measuring Units	Players Obtained Positions	Players did not Obtained Positions	"T" Value
		M ± SD	M± SD	
Agonist/Antagonist Ratios	%	36.6 ± 6.2	33.2 ± 4.4	1.39
Peak Torque of Flexion	N-M	92.6 ± 14.9	82.6 ± 9.3	*2.32
Acceleration Time of Flexion	M-SEC	76.7 ± 17.8	43.4 ± 4.9	*4.17
Deceleration Time of Flexion	M-SEC	175.1 ± 86.6	165.1± 72.9	0.952
Peak Torque of Extension	N-M	278.3 ± 9.2	232.3± 53.7	*2.53
Acceleration Time of Extension	M-SEC	40.1 ± 8.5	33.4± 13.1	1.38
Deceleration Time of Extension	M-SEC	133.4± 34.5	93.4± 17.8	*4.19

"T" Value from the table at the level of 0.05 and degree of freedom 22 = 2.07

It's clear from Table (3) that there are statistical significant variances between the players obtaining positions and the players not obtaining positions in the same weight in some variables of the Muscles' Balance in the knee joint, including Peak Torque of Flexion, Acceleration Time of Flexion, Peak Torque of Extension, and Deceleration Time of Extension in favor of the players who obtained position. The values of calculated (T) range between (2.32, 4.19), which is more than the tabulated value of (T) at the significant level of (0.05) and at the degree of freedom 22 is = 2.07. There are not statistical significant variances between the players obtaining positions and the players not obtaining positions in the same weight in some variables of the Muscles' Balance in the knee joint, including Agonist/antagonist Ratios, Deceleration Time of Flexion, and Acceleration Time of Extension. The values of calculated (T) are (1.39 ،0.952 ، 1.38) respectively, which is less than the tabulated value of (T) at the significant level of (0.05). The degree of freedom 22 is = 2.07.

Table (4)
Means, Standard Deviation and "T" Values between the Players in the Trunk Joint

Variables	Measuring Units	Players Obtained Positions	Players did not Obtained Positions	"T" Value
		M ± SD	M ± SD	
Agonist/Antagonist Ratios	%	102.2± 6.91	77.9 ± 7.6	*4.16
Peak Torque of Flexion	N-M	210.6± 23.4	187.8 ± 28.7	*4.23
Acceleration Time of Flexion	M-SEC	187.4± 25.5	126.7 ± 34.5	*5.30
Deceleration Time of Flexion	M-SEC	163.4± 33.9	155.1 ± 17.1	0.705
Peak Torque of Extension	N-M	273.1 ± 41.5	239.9 ± 7.1	*5.33
Acceleration Time of Extension	M-SEC	90.1 ±13.3	73.4± 9.8	0.863
Deceleration Time of Extension	M-SEC	230.1 ± 44.4	206.7 ± 77.4	1.38

"T" Value from the table at the level of 0.05 and degree of freedom 22 = 2.07

It's clear from Table (4) that there are statistical significant variances between the players obtaining positions and the players not obtaining positions in the same weight in some variables of the Muscles' Balance in the trunk joint, including Agonist/antagonist Ratios, Peak Torque of Flexion, Acceleration Time of Flexion, and Peak Torque of Extension in favor of the players who obtained position. The values of calculated (T) range between (4.16 ،5.33), which is more than the tabulated value of (T) at the significant level of (0.05). The degree of freedom 22 is = 2.07. There are no statistical significant variances between the players obtaining positions and the players not obtaining positions in the same weight in some variables of the Muscles' Balance in the trunk joint, including Deceleration Time of Flexion, Acceleration Time of Extension, and Deceleration Time of Extension. The values of calculated (T) are (0.705،0.863 ،1.38) respectively, which is less than the tabulated value of (T) at the significant level of (0.05). The degree of freedom 22 is = 2.07.

Table (5)
Means, Standard Deviation and "T" Values between the Players in the Elbow Joint

Variables	Measuring Units	Players Obtained Positions	Players did not Obtained Positions	"T" Value
		M ± SD	M ± SD	
Agonist/Antagonist Ratios	%	95.1 ± 37.9	75.6 ± 35.6	*4.30
Peak Torque of Flexion	N-M	72.2 ± 27.8	65.9 ± 4.4	0.662
Acceleration Time of Flexion	M-SEC	80.1 ± 8.5	50.1 ± 14.8	*3.70
Deceleration Time of Flexion	M-SEC	153.4 ± 64.01	130.1 ± 30.7	*3.233
Peak Torque of Extension	N-M	134.5 ± 32.9	106.6 ± 22.8	*2.31
Acceleration Time of Extension	M-SEC	60.1 ± 14.8	50.1 ± 0.015	1.39
Deceleration Time of Extension	M-SEC	236.7 ± 56.8	196.7 ± 27.4	*4.15

"T" Value from the table at the level of 0.05 and degree of freedom 22 = 2.07

It's clear from Table (5) that there are statistical significant variances between the players obtaining positions and the players not obtaining positions in the same weight in some variables of the Muscles' Balance in the elbow joint, including Agonist/antagonist Ratios, Acceleration Time of Flexion, Deceleration Time of Flexion, Peak Torque of Extension, and Deceleration Time of Extension in favor of the players who obtained position. The values of calculated (T) range between (2.31, 4.30), which is more than the tabulated value of (T) at the significant level of (0.05) and at the degree of freedom 22 is = 2.07. There are no statistical significant variances between the players obtaining positions and the players not obtaining positions in the same weight in some variables of the Muscles Balance in the elbow joint, including Peak Torque of Flexion, Acceleration Time of Extension. The values of calculated (T) are (0.662 ،1.39) respectively, which is less than the tabulated value of (T) at the significant level of (0.05) and at the degree of freedom 22 is = 2.07.

Discussion:

It's clear from Table (3) that there are statistical significant variances between the players obtaining positions and the players not obtaining positions in the same weight in some variables of the Muscles' Balance in the knee joint, including Peak Torque of Flexion, Acceleration Time of Flexion, Peak Torque of Extension, and Deceleration Time of Extension in favor of the players who obtained position. The values of calculated (T) range between (2.32, 4.19), which is more than the tabulated value of (T) at the significant level of (0.05) and at the degree of freedom 22 is = 2.07. There are not statistical significant variances between the players obtaining positions and the players not obtaining positions in the same weight in some variables of the Muscles' Balance in the knee joint, including Agonist/antagonist Ratios, Deceleration time of Flexion, and Acceleration Time of Extension. The values of calculated (T) are (1.39 ،0.952 ، 1.38) respectively, which is less than the tabulated value of (T) at the significant level of (0.05) and at the degree of freedom 22 is = 2.07.

It's clear from Table (4) that there are statistical significant variances between the players obtaining positions and the players not obtaining positions in the same weight in some variables of the Muscles' Balance in the trunk joint, including Agonist/antagonist Ratios, Peak Torque of Flexion, Acceleration Time of Flexion, and Peak Torque of Extension in favor of the players who obtained position. The values of calculated (T) range between (4.16 ،5.33), which is more than the tabulated value of (T) at the significant level of (0.05) and at the degree of freedom 22 is = 2.07. There are no statistical significant variances between the players obtaining positions and the players not obtaining positions in the same weight in some variables of the Muscles' Balance in the trunk joint, including Deceleration Time of Flexion, Acceleration Time of Extension, and Deceleration Time of Extension. The values of calculated (T) are (0.705،0.863 ، 1.38) respectively, which is less than the tabulated value of (T) at the significant level of (0.05) and at the degree of freedom 22 is = 2.07.

It's clear from Table (5) that there are statistical significant variances between the players obtaining positions and the players not obtaining positions in the same weight in some variables of the Muscles' Balance in the elbow joint, including Agonist/antagonist Ratios, Acceleration Time of Flexion, Deceleration Time of Flexion, Peak Torque of Extension, and Deceleration Time of Extension in favor of the players who obtained position. The values of calculated (T) range between (2.31, 4.30), which is more than the tabulated value of (T) at the significant level of (0.05) and at the degree of freedom 22 is = 2.07. There are no statistical significant variances between the players obtaining positions and the players not obtaining positions in the same weight in some variables of the Muscles' Balance in the elbow joint, including Peak Torque of Flexion, Acceleration Time of Extension. The values of calculated (T) are (0.662 ،1.39) respectively, which is less than the tabulated value of (T) at the significant level of (0.05) and at the degree of freedom 22 is = 2.07.

Both researchers found that 'the statistical significant variances between the players who won positions and the players who did not win positions in the same category (weight of 61 Kg 68 Kg 76 K, and above 76 Kg) in some variables muscular balance in each of the knee joint, trunk joint, and elbow joint for the benefit of the players who won positions' refers to the importance of muscular balance ratios of the joints of the body of the Karate "Kumite" players. The player carries out many of the motor skills during the defense, attack and counter-attack by doing punches or kicks against the competitor by the use of the feet, arms, trunk and head. It requires the ability of motor balance and muscular balance, which is considered a big difference between the players in the movement speed, muscular strength and explosive power. Both researchers added that it's important to put the muscular balance ratios of the knee joint, trunk joint, elbow joint and the other joints of the body ,that contribute effectively in the performance and in the methods of the tactical defense and offensive implementation, into account as a guide in designing the training programs.

The results that are excluded by the researchers are consistent with both zeevi dvir (1995), Lee e. Brown, medcscs (2000) that the variables of the muscular balance ratios as in **Agonist/Antagonist Ratios**, which represents the relationship between the maximum torque for each of the flexor and extensor muscles, affect the optimal movement shape. (28: 30), (25: 6-10)

The results are consistent with the study of Jaric et al (2005) (23) that the strong working muscles can increase the acceleration of the part during doing the motor performance, while the strong opposite muscles can stop the movement of the part during doing the motor performance in a shorter time. It provides a longer acceleration, which demonstrates the importance of identifying the muscular balance ratios of the working muscles and in the high-speed movements.

The results that showed the importance of developing training programs contributing in improving the muscular balance, and developing some of the variables of physical performance are consistent with the study of Ali Yusuf Hussain, Omar Mohammed Abdul Razzaq (2005) (13).

These studies say that the training program has a positive effect on strengthening the back muscles of the upper limb, which contributes in improving the technical performance, as well as contributes in achieving the strength balance between the front and back muscles. The proposed training program has a positive effect on the accuracy of the performance of the kicks. The study of Hatem Fathallah Mohammed (2007) (7) showed that the training program has a positive impact on developing the balanced extensor and flexor muscles of the knee joint and on the motor range. The study of Najia Abdel Fattah Shawki (2009) (18) say that the training program using specific exercises has a positive impact on the muscular balance. The study of Ashraf Mustafa Abdel Hafez (2009) (4) found thet the training program has a great effectiveness in improving the muscular balance of the lower limb for the racers of 400-meter hurdles. The study of Muhammad Zakaria Islands (2010) (15) found that the muscular balance achieved through the training program between the flexors and the extensor muscles is (1: 1).

Both Talha Hussain (1994), and James (2000) agreed upon that when we increase the muscular strength during the training, it is recommended to distribute the training loads on the muscles of the body according to the proportions of their participation in the performance and the movements (9:47), (22:12).

El-Said Abdel-Maksoud (1997) indicates that there is no sporting activity develops all muscle groups equally and in a coordinated manner. The training leads mainly to develop the working muscles groups required to perform the competitions successfully, while the other groups that seem not more important are neglected. It leads to what called the muscular balance deficiency. (5: 391)

Also Hani Deeb (2003) confirms on the importance of inserting the push and pull exercises in the training program to maintain the muscular balance. (19:21)

Bell, j. (2007) (20) put a standard for the muscular balance ratios in the flexors and extensor muscles at different body's joints during the maximum muscular work. It is illustrated in table (6).

Table (6)
Balance Ratios in the Flexor and Extensor Muscles on the Different Body's Joints

Muscle Groups	Muscle Balance	Ratio Weight (Example)
Ankle Invertor & Everters	1: 1	25 : 25
Ankle Plantar Flexor & Dorsiflexion	3 : 1	75 : 25
Elbow Flexors & Extensors	1: 1	25 : 25
Hip Flexors & Extensors	1: 1	25 : 25
Knee Flexors & Extensors	2 : 3	50 : 75
Shoulder Internal & External Rotators	3 : 2	75 : 50
Shoulder Flexors & Extensors	2 : 3	50 : 75
Trunk Flexors & Extensors	1 : 1	25 : 25

Conclusions:

1. There are statistical significant variances between the players obtaining positions and the players not obtaining positions in the same weight in some variables of the Muscles' Balance in the knee joint, including Peak Torque of Flexion, Acceleration Time of Flexion, Peak Torque of Extension, and Deceleration Time of Extension in favor of the players who obtained position.
2. There are not statistical significant variances between the players obtaining positions and the players not obtaining positions in the same weight in some variables of the Muscles' Balance in the knee joint, including Agonist/antagonist Ratios, Deceleration time of Flexion, and Acceleration Time of Extension.
3. There are statistical significant variances between the players obtaining positions and the players not obtaining positions in the same weight in some variables of the Muscles' Balance in the trunk joint, including Agonist/Antagonist Ratios, Peak Torque of Flexion, Acceleration Time of Flexion, and Peak Torque of Extension in favor of the players who obtained position.
4. There are no statistical significant variances between the players obtaining positions and the players not obtaining positions in the same weight in some variables of the Muscles'

Balance in the trunk joint, including Deceleration Time of Flexion, Acceleration Time of Extension, and Deceleration Time of Extension.

5. There are statistical significant variances between the players obtaining positions and the players not obtaining positions in the same weight in some variables of the Muscles' Balance in the elbow joint, including Agonist/antagonist Ratios, Acceleration Time of Flexion, Deceleration Time of Flexion, Peak Torque of Extension, and Deceleration Time of Extension in favor of the players who obtained position.
6. There are no statistical significant variances between the players obtaining positions and the players not obtaining positions in the same weight in some variables of the Muscles' Balance in the elbow joint, including Peak Torque of Flexion, and Acceleration Time of Extension.
7. There is a direct relationship between the Muscles Balance Rations and the Athletic Achievement Level, which can be considered as a determinative factor for the training programs for Karate 'Kumite' Players.

Recommendations*:*

1. The need to take into account the importance of muscular balance of the knee joint, trunk joint, and elbow joint of the working muscles and the opposite muscles. It contributes effectively in the technical performance of the fast and ultra-fast movements that are used to implement the tactical defensive and offensive methods for the actual fighting "Kumite" players.
2. The trainers must pay attention to develop the training programs that contribute in improving the muscular balance ratios of the working muscles of the different joints in light of the nature of technical and tactical performance.
3. Conducting similar studies to compare between the players of the actual fighting "Kumite", and the players of "kata" that participate in the national teams (girls, boys). It is according to the weights and ages to know the differences in the muscular balance ratios, as an indicator to guide and develop the training programs.
4. Conducting comparative studies between the players of the national teams and the others of the international teams to know the differences in the muscular balance ratios, as an indicator to guide and develop the training programs of "Kumite".
5. Conducting future studies on variables of the muscular balance ratios (Agonist/Antagonist Ratios, Peak Torque of Flexion, Acceleration Time of Flexion, Deceleration Time of Flexion, Peak Torque of Extension, Acceleration Time of Extension, and Deceleration Time of Extension) and their relationship with the rest periods of the players.

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