Biomechanical and Anatomical correlations as a determiner for Qualitative exercises of Pull circular kick skill in Sanda – Kung Fu

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Abestrac :

This Biomechanical analytic research aims to know the time distribution, percentage, some momentary and general biomechanical variables (displacement, Velocity, acceleration, and angles), functional anatomical analysis of main articulations and muscles for the performance's stages - subject of research - of Pull circular kick skill (modernized skill) and some private qualitative exercises in Sanda, Kung Fu. And to know the values of Spearman correlation factors in such biomechanical and biological variables between the skill Biomechanical performance and its qualitative exercises and determining the perfect rate for these values as a main criterion to select the skill qualitative exercises. The researcher used the descriptive method through cinematography and 3D movement analysis. The Sample participants was selected purposively of one player ,who holds the world championship of Sanda – Kung Fu on (2013-2016) of (75) kg. He is the only who used the skill under research effictively in different championships. Observation was one of the most important methods for collecting data, The most important results were represented in that the time of performing pull circular kick skill was (0.44) sec and ranging in the qualitative exercises between (0.42-0.52) sec and The least value of time was in the exercise of drop ball and the highest value was in the exercise of elastic triangle. There was a correlation or a great similarity between basic movement variables for the technical performance of the skill under research and all its qualitative exercises range in most studied

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movement variables between (0.77 - 1.000) and it was the highest correlation in the exercises of punch bags, weights bands and drop ball and the minimum in the exercises of elastic triangle, lion jaws and steering pin . And muscles worked in the main articulation movements through Pull circular kick skill and its qualitative exercises in Sanda - subject of research - that became (32) skeletal muscles distributed on (13) main articulation movements, the top of them is the femur grasping that is Psoasmajor, Iliocostalis and Sartorius muscles. The lower of them is finger flexion in the grasp muscle of fingers.
Key words : kinesiology , Sanda , pulled circular kick , qualitative exercises .

Introduction :

Kinesiology is one of the most important science concerned with developing motion performance in sport field. It teaches the art of movement performance objectively, it also specialized in analyzing movement skills to know biomechanical and anatomical principles that should be put into consideration this comes from quantitative and qualitative analysis in kinesiology in which the most important duties are clarifying, justifying, improving, and creating methods for technical performance of various motor activities whether in education or training or motor evaluation arriving the movement to a maximum potential efficiency in performance. (Amaal , 2013, p. 11) .

Kung Fu sport considered cross cutting for fighting sports for what it includes of variation in movement performance and extensiveness in competition law whether in methods or Sanda that is the actual fighting in Kung Fu. Basically Sanda relies on attack to achieve winning in matches, since attack is the best method for defence and the basic road for gaining scores in matches, but in spite of attack methods multiplicity in Sanda, but these methods in which legs are used whether in feet movements or kicks occupy a basic status in favouring player hand through matches by collecting scores or

implementing kick down, so the result of the match can be ended early on behalf for the player leading to winning potential in short time and with the least effort. (Abbass, 2005, p.13) " that the basis of sound fighting is good feet movements whether in movements or kicks that puts your attack before the goal and avoids to be a goal. The skillful player is the one who can change his directions and movements during fighting and implement movements simply and economically "

Circular kicks in Sanda are the most important kicks.They are characterized with varied methods, Velocity of its performance and the potential of using them easily and integrating them with most other skills in all directions and attack times, since kicks movements play an important and a basic part in attack for it is characterized with good functioning for major muscles group in which legs are characterized to produce a big strength and high effective Velocity in technical performance of attack. On the other hand, these kicks are characterized with leg length which plays a vital role in good exploitation of the distance between player and the opponent.To study this type of skills, there are important points that are put into consideration representing in Velocity, balance, correct path, strength concentration, Biomechanicals of movement, suitable rhythm and timing, ideal economic use for parts involved in body performance, (Badeny, 2015, p. 18) assures " that the characteristics of circular kicks are that they are shot from long, middle and short distances and can be used basically in attack and counter attack successfully and easily during matches when performed quickly and accurately".

Pull circular kick is a novel kick. From the point of view of quantitative movement analysis, all circular kicks, leg after kicking is backed in a circular path opposite kicking direction. This requires a big energy, super movement conformity and longer time period. But in Pull circular kick, leg after kicking is backed in semi straight path

and complementary somewhat for kick movement path like geometrically the form of horizontal protractor. Kicking movement product is used in return direction in the form of leg drag with body rotation for the opposite direction that increases the Velocity of leg drag, consequently the kick doesn't take the same time and effort that is done in other half circular kicks .

In view of movement performance methods development in Sanda competition and its distribution between players, it is necessary searching for other methods of performance increasing competition heat and fighting art, particularly that some traditional methods have some defects as in traditional half circular kick and through its performance it is easy for the competitor to catch player leg and make very danger counter attack or loosing for the player, so it is necessary to find and invent a new skill by which player benefits from Velocity and power of leg and body rotation during kicking, as well as Velocity and power of dragging this leg away from the opponent in straight line path towards the inner side of pivot leg but in fast and strong form like penetrable arrows. The advantage of this is, as we mentioned, increasing Velocity and power of kick, escaping from counter attack for the opponent, relating dragging with rotation and performing other attack skills having further Velocity and power in the form of kicking or a punch or a strong beat may be a knock one and achieving winning for the player. In the case of player catching of opponent leg, the player can use this technique that is dragging the opponent by the kicking leg towards the player to approximate, clutch and hinder him from making an effective counter attack .

In order to achieve Velocity and proficiency in learning and developing this skill for the player and reach with it to the ideal motor performance, the researcher concerned with making routines for the Pull circular skill and analyzes it kinetically like the skill to know the extent of technical performance connection or similarity for

these drills with the technical performance of the skill to develop a priority in selecting these drills and know which is connected with the skill, training it to be the effective method to acquire and perfect of this skill for saving time and effort through training and matches. Qualitative exercises are drills in which the requirements of the skill are put into consideration in all aspects pertaining with performing the skill and the skill is used with all its details as if it is performed in the match adding some requirements and conditions in performing it to achieve qualitative physical or skilful or competitive purpose. (El Redy**,** 2010, p.19) " argues the necessity of obtaining the best routines and the most similar with motor and temporal path for performing motor skills by using motor analysis for these drills and comparing with the ideal performance of various skills in specialized sport", also argues (Marwa**,** 2013, p. 8,9) "that those qualititve exercises are similar with the skills in the qualitativeity of energy system, qualitativeity in shape and nature of performance ,and the qualitativeity of muscular groups" . (Talha,1998, p. 127) sees that study of a movement made the human body demands an accurate analysis for each muscular work accompanies the movement and what manages this movement from principles and mechanical rules to know how and why this movement is made on its way. Such information includes achieving the best grades of effectiveness and efficiency for such movements. In addition, it helps in distinguishing between helping and delaying factors for the success of the Biomechanical performance.

So, the idea and issue of the research arose whereas according to the two researchers, there is no study aimed to modernize this skill and a biomechanical, biological or Biomechanical analysis wasn't made, putting its specific exercises, making a Biomechanical analysis for such exercises and knowing the level of correlation factors and similarity between its performance and technical performance of the skill according to both mechanical

and biological sides to provide whole information about understanding, learning, modernize and evaluate of the Biomechanical performance of the skill and qualitative exercises that assures good selection of these exercises according to increasing the mechanical and biological correlations of the chosen skill to acquire and accurate this skill and achieve the most available effectiveness

Hence appeared the idea and problem of the research since in thevalue of the researcher knowledge there is no study discusses the novelty of this skill and no movement analysis is made or put qualitative exercises for it or make a movement analysis for these qualitative exercises and recognizing the extent of its performance connection and similarity with the skill technical performance (under research) in order to acquire and perfect this skill and reach it to the biggest potential effectiveness .

The researcher used several studies related with the research subject as the study of (Kamel, 2015) that emphasized on compound qualitative exercises in chest swimming, the study of (Gordon I & Robertson, 2012) that aimed at recognizing biomechanical determinants of front kick in Karate, the study of (Abdel Hamid, 2011) that concerned with evaluating mechanical effectiveness of some qualitative exercises in the light of biomechanical indicators for converse circular kick in Karate sport, the study of (Sylvia Velose, Manu & Barbara 2011) that concerned with determining the product strength in kicks of military arts, the study of (Yossef, 2007) that emphasized on biomechanics of performing a converse circular kick as an indicator for qualitative exercises in Karate sport, the study of (Hong, Kim, Jim, 2000) that concerned with biomechanical analysis of kicking methods in Taeknodo, the study of (El Awady, 1989) that emphasized on the importance of movement analysis for some attack waves skills as a basis for developing a training program on these skills . Study of (Zakaria, 2007), study of " Marwa, 2002)

that both of then concern with anatomical analysis of the main muscles in performing skill of front and back kick in Tae kwon do.

importance of the research :

- Inventing a new method for performing the skill of circular kick increasing its effectiveness during matches of Sanda .
- Inventing qualitative exercises increasing the potential of acquiring, developing and effectiveness of the skill (under research) during fighting .
- Confirming and supporting a method for selecting qualitative exercises of motor skill based upon movement analysis Biomechanical and biological of the skill and its qualitative exercises according to correlation coefficient (similarity) in technical performance between them .

Aim of the research :

1. Knowing the values of time distribution and main Biomechanical variables (displacement, Velocity, acceleration, and angles) for performance stages of research subject in performance of Pull circular kick skill (modernized skill) and some private qualitative exercises in Sanda.
2. Functional anatomical analysis of main muscles in the performance of main articulation movements in performance of Pull circular kick skill and its qualitative exercises in Sanda.
3. Knowing the values of biomechanical correlation factors in main biomechanical variables (displacement, Velocity, acceleration, and angles) and the biological correlation factors in importance degrees of muscles worked in main articulation movements and both correlation factors between the performance of Pull circular kick skill (modernized skill) and some private qualitative exercises in Sanda.

Questions of the research :

1. What are values of time distribution and main Biomechanical variables (displacement, Velocity, acceleration, and angles) for

performance stages of research subject in performance of Pull circular kick skill (modernized skill) and some private qualitative exercises in Sanda ?

2. What details Functional anatomic analysis of main muscles in the performance of main articulation movements in performance of Pull circular kick skill and its qualitative exercises in Sanda ?

3. What are values of biomechanical correlation factors in main biomechanical variables (displacement, Velocity, acceleration, and angles) and the biological correlation factors in importance degrees of muscles worked in main articulation movements and both correlation factors between the performance of semi-Pull circular kick skill (modernized skill) and some private qualitative exercises in Sanda ?

Terms of the research :

1- Movement correlation :

the similarity between two kinetic performance or more in some or all Biomechanical and biological variables for performance (Procedural definition)

1- Pull semi – circular kick :

A kick in which the kick leg moves in a circular path from upper and to inside till clashing with goal, then pull it back and inside in a straight line near tibiale of the pivot leg with body and pivot leg rotation with pulled movement (procedural definition) .

Methodes :

Methodology and Participants :

The researcher used the descriptive method on an intended participants sample of one international player - the champion of the world - for Sanda Kung Fu on (2013-2016) in weight of (75) kg. His name is Ayman Galal Fathy of nearly (20) years old. He is the only player who used the skill under research effictively in different championships Table (1) shows the basic body characteristics of the participant in this research .

Table (1)
Arithmetic mean, median, standard deviation, skewness coefficient and kurtosis coefficient for the age, somatic and physical variables of the research sample (n=5)

Serial	Variables	Measurement	Measurement unit
1	Weight	75	Kg
2	Total length	177	Centimetre
3	Height of head and neck	27	Centimetre
4	Trunk length	43	Centimetre
5	Arm length	78	Centimetre
6	Humerus length	28	Centimetre
7	Forearm length	29	Centimetre
8	Hand length	21	Centimetre
9	Leg length	107	Centimetre
10	Thigh length	53	Centimetre
11	Tibia length	47	Centimetre
12	Foot height	7	Centimetre
13	Foot length	26	Centimetre

Tools of data collection :

1- Apparatus: A restameter to measure height ,a balance to measure weight, Stop watch, (3) Sony video camera of frequency (60/H) with (3) triple stands equipped with a water balance, a computer with a program of Skill Spector .

2-Instruments:A measurement tap of (10) length, a colourful handball, control and guidance marks around body joints, (1) criterion unit (draw scale), a form to record personal data of the participant, A survey sample of experts' opinions in functional anatomical analysis of skill performance and qualitative exercises in question.

Steps of implementing the research :

1- Pilot studies: was conducted in 9/2/2017 on the

research sample to ascertain the validity of apparatus, instruments and the place used for implementing the basic experiment, assistant hands understanding for its duties and tasks and recognizing the problems that implementation process faces. and this was achieved .

2- The basic study: Personal data and body measurements were taken and the basic study (picturing movement performance) was implemented on participant in 13/2/2017 at Minia university stadium as much as (2) trials for performing each skill (under research) and its qualitative exercises and the best two trials of each performance were selected and analyzed and hence (14) trials were analyzed . On the other hand, anatomic alanalysis of muscles worked in main articulation movements through the performance of Pull circular kick skill and some private qualitative exercises in Sanda the sample done through scientific references (Ali & Abdel Baseer. 2007, Health sciences department, 2016, Talha, (1998**)** and experts' opinions in Anatomical, physiotherapy, Biomechanicals and Sanda.

The used statistical treatments :

Mean– Spearman correlation coefficient.

Results :

Table (2)
Basic movement variables for performing the skill of pull semi – circular kick and its qualitative exercises

Follow Table (2)
Basic movement variables for performing the skill of pull semi – circular kick and its qualitative exercises

Table (3)
Correlation coefficient between basic movement variables for performing the skill of pulled circular kick and its qualitative exercises

Skill and exercise Variables		Measurement unit	Stages number (n)	Exercise of steering pin	Exercise of punch bag	Exercise of drop ball	Exercise of lion jaw	Exercise of elastic triangle	Exercise of weights bands
The skill of Pull circular kick	Performance time	second	3	*0.999	*0.999	0.986	*0.997	0.994	*0.998
	Percentage	%	3	*1.000	*0.998	0.979	0.990	0.988	*0.997
	Linear displacement of front kick foot from the moment of its take off till the time of its collision with the goal	Meter	3	*1.000	*1.000	*1.000	*1.000	*1.000	*0.999
	Linear displacement of front kick foot from the moment of its pull till the end moment	Meter	3	*1.000	*1.000	*1.000	*1.000	*0.998	*0.999
	The intermediate velocity of front kick foot from the moment of its take off till the moment of its collision with the goal	Meter / sec	3	*1.000	*1.000	*1.000	*0.999	*0.999	*0.998
	The intermediate velocity of front kick foot from the moment of its pull till the moment of its collision with the goal	Meter / sec	3	*1.000	*1.000	*1.000	*0.999	*0.999	*0.998
	The intermediate acceleration of front kick foot from the moment of its take off till the moment of its collision with the goal	Meter / sec^2	3	*1.000	*1.000	*1.000	*1.000	*0.998	*1.000
	The intermediate acceleration of front kick foot from the moment of its pull till the moment of its collision with the goal	Meter / sec^2	3	*1.000	*1.000	*1.000	*1.000	*0.998	*0.999
	Angular range for the basic joints in movement performance of legs from the moment of take off till the moment of kick foot collision with the goal	Angle (take off)	5	*1.000	*1.000	*0.994	*1.000	*0.998	*1.000
		Angle (collision)	5	*0.997	*1.000	*0.999	*0.998	*0.951	*0.955
	Angular range of the basic joints in movement performance from the moment of pull till the moment of ending the pull of kicking foot	Angle (start)	5	*0.929	*0.619	*0.882	0.877	*0.655	*1.000
		Angle (ending)	5	*1.000	*0.998	*1.000	*0.998	*1.000	*1.000
	Variables as a whole		44	*0.984	*0.976	*0.986	*0.988	*0.987	*0.983

Tabulated (t) value at freedom degree (1) and a significance level (0.05) = 0.0997, at freedom degree (3) and a significance level (0.05) = (0.878) , at freedom degree (42) and a significance level (0.05) = 0.298 .

Table (4)
Functional anatomical analysis of main muscles in the performance of main articulation movements in performance of Pull circular kick skill and its qualitative exercises in Sanda.

Stage	Articulated movements	Basic muscles	Figure
The introductory stage	Main muscles in head and trunk moderation	Splonius, Semispinalis, Trabezius, Erector spine and Rectus abdomints.	
	Main muscles in elbow and crank flexion	Biceps Brancni, Pronator Teres and Brachio Radialis.	
	Main muscles in fingers flexion	Flexor Digitorum Sublimis.	
	Main muscles in humerus grasp	Deltoid and Pectorlis.	
	Main muscles in femur grasp	Psoas Major Muxles, Ilicus and Sartorsius.	
	Main muscles in knee flexion	Biceps Femoris, Semimembrano and Popliteus.	
	Main muscles stable leg uplifting, circulation and stability	Solieu, Tibialis Posterio, Peroneus Longsu, Quadriceps Femoris and Sartorsius.	
	Leg circulation and stability	Longsu, Quadriceps Femoris and Sartorsius	
The basic stage	Main muscles in femur grasp:	Psoas Major Muxles, Ilicus and Sartorsius.	
	Main muscles in lateral condyle of femur circulation and retraction	Rectus Femoris and Gluteus minimum, medium, maximum.	
	Main muscles in knee flexion	Biceps Femoris, Semimembrano and Popliteus.	
	Main muscles in foot stretching	Tibialis Rnterior, Peroneus Longsu and Tibialis Posterior.	
	Main muscles in trunk stability and circulation	Rectus abdomints, External oblique, Erector spine and Spinalis longissimus.	
	Main muscles in medial condyle of femur circulation and allurement	Adductor Longus, Brivis and Magnus.	
	Main muscles in knee stretching	Sartorsius and Quadriceps Femoris.	
	Main muscles stable leg uplifting, circulation and stability	Solieu, Tibialis Posterio, Peroneus Longsu, Quadriceps Femoris and Sartorsius.	

Following Table (4)
Functional anatomical analysis of main muscles in the performance of main articulation movements in performance of Pull circular kick skill and its qualitative exercises in Sanda.

Stage	Articulated movements	Basic muscles	Figure
The final stage	Main muscles in knee flexion	Biceps Femoris, Semimembrano and Popliteus	
	Main muscles in foot grasp	Gastroenmius, Solieu and Pantaris.	
	Main muscles stable leg uplifting, circulation and stability	Solieu, Tibialis Posterio, Peroneus Longsu, Quadriceps Femoris and Sartorsius.	
	Main muscles in trunk stability and circulation	Rectus abdomints, External oblique, Erector spine and Spinalis longissimus.	
	Main muscles in femur grasp	Psoas Major Muxles, Ilicus and Sartorsius.	
	Main muscles stable leg uplifting, circulation and stability	Solieu, Tibialis Posterio, Peroneus Longsu, Quadriceps Femoris and Sartorsius.	

Table (5)
Correlation coefficient among main muscles in performance the skill of pulled circular kick and its qualitative exercises

Variables			exercises						
skill	n	Muscles and basic articular movements	Range , frequency	steering pin	punch bag	Drop ball	lion jaw	elastic triangle	weights bands
pulled circular kick	١	**Main muscles in femur grasp:** Psoas Major Muxles, Ilicus and Sartorsius.	B 3	١.٠٠	١.٠٠	٠.٩٩	٠.٩٨	١.٠٠	١.٠٠
	٢	**Main muscles in knee flexion:** Biceps Femoris, Semimembrano and Popliteus.	B 3	٠.٩٥	98٠.	1.00	٠.٩٧	٠.٩٧	00.1
	٣	**Main muscles in trunk stability and circulation:** Rectus abdomints, External oblique, Erector spine and Spinalis longissimus.	M 2	٠.٩٥	٠.٩٥	٠.٩٦	٠.٩٧	٠.٩٢	6٠.٩
	٤	**Main muscles stable leg uplifting, circulation and stability:** Solieu, Tibialis Posterio, Peroneus Longsu, Quadriceps Femoris and Sartorsius.	S 3	٠.٩٤	٠.٩٤	5٠.٩	٠.٩٠	٠.٩٤	٠.٩٣
	٥	**Main muscles in medial condyle of femur circulation and allurement:** Adductor Longus and Brivis Magnus.	B 2	٠.٩٣	٠.٩٠	٨9٠.	٠.٩٠	٠.٩١	٠.٩٥
	٦	**Main muscles in knee stretching:** Sartorsius and Quadriceps Femoris.	B 1	٠.٩٣	4٠.٩	3٠.٩	٠.٩٠	٠.٨٧	٠.٩٣

Follow Table (5)
Correlation coefficient among main muscles in performance the skill of pulled circular kick and its qualitative exercises

Variables			exercises						
skill	n	Muscles and basic articular movements	Range , frequency	steering pin	punch bag	Drop ball	lion jaw	elastic triangle	weights bands
	٧	**Main muscles in lateral condyle of femur circulation and retraction:** Rectus Femoris and Gluteus minimum, medium, maximum.	B 1	٠.٩٣	4٠.٩	95٠.	٠.٨٩	٠.٩٢	2٠.٩
	٨	**Main muscles in foot stretching:** Tibialis Rnterior, Peroneus Longsu and Tibialis Posterior.	S 1	٠.٩٢	٠.٩١	93٠.	٠.٨٨	٠.٩٠	4٠.٩
	٩	**Main muscles in foot grasp:** Gastroenmius, Solieu and Pantaris.	S 1	٠.٨٩	٠.٨٩	91٠.	٠.٨٦	٠.٩١	٠.٩٢
	١٠	**Main muscles in head and trunk moderation:** Splonius, Semispinalis, Trabezius, Erector spine and Rectus abdomints.	S 1	٠.٨٣	٠.٨٢	٠.٨٥	٠.٨٥	٠.٨٢	٠.٨٣
	١١	**Main muscles in elbow and crank flexion:** Biceps Brancni, Pronator Teres and Brachio Radialis.	S 1	٠.٧٩	٠.٨٤	8٠.٧	٠.٨٦	٠.٧٨	٠.٨٠
	١٢	**Main muscles in humerus grasp:** Deltoid and Pectorlis.	S 1	٠.٧٨	٠.٨٣	8٠.٧	٠.٨٤	7٠.٧	9٠.٧
	١٣	**Main muscles in fingers flexion:** Flexor Digitorum Sublimis.	S 1	7٠.٧	٠.٨٠	9٠.٧	٠.٧٨	8٠.٧	80٠.

Movementment limit: A distance made by a remote part to the articulation bone.

Repeat movement = Frequency Range : (B = Big) more than one meter. (M =

Medium) from half meter to one meter. (S = Small) less than half one meter.

Tabulated (t) value : a significance level (0.05) = 0.63

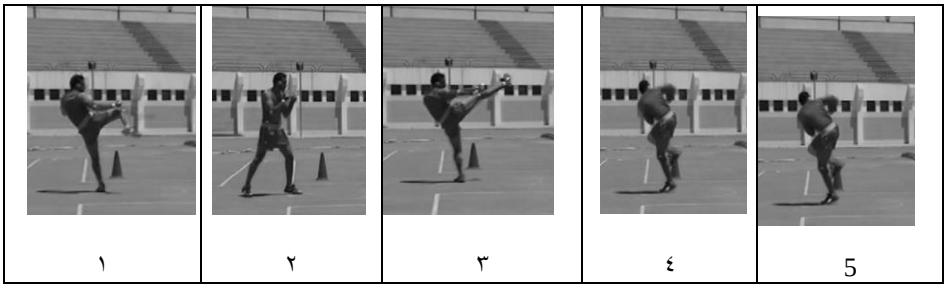

Figure (1) stages of movement performance for the skill of pull semi - circular kick

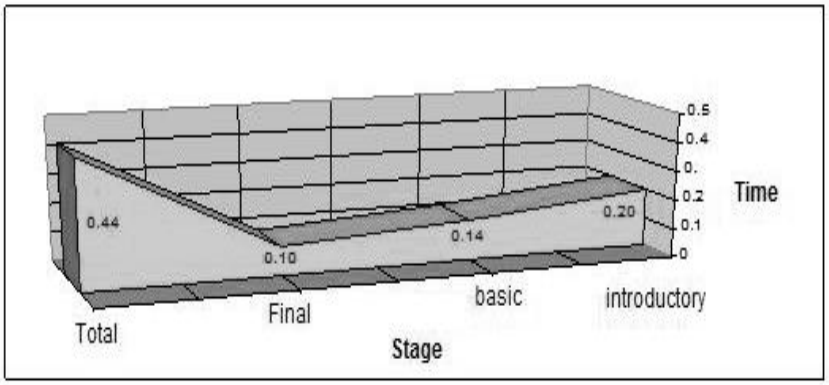

Figure (2) stages time of performing the skill of Pull circular kick

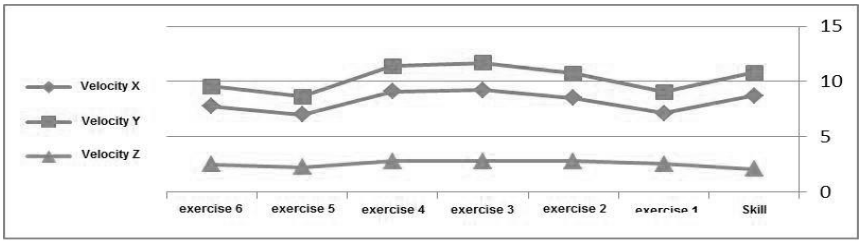

Figure (3) intermediate Velocity x-y-z in performing of the skill of pull circular kick and its qualitative exercises .

Firstly : general movement variables :

Performance time :

It is shown from table (2) and figures (2) that performance time of the participant of the research for the introductory stage of skill was (0.20) seconds and ranging during qualitative exercises between (0.19 - 0.23) second and it was the minimum value in exercises of drop ball, lion jaws , and it was the highest value in exercise of steering pin. But in the basic stage, performance time was (0.14) and ranging in qualitative exercises between (0.13- 0.17) second and it was the minimum value in exercises of drop ball and lion jaws and the highest value in exercises of steering pin and elastic triangle. Performance time in the final stage of performing stage was (0.10) second and ranging in qualitative exercises between (0.10- 0.13) second, it was the minimum value in the exercise of drop ball and the highest value in the exercise of elastic triangle. Whereas total time of performing the skill was (0.44 sec) and ranging in qualitative exercises between (0.42 – 0.52) second and it was the minimum value in the exercise of drop ball and the highest in the exercise of steering pin and elastic triangle, It was noticed from previously mentioned that the least time in most performance stage of qualitative exercises was in the exercises of drop ball and lion jaws .

Displacement:

It is shown from table (2) that the value of the product linear displacement of front kick foot during the basic stage (kicking) was (1.96) metre and ranging in qualitative exercises between (1.93- 2.00) metre , it was the minimum value in the exercises of lion jaws and elastic triangle and it was the highest value in the exercises of steering pin and weights bands. Whereas the product linear displacement of front kick foot during the final stage (pulling) was (1.53) metre ranging in qualitative exercises between (1.41-1.53) metre and it was the minimum value in the exercise of elastic triangle and it was the highest value in the exercise of weights bands.

Velocity :

It is shown from table (2) and figure (3) that the value of mean product Velocity of front kick foot during the basic

stage (kicking) for performing the skill was (14.10) m/sec ranging in routines between (11.80:15.10) m/sec and it was the minimum value in the exercise of steering pin, and the highest in the exercise of weight bands. Whereas the product medium velocity for front kick foot during the final stage (pull) for performing the skill was (14.09) m/sec, ranging in qualitative exercises between (10.80: 14.90) m/sec and it was the minimum value in the exercise of weight bands and the highest value in the exercise of drop ball .

Acceleration:

It is shown from table (2) that the value of the product mean acceleration for front kick foot during the basic stage (kicking) for performing the skill was (100.13) metre /sec^2, ranging in qualitative exercises between (66.80- 116.50) metre /sec^{2}and it was the minimum value in the exercise of elastic triangle and it was the highest value in the exercise of drop ball. Whereas the product of medium acceleration for front kick foot during the final stage (pull) for performing the skill was (147.60) metre/sec^2 and ranging in qualitative exercises between (83.50-148.60) metre/sec^2 and it was the minimum value in the exercise of elastic triangle and the highest value in the exercise of drop ball.

Angles :

It is shown from table (2) that the value of angular range for kick foot knee joint during the basic stage (kicking) for performing the skill was (127-173) angles and ranging in qualitative exercises between (122-174) angles and it was the minimum value (beginning of the kicking) in the exercise of elastic triangle and the highest value (final of the kicking) in the exercise of weight bands. whereas angular range of kick leg knee joint during the final stage (pull) for performing the skill was (87-173) angle ranging in the qualitative exercises between (178-83) angle and it was the minimum value (final of pulling) and the highest value (beginning of pulling) in the exercise of two punch bags.

General variables:

All mentioned qualitative exercises in the research are of high correlation

coefficient in performing the skill under research in total movement variables in the research and ranging in most variables between (0.87-1.00).The preference was for the exercises of weights bands and punch bags.

Biological analysis (functional anatomical) :

Table (4) shows that the muscles worked in main articulation movements through the performance of Pull circular kick skill and its qualitative exercises in Sanda the sample reaches (32) skeletal muscles, unrepeated and distributed on (13) main articulation movement. (25) muscles out of them distributed on (9) movements of the two legs articulation. The most important muscles are the main muscles in femur grasp that are Psoas Major Muxles, Ilicus and Sartorsius. And the less important muscles among them are the main muscles in foot grasp: Gastroenmius, Solieu and Pantaris.(7) the rest of the muscles, unrepeated and distributed on (4) movements of articulations of head, elbw and the two arms.The most important muscles in skill performance and qualitative exercises are Main muscles in head and trunk moderation: Splonius, Semispinalis, Trabezius, Erector spine and Rectus abdomints. And the less important are the main muscles in fingers flexion: Flexor Digitorum Sublimis. And Table (5) shows that the correlation factors among the importance degrees of muscles worked in the movements of main articulations through the performance of Pull circular kick skill and some of its qualitative exercises in Sanda in the sample ranged between (0.77 – 1.00) and it was the highest correlation in the exercises of punch bags, weights bands and drop ball and the minimum in the exercises of elastic triangle, lion jaws and steering pin .

Disscussing :

Firstly : general movement variables :

Performance time : the achieving of the participant player of the research to the least time in most of the performance stages of the qualitative exercises was in drop ball and lion jaws exercises,which due to that

these two exercises rely on two important kinds of Velocity, that are reaction Velocity and movement Velocity. player concentration on them increases his Velocity, so, performance time is reduced, on the contrary, in the exercises of steering pin and elastic triangle, the player concentration on the accuracy of motor path and overcoming the resistance than his concentration on Velocity, hence performance time is increased, as well as that in the exercise of elastic triangle, player power is distributed with the publicity of elastic dragging lines in the directions of horizontal, vertical and broad component (z,y,x) that increases also performance time (Marwa**,** 2013, p. 18) indicates that "time of performing movement skills plays an important part in achieving player goals and taking opportunities of different play situations. It requires that the player concentrates performance in two directions, one is the correct performance of the skill, the second is the Velocity of achieving the skill with a suitable reaction to make use of the available situations circumstances in the best possible form" .

Displacement:

the achieving of the minimum value of displacement in the exercise of lion jaws and elastic triangle and the highest value in the exercise of steering pin And weight bands due that in the exercise of lion jaws the player concentrates on performance Velocity greater than performance accuracy leading to little shortening or reduction in movement path and displacement amount. As for the elastic triangle, as a result of increasing rubber resistance in the end of movement restricting full path of movement, displacement is reduced. Whereas displacement is increased in the exercise of steering pin as a result of the player keenness on increasing foot rotation and height of the ground and path, so displacement is increased. In the exercise of weights bands, the addition weight leads to increasing of muscular contraction and raising of knee joint bending in the beginning

and end of movement, consequently increasing displacement of front kick foot. (Labib & Mahrous, 2008, p. 114,115) confirm that "the disadvantages of elastic resistance exercises are the negative effect on player Velocity in movement end as a result of resistance increase and perhaps on the proper path for performing some movement skills unless the resistance is standardized and change angles and distances of pull carefully" .

Velocity :

the achieving of the minimum value of Vlocity during the basic stage in the exercise of steering pin and the highest value in the exercise of weight bands due that in the exercise of steering pin, the displacement is big and performance time is long relatively and the Velocity is reduced, while in the exercise of weight bands, the displacement is big and its time is little, so the Velocity increases, in addition that the player feeling of challenge and power with the exercise of weight bands leads him to performance faster. the achieving of the participant to the minimum value of Vlocity during the final stage in the exercise of weight bands and the highest value in the exercise of drop ball due that in the exercise of weight bands, the Velocity during his performance is lower in view of transfer and change difficulty from kick movement to pull movement in the opposite direction, the time increases and the Velocity reduces. As for the drop ball, the Velocity increases as a result of reduction somehow in the basic stage on behalf of the pull stage and consequently earliness and acceleration of pull, so the Velocity increases. (Sawsan, Amin, Sabry, & Raageb 1977, p.173) argues that "the angular momentum should be constant, surpassing of inertia momentum causes increasing of angular Velocity and vice versa".

Acceleration :

the achieving of the minimum value of Acceleration in the exercise of elastic triangle and the highest value in the exercise of drop ball due to the littleness of movement Velocity in its end

in the exercise of elastic triangle since that in this exercise, the resistance increases with the increase of elastic tension, it restricts the attempt of complete leg stretch that influences negatively on the extent and Velocity of the movement in its end and leads to a negative reduced acceleration in performance. As for acceleration increase in the exercise of drop ball, player concentration and his keenness on ball preceding and competing it leads to collect his strength to get the biggest power for taking off of the kicking leg and the biggest torque during turning with it and body towards the goal, then following rotation with pulling the kicking leg away in the opposite direction leading to increase his Velocity in performance, hence a positive increases acceleration is caused. (Hosaam El Deen**,** 1994, p. 93) confirms that" during doing turning movements around longitudinal axis, body inertia is little than in the state of rotation around any other axis .as that rotation around any other axis which its body inertia is variable, leads to change of positions. angles that cause between different joints lead in fact to reducing the distance between parts masses and the axis in which the body rotates, consequently m reducing body inertia with big proportions ".

Angles :

The achieving of the minimum value of the angular range of the joint of kicking leg during the main stage (kicking)in elastic triangle exercise and the top value in weight band exercise due to the multiplicity of elastic tension angles and it is the cause of delaying the Velocity of knee joint movement Velocity and its agonists that reduces its range angles, whereas weight bands lead to increasing movement amount in the direction of the required performance leading to increasing angles of knee joints according to Newton second law of motion known as acceleration law stating that " the amount of change in body Velocity is directly proportional with its power and towards its direction" (Hosaam El Deen, 1993, p. 109), and The achieving the minimum and maximum value of the angular range of the joint of kicking leg during the final

stage (pulling)in elastic triangle exercise and the top value in punch bags exercise due to, player keenness on the Velocity of pulling kick leg and his concentration on it is bigger than his concentration on technicalities and accuracy of kick leads to reducing the movement range of knee joint in the end of kicking stage and its increase in pull stage as a result of pull power and Velocity. This accords with Newton first law of motion known as inertia law stating that "the body stays in its state whether at rest or in motion unless external forces influence it changing its state " (Alshegk, 1992, p. 113) . (Abdel Hamead, 1999, p. 351) indicates "it is necessary that the final movement chain is derived from rotating body movement that if a final ring of the movement chain (a hand or a foot) acquires a possible high Velocity through increased acceleration in a circle path, it is necessary that body push transition is caused to this final ring".

General variables:

The achieving of high correlation coefficient participant in performance of all between the performance of the qualitative exercises to a high Correlation coefficient and the performance of the skill under study for the values of total movement variables due to the accuracy of selecting these qualitative exercises where the qualitative analysis had a large role in determining what is suitable for the skill under research of the qualitative exercises, then are subjected for the quantitative movement analysis by using the computer to know the accurate movement details in the technical performance of the skill and its qualitative exercises. (Yossef, 2007, p. 85) argues " the necessity of depending upon movement and technical analysis for different skills during developing training programs that rely upon using the suitable qualitative exercises with a structured significance and formulating programs on accurate scientific bases", (Kamel, 2015, p. 24) indicates that " the importance of players preparation inclusion on qualitative exercises to raise the level of skilful performance and reach high levels that the more similarity between training and the given skill increases, this exercise is

characterized with qualitativeity and its effectiveness increases with improving the skill performance and the least the similarity between them, the exercise is unsuitable for developing the skill " It is worthy mentioned that correlation coefficient in table (4) indicates the amount of monotonous positive relation between partial and values for every variable in the skill and the qualitative exercise ,not the total value. So, variables values in table (2,3) indicate the total similarity between the skill and the qualitative exercise. Whereas table (4) indicates the partial similarity consequently, tables (2,3,4) integrate each other for example, the variable of performance time in table (2) that the most similar qualitative exercises with the skill is the exercise of lion jaws where total performance time of the exercise was (0.43 sec), in the skill (0.44sec), whereas the value of correlation coefficient between this exercise and the skill is the least values between the remaining exercises, where it was (0.986). This due to the difference in some particles of this exercise with the particles of the skill where there is a monotonous relation between each other in some parts and a converse relation in other parts.

Biological analysis (functional anatomic) : the most important of leg muscles in the Biomechanical performance of skill and its qualitative exercises the sample are the main muscles in femur grasp: Psoas Major Muxles, Ilicus and Sartorsius. The less important of them are the main muscles in foot grasp: Gastroenmius, Solieu and Pantaris. This goes back to that the movement of femur grasp is made twice, one of them through main stage and the second one through the final stage. In each one of them, the movement is made with a wide limit that is about more than one meter. In general, the performance Velocity through the two stages affected by the Velocity of starting of femur grasp movement that leads to a great energy and persistence that reflects positively the Velocity and power of the Biomechanical performance in a skill and its qualitative

exercises and that is what assured by the first principle of biomechanical ones of the power of the beginning and the best position for the performance. (Alshegk, 1992) . The high limit of correlation factors among the importance degrees of muscles worked in the movements of main articulations through the skill performance and its qualitative exercises the sample goes back to the existence of a great similarity among the parts, stages and details of the Biomechanical performance according to mechanical and biological ways between this skill and its specific exercises.

Conclusions :

- Total time for performing the skill (under research) was (0.44) sec and the nearest exercises time for the skill time are exercises of punch bags, drop ball and lion jaws, whereas the farthest exercises time for the skill time were steering pin, elastic triangle and weight bands .
- The least displacement, Velocity and acceleration in performing qualitative exercises for the skill under research were exercises of elastic triangle , steering pin, and the highest displacement, Velocity and acceleration in performing qualitative exercises for the skill (under research) were exercises of drop ball and weight bands.
- The least angles of kick leg knee in the qualitative exercises for the skill (under research) were in the exercises of elastic triangle and punch bags, and the highest angles were in the exercises of elastic triangle, weights bands and punch bags.
- The least angles of kick leg pelvis in qualitative exercises for the skill (under research) were in the exercises of elastic triangle and lion jaws and the highest angles were in the exercises of steering pin and punch bags .
- The least angles of pivot leg knee in qualitative exercises related with the skill (under research) were in the exercises of elastic triangle, and the highest angles were in the exercises of punch bags and drop ball
- The least related qualitative exercises in different studied movement variables (displacement time

performance, velocity, acceleration, angels and general variables with the skill (under research) were in the exercises lion jaws and elastic triangle, whearas the highest related exercise with the skill (under study) in the studied movement variables are in the exercises of weights bands and punch bags .

- All qualitative exercises in the research are good and of high correlation coefficient in performing of the skill (under research) range in most between (0.877-1.000) and the preference was for exercises of weights bands and punch bags .
- The muscles worked in main articulation movements through the performance of Pull circular kick skill and some of its qualitative exercises in Sanda the sample that reached (32) skeletal muscles, distributed on (13) main articulation movement. The most important of them are the main muscles in femur grasp: Psoas Major Muxles, Ilicus and Sartorsius. The less important of them are the main muscles in fingers flexion: Flexor Digitorum Sublimis.
- The correlation factors among the importance degrees of muscles worked in the movements of main articulations through the performance of Pull circular kick skill and its qualitative exercises the sample ranged between (0.77 – 1.00) and it was the highest correlation in the exercises of punch bags, weights bands and drop ball and the minimum in the exercises of elastic triangle, lion jaws and steering pin .
- The correlation factors in values of biological biomechanical and Biomechanical analysis (anatomic functional) between the Biomechanical skill and its qualitative exercises are considered as a main standard in selecting the qualitative exercises of the Biomechanical skill.

Recommendations :

- Training concentration for improving total time of performing the skill of pulled circular kick in Sanda on the exercises of punch bags, drop ball and lion jaws .
- Training concentration for improving stages time of performing the skill of pulled circular kick in Sanda on the

exercises of punch bags, drop ball and weight bands.

- Training concentration for improving the angular range of kick leg knee in performing the skill of pulled circular kick in Sanda on the exercises of punch bags and weights bands .
- Training concentration for improving the angular range of kick leg pelvis in performing the skill of pulled circular kick in Sanda on the exercises of punch bags and drop ball.
- Training concentration for improving the angular range of pivot leg knee in performing the skill of pulled circular kick in Sanda on the exercises of punch bags and weights bands .
- Training concentration for improving all movement variables for performing the skill of pulled circular kick in Sanda on the exercises of punch bags and weights bands.
- Giving greater priority in the training for improving all movement variables for performing the skill of pulled circular kick in Sanda on the exercises of punch bags, weights bands and the least priority for the exercises of elastic triangle and lion jaws .
- Conducting this kind of research on other movement skills in Sanda, methods in Kung Fu sport and on varied movement skills in the other sports and on different age stages .
- The importance for the correlation factors to be in the range of (0.77 – 1.00) in values of the variables of Biomechanical and anatomical analysis between the Biomechanical skill and its qualitative exercises to be depended on as a main standard in selecting the qualitative exercises of the Biomechanical skill.
- Paying attention to the two Biomechanical and anatomical analyses of the body in the performance of Biomechanical skill and its qualitative exercises and the integration among them especially with modernized Biomechanical skills such as the Biomechanical skill the sample.
- On the education, evaluation and training to develop the skill the sample through its specific exercises,

we should attention to the priority of muscles worked on main articulations in the skill Biomechanical performance and qualitative exercises especially those muscles that worked in femur grasp, knee flexion, trunk stability and circulation, stable leg and knee stretching.

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