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Order of Optional Kata (Tokey Kata) Performance Within the Competition in Light of Some Physiological Variables in Karate

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Abstract: The identification of the physiological information is one of the most important factors in improving performance and achieving the best results. The research aims to identify the order of the optional kata performance, in the present study, in the finals in the competition in the light of some physiological variables. The researcher used the descriptive approach. The research sample was selected intentionally, from the kata players of El-Rabat Club in the Branch of Port Said following the Egyptian Union of Karate, the level of first class, over 18 years old (men), who are participants in the Premier League of kata men and they were 8 players. The results showed reaching the most appropriate order for the performance of the most important optional kata in the finals in the competition in terms of the least influential in the physiological variables, in the present study, in a way that increases the ability of the player to maintain the level of their functional efficiency for the longest possible time to raise the level of performance and achieve better results. The order was Gankaku, Empi, Gojushiho sho, Unsu and Kanku sho.

Key words: Karate · Shotokan · Tokey Kata · Physiological variables

INTRODUCTION

Karate needs special requirements that distinguish it from other sports and when these requirements are available for its practitioners, they have greater opportunities to absorb and master the motor skills and its performance efficiently. Karate is a competitive sport with the changing attitudes of play as it requires the player to have high levels of functional efficiency, which demonstrates the adaptation of their vital systems with the requirements of the competition Ibrahim and Al-Bisatti [1].

The kata (fictitious fighting) is one of the karate competitions, which Dan [2] defined as "a series of motor skills represented in the types of block, punching, kicking and counter-attack against fictitious opponents. Both Kanazawa [3] and Hidetoshi [4] agreed upon the importance of studying and practicing kata to improve the level of skilful performance in karate. Ibrahim [5] indicated to the importance of recognizing the physiological variables and their mechanisms within the player's body during the sports activity, where this information would help the coach and people concerned with the planning of training programs for the players of teams in understanding these changes and their interpretation, which leads them to the best ways to improve and control them, which would be reflected in the levels of achievement through competition.

The author explains that kata competitions start with the qualification rounds where the players perform the mandatory kata which called (*Shitei kata*) then climb to the final rounds where they play the optional kata which called (*Tokey Kata*) – as the players do at maximum 5 optional katas until the final round. Most of the players select the sequence of performing the optional kata according to the circumstances of training and competition. The kata chosen by the competitor without taking into consideration the physiological indicators of the loading of the kata match on the vital organs of the player body may affect the performance of the player and the continuation of the competition. Ibrahim [6] defines the loading of the match as "a nervous, mental and physical effort that affects the different vital systems as a result of hyperactive performance during an actual match within the framework of competition."

The researcher refers that the optional kata, in the present study, is related to *Shotokan* School which is one of the four most main, important schools registered in

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World Karate Federation. The performance of kata Player is evaluated by the majority opinion (Flagging system) or by degrees ranging from 0 to 10. These degrees are given by every umpire then the sum of the three middle degrees given by the five umpires has been calculated after deleting the higher and lowest degrees as this sum will define the performance level of the player (method of arbitrators) regardless of the name of the selective kata, number of movess, or the period of performing this kata. The Optional Kata, in the present study, to a great extent, is close in the importance and difficulty level and that's assured by the close degrees that the player, especially the high-level player- acquired through his performance to the katas in the final rounds in the competition. The player has the choice to select one of the optional katas (in the present study) to do it in any rounds of the final ones in the competition: the matter which gives the optional kata, in the present study, close importance levels.

The researcher analyzed the Republic championship for the first class over 18 years (men), which was held in Port Said on 02/22/2010 to determine the most important optional kata performed by the players in the final rounds of the competition. It becomes clear that the optional kata (in the present study) gets the highest rates of the choice to be performed in the final rounds of the competition, where the percentage for the selection of Gojushiho Sho kata 30.9 %, Empi Kata 26.2 %, Kanku Sho kata 21.4 %, Unsu kata 16.7 %, Gankaku kata 4.8 % of the total number of the optional kata performed in the final rounds in the competition and it is all the katas chosen by the players, which refers to their importance as a competitive kata.

Some physiological transformation resulting from performing the optional Kata (in the present study) in the final rounds of the competition can be considered as an indicator to know the least- impact kata on the vital organs of the player to arrange these katas in the light of these physiological changes and take an advantage from this arrangement in a possibility to start with the least-impact kata and then the more influential kata on the vital organs of the body of the player to delay and reduce the rate of accumulation of lactic acid in blood and restrict the hypoglycemia (low blood-sugar level) which leads to speed the restoration of the normal case of the player, delay the fatigue impact on the vital organs of the body of the player and the continuation of the competitor which may take throughout the day.

The kata competition plan has been arranged according to the priority order of performance in the competition before break into the matches according to the capacity and efficiency of the player and according to the circumstance of the competition and competitor as much as possible to ensure the continuation of the player in the competition, get the high grades and achieve the best results.Therefore, the researcher tries to know some indicators which help him in determining the priority sequence of performing the optional kata (in the present study) in the final rounds in the competition in a way to help the player maintaining his functional efficiency for the longest time until the end of competition and in order to raise the level of performance to the maximum possible degree and achieving the best results. That's what motivates the researcher to do that study for the purpose of knowing the sequence of performance of the most important optional kata (in the present study) in the final rounds in the competition in the light of the expressive physiological transformation (available for use and measurement) of the players whose their ages allow them to compete (men over 18 years) as it is the most important and latest ages capable for competition in the sport of Karate.

The research is aiming to determine the sequence of performing of the optional kata (in the present study) in the final rounds in the competition in the light of some physiological transformation in Karate. The research is trying to answer the following question: what is the sequence of performing of the optional kata (in the present study) in the final rounds in the competition in the light of some physiological transformations in karate?

MATERIALS AND METHODS

The researcher used the adjective method due to the relevance of the technical nature of that research.

Participants: The research sample has been selected by the purposive approach of the Kata players in El-Robat club in Port Said (the first class level over 18 years / men). The number of the sample was 8 players, all of them registered in Egyptian Karate Federation and they are participant in the contest of kata Premier League (Men) season 2010/2011.

The researcher measured the physiological transformations (in the present study) of the players (used as samples in the study) during the break to ensure that the measures are neutral and in their normal rate and also to ensure that there is no any organic cause in the players (used as samples in the study) may affect the baseline measures of the study which will be carried out on the members used as samples in the study after the exerted efforts from performing the optional kata (in the present study) during the trial competition as described in Table 1.

Table 1: Mean and standard deviation of the subjects in the physiological variables during rest Intervals in the present study n= 8

Physiological Variables	Measure Unit	M	SD
Pulse rate	N/Min.	69.88	2.17
Systolic blood pressure	Mm / Hg	114.50	4.40
Diastolic blood pressure	Mm / Hg	76.25	3.96
Percentage of glucose concentration in blood	Milligrams / deciliter	81.63	3.16
Percentage of lactic acid concentration in blood	Millimole	1.53	0.19

Table 2: Mean and Standard Deviation of the Subjects in the Degree of Optional Kata Performance in the Present Study n= 8

Optional Kata	Measure Unit	M	SD
Empi	Point	21.16	0.15
Kanku sho	Point	21.08	0.12
Gankaku	Point	20.98	0.14
Gojushiho sho	Point	20.99	0.10
Unsu	Point	21.11	0.12

Table 1 indicates that the values of the arithmetic mean of the members of research sample in the physiological variables, in the present study, during the rest were 69.88 for each of the pulse rate, 114.50 for systolic blood pressure, 76.25 for diastolic blood pressure, the percentage of glucose concentration and lactic acid in blood were 81.63, 1.53 respectively. The values of the standard deviation of these variables also confined between 0.19 and 4.40 and all measurements in their natural rate and equivalent to each other during rest. Skieska *et al.* [7] confirmed that all biological, functional and chemical processes of fit person are to be neutral in the resting state and the body fluids and components are in a state of equilibrium and stability.

The researcher also measured the performance of optional kata, in the present study, of the members of research sample during conducting the essential study to ensure the convergence the degrees of the sample performance in each of the optional kata, in the present study, with the shape in which significant decrease does not appear in the performance of the research sample for a particular katat. This would ensure that the nonimpact of the low level of performance of one of the katat on the physiological variables, in the present study, as illustrated in Table 2.

Table 2 indicates that the values of the arithmetic mean of the sample research members in the degree of performing the optional kata, in the present study, confined between (20.98, 21.16). The values of the standard deviation of these katas also confined between 0.10and 0.15, which refers to convergence the degrees of the performance level of the sample in the optional kata in the present study.

Methods of Data Collection: Through the use of previous studies and theoretical readings, the researcher concluded the appropriate physiological variables and their measurement devices of performance Evaluation of kata (method of arbitrators) [5, 6, 8,9-12].

- Measurement of pulse rate, systolic and diastolic blood pressure, using a Digital blood pressure monitor.
- Measurement of the percentage of glucose concentration in blood, using a Rightest GM 300 device.
- Measurement of the percentage of lactic acid concentration in blood, using the Accusport device.

Procedures

The Explorative Study: The researcher conducted a survey on Saturday dated 24/07/2010 for the purpose of determining the period involved in making the measurements and determining the sequence of their conduct as well as to ensure the safety and the validity of the devices used to measure the physiological transformations (in the present study) where the measurements were taken from one of the players on each device three times successively in the same circumstances. The results of measurements have been come out close to a great extent, which confirms the safety and efficiency of these devices for the measurement process.

The Main Study: The main study was conducted in the period from Sunday dated 25/07/2010 to Thursday dated 29/07/2010 on the number of (8) players of El-Robat club of Karate in Port Said Branch, where each player

(used as samples in the study) performed the optional kata (in the present study) successively through experimental competition with rate of one only kata per day, to make sure that the players restore their normal case after the impact of loading of the previous kata and to get rid of any physiological influence resulted from the past performance. The researcher took into his consideration conducting the measurements at the same time of every day when he measured the pulse rate, systolic blood pressure, diastolic blood pressure and Percentage of glucose concentration in blood in each player immediately after the performance of kata, while the percentage of lactic acid concentration in the blood has been measured after two minutes from performing the kata. Skinner *et al.* [13] assured that the lactic acid accumulates in the muscles and reaches to the blood in a fixed time as it almost takes 2 minutes after the completion of performance.

Statistical Analysis: The package of Statistical program of Social Sciences (SPSS) was used by activating the usage of computer in the statistical treatments.

RESULTS AND DISCUSSION

Table 3 indicates that the value of k^2 computed by using the variance analysis of Friedman test for the significance of differences between the optional Kata, in the present study, in the variable of pulse rate has reached 31.30 and at the degree of freedom (4), which is statistically significant. The differences between the optional Kata, in the present study, are real ones in favor of Gankaku kata. This suggests that this Kata is the least optional one, in the present study, which has an effect on raising the pulse rate, respectively, followed by each of the Empi, Gojushiho, sho, Unsu and Kanku sho kata.

Table 4 indicates that the value of k^2 computed by using the analysis of variance of Friedman for significance of differences between the optional Kata, in the present study in the variable of systolic blood pressure reached 29.20 and at the degree of freedom (4), which is statistically significant. The differences between the optional Kata, in the present study, are real ones in favor of Gankaku Kata. This shows that this Kata is the least optional one, in the present study, which has an effect on raising the systolic blood pressure, respectively, followed by each of the Empi, Gojushiho, sho, Unsu and Kanku sho Kata.

Table 5 indicates that the value of k^2 computed by using the analysis of variance of Friedman for significance of differences between the optional kata, in the present study in the variable of diastolic blood pressure reached 21.66 and at the degree of freedom (4), which is statistically significant. The differences between the optional kata, in the present study, are real ones in favor of Gankaku kata. This shows that this kata is the least optional one, in the present study, which has an effect on raising the diastolic blood pressure, respectively, followed by each of the Empi, Gojushiho, sho, Unsu and Kanku sho Kata.

Table 6 indicates that the value of k^2 computed by using the analysis of variance of Friedman for significance of differences between the optional kata, in the present study, in the variable of percentage of glucose concentration in blood reached 25.30 and at the degree of freedom (4), which is statistically significant. The differences between the optional kata, in the present study, are real ones in favor of Gankaku kata. This shows that this Kata is the least optional one, in the present study, which has an effect on decreasing the percentage of glucose concentration in blood, respectively, followed by each of the Empi, Gojushiho, sho, Unsu and Kanku sho Kata.

Table 3: Friedman variance analysis of significance differences among optional Kata in the pulse rate in the present study. n= 8

Optional Kata	Ranks *M*	Degrees of freedom	Computed k^2	Sig. Level
Gankaku	1.13	4	31.30	Sig.
Empi	1.88			Sig.
Gojushiho sho	3.00			Sig.
Unsu	4.00			Sig.
Kanku sho	5.00			Sig.

Tabular k^2 at 0.05 = 7.65.

Table 4: Friedman variance analysis of significance differences among optional Kata in the systolic blood pressure in the present study. n= 8

Optional Kata	Ranks *M*	Degrees of freedom	Computed k^2	Sig. Level
Gankaku	1.25	4	29.20	Sig.
Empi	2.00			Sig.
Gojushiho sho	2.75			Sig.
Unsu	4.00			Sig.
Kanku sho	5.00			Sig.

Table 5: Friedman variance analysis of significance differences among optional Kata in the diastolic blood pressure in the present study. n= 8

Optional Kata	Ranks *M*	Degrees of freedom	Computed k^2	Sig. Level
Gankaku	1.25	4	21.66	Sig.
Empi	2.31			Sig.
Gojushiho sho	3.06			Sig.
Unsu	4.00			Sig.
Kanku sho	4.38			Sig.

Table 6: Friedman variance analysis of significance differences among optional Kata in the percentage of glucose concentration in blood in the present study. n= 8

Optional Kata	Ranks *M*	Degrees of freedom	Computed k^2	Sig. Level
Gankaku	4.81	4	25.30	Sig.
Empi	3.75			Sig.
Gojushiho sho	2.94			Sig.
Unsu	2.38			Sig.
Kanku sho	1.13			Sig.

Table 7: Friedman variance analysis of significance differences among optional Kata in the percentage of lactic acid concentration in blood in the present study n= 8

Optional Kata	Ranks *M*	Degrees of freedom	Computed k^2	Sig. Level
Gankaku	1.13	4	26.20	Sig.
Empi	2.13			Sig.
Gojushiho sho	3.00			Sig.
Unsu	4.13			Sig.
Kanku sho	4.63			Sig.

Table 7 indicates that the value of k^2 computed by using the analysis of variance of Friedman for significance of differences between the optional kata, in the present study, in the variable of the percentage of lactic acid concentration in blood reached 26.20 and at the degree of freedom (4), which is statistically significant. The differences between the optional kata, in the present study, are real ones in favor of Gankaku Kata. This shows that this kata is the least optional one, in the present study, which has an effect on raising the percentage of lactic acid concentration in blood, respectively, followed by each of the Empi, Gojushiho, sho, Unsu and Kanku sho Kata.

DISCUSSION

As shown in tables 3-7, it become clear that there is a differences between optional kata (in the present study) in its effect on the variable pulse rate, systolic blood pressure, diastolic blood pressure, the percentage of glucose concentration in blood and the Percentage of lactic acid concentration in blood where calculated values of k^2 of these statistics ranged between 66, 21, 30, 31 and all of them are statistically significant, which indicate a significant effect of the optional kata (in the present study) for these variables.

However, there was a discrepancy between the optional kata (in the present study) in the degree of its impact on physiological transformation (in the present study). The researcher referred to what Ibrahim [5] said that the effects of kinetic routines (kata) on the functional transformations varies due to the different number of methods, the nature of performance and the moves and time of tracks of exerted power in addition to the properties of the difficulty of performance within the content of the kata.

As can be seen from the tables that the difference between the optional kata (in the present study) was for the favor of Gankaku kata as it is the least-impact optional kata (in the present study) on the physiological transformations (in the present study) as this kata recorded the lowest rates of the pulse rate, blood pressure, the percentage of lactic acid concentration in blood and recorded the highest rate of glucose concentration in blood, while Kanku sho kata was the most impact optional kata (in the present study) on the physiological transformations (in the present study) as it has recorded the highest rate of the pulse rate, blood pressure and the percentage of lactic acid concentration in blood and recorded the lowest rate of glucose concentration in blood after performance.

Abdel-Maksoud [14] indicates that the transformations occurred inside the internal organs of the human being becomes greater when the load is in the highest rate of intensity and when it continues for a long time. Ibrahim [15] assured that performing the moves of kata affects the percentage of lactic in the blood, the rates of blood pressure and the consumption of the heart muscles of oxygen due to the variation of the effect of each kata that leads to the difference of response of the vital organs of the player.

The researcher assures that the Gankaku kata is the least impact optional kata (in the present study) on the physiological transformations (in the present study). It may be due to the fact that this kata is the least optional kata (in the present study) in the total number of moves which amounted to 42 moves, the number of offensive moves amounted to 12 move, the number of the frequency of deep fulcrum positions which has been repeated 18 times within the kata and the increase of the number of moves carried out at a slow pace which amounted to 15 moves with the percentage of 35.7% of the total number of kata moves. The average time of performing that kata 58 seconds (as appeared on the samples) in addition to the nature and level of difficulty of performing that kata: the matter which makes that kata the most appropriate one to be the first kata performed at the beginning of the final rounds in the competition.

Unsu kata comes in the fourth rank of the least-impact optional kata (in the present study) on the physiological transformations (in the present study) that is may be due to the fact that this kata is the less optional kata (in the present study) in the number of moves carried out at a slow pace, which amounted to 7 moves with the percentage of 12.1% of the total number of moves of that kata. This kata is distinguished by the high number of the frequency of the use of deep fulcrum positions which amounted to 19 times and the increase of the average time of performing that kata which is 85 seconds in addition to the method and level of difficulty of performing that kata such as performing the skill jump with rotation in the air *Zempu tobi geri*. Therefore, that kata comes in the fourth rank to be performed in the final rounds in the competition.

Kanku sho kata comes in the fifth rank of the least-impact optional kata (in the present study) on the physiological transformations (in the present study). That may be due to the fact that this kata is less optional kata (in the present study) in the number of moves carried out at a slow pace which amounted to 7 moves with the percentage of 14% of the total number of moves of that kata. This kata is also characterized by the increase average time of its performing which amounted to 84 seconds in addition that the skills of that kata have been specifically performed by using the deep fulcrum positions repeated 27 times in this kata with the percentage of 81.8% of the total number of repeating the fulcrum positions in that kata which increased the physical burden on the player as a result of increasing the amount of the expenditure of energy in performing the skills of that kata in comparing with the kata where some of the skills have been performed by using the high fulcrum positions.

Abdul-Baseer *et al.* [16] indicates that the work = force × distance so if force affected a body and its move, the amount of work will increase by the increase of the distance.

Therefore, through the skills of punching, kicking, defense and beating performed in this kata, the amount of the work generated from that kata by using the deep fulcrum positions from beginning of the kata to the end, such as the front fulcrum position *Zenkutsu dachi*, the back fulcrum position *Kokutsu dachi*, the position of riding horse Kiba dachi. This is in addition to the skills of jumping with rotation in the air to defense with the knife hand *Tenshin tobe gaeshi* and jumping with rotation in the air to perform the move of sweeping with the foot to perform the back kick *Tobi ashi barai tobi ushiro geri* and pushing the earth by hands together in a position of Ryote fuse to reach the back fulcrum position. These skills are characterized by a high degree of difficulty, increase the physical load on the player and then influence the functional efficiency on the internal organs of the body, so this kata comes in the fifth and last grade to be performed in final rounds in the competition.

The researcher noticed the indifferent grades of the stated optional katas(in the present study) in their impact on all the physiological transformations (in the present study) as the Gankaku kata in the first rank of the least-impact optional kata (in the present study) on the physiological transformations (in the present study) followed by Umpi, Gojushiho, Unsu, then Kanku Sho.

The researcher refers to the relation of the physiological transformations, their impacts and their influence on each other inside the body of the player. Allawi and Abdul-Fattah [11] said that through studying the relation between blood pressure and Pulse rate, you can notice that this relation is parallel.

Abdel-Fattah [17] clarified the opposite relation between lactic acid and glucose as the lactic acid is called Anaerobic Glycols relating to the fission of the sugar in the absence of oxygen where the lactic acid is the final result of Sugar splitting.

Table 3 insulates that the value of calculated k^2 to indicate the differences between the optional kata (in the present study) in the variable pulse rate has been amounted to 30, 31 for the favor of Gankaku kata. Shalabi [18] quoted from Lamb the importance of using the pulse rate as an indicator for several physiological transformations as it is related with the rate of oxygen consumption, the blood push, the number of red blood cells, hemoglobin concentration in red blood cells, the efficiency of metabolic processes and energy production.

Therefore, Allawi and Abdul-Fattah [11] said that the pulse rate can be used to know immediately suitable range of loading of the training level of the player.

Ibrahim [5] confirms that the increase of the heart pulse rate commensurate with the performance of components of the moves of Kata which carried out by the player which appeared in the number of defensive and offensive tactics and the course of exerted force and its pace in addition to performance line of the kata.

Therefore, it is more appropriate to choose the kata has the least impact on physiological transformations to be performed as a start in the final rounds in the competition in order to its low impact on the high of pulse rate the matter which leads to the continuation of keeping the efficiency of the level of cardiovascular system and the readiness to perform the following kata with less pulse rate.

Abdel-Maksoud [14] said that the low pulse rate has a positive impact on the level of blood flow in heart muscle whether during the loading or break period as it keeps that (blood flow) for the heart as long as possible in extraversion and fullness stages and that is positively affect providing the heart muscle with Oxygen.

Tables 4 and 5 explained the calculated value of k^2 to signify the differences between the optional Kata (in the present study) in the variable systolic blood pressure and diastolic blood pressure have amounted 20, 29, 66, 21 respectively and in favor of Gankaku Kata. Allawi and Abdul-Fattah [11] show that the high blood pressure has been affected by several factors including the age, quantity of muscles participating in the work and the situation of the body during the physical exercises. The high blood pressure during the physical exercises leads to the reduction of the resistance of blood flow which increases during the muscles exercises in the foot as a result of increasing the muscles quantity participating in the work. So the capillaries which received the blood in the legs have a larger quantity therefore, they receive a large quantity of blood so the resistance of peripheral blood flow reduces.

What has been mentioned above explained that Kanku sho kata is the most -impact optional kata on the physiological transformations as most of its skills used by deep fulcrum positions leads to the increase of the physical burden on the legs muscles.

Table 6 clarified that the calculated value of K^2 to indicate the differences between the optional kata (in the present study) in the variable percentage of glucose concentration in the blood have been amounted to 30, 25 for the favor of Gankaku kata. Abdel-Maksoud [14] sees that glucose contributes in saving the energy and it depends on the volume and intense of the loading as well as the training level.

The researcher noticed that starting with the least-impact kata followed by more and the most impact kata (in the present study) contributes in saving the stockpile of glycogen in the body for a long time with the continuation of the competition. Abdel-Maksoud [14] observed that the more of high level of training, the more of maintaining the stockpile of glycogen in the tissues and in the liver therefore keeping the sugar level on the blood.

As shown in Table 7 that the calculated value of K^2 to signify the differences between the optional kata optional (in the present study) in the variable percentage of the concentration of the lactic acid in the blood has amounted to 20, 26 and for the favor of Gankaku kata, where Francescata *et al.* [19] and Imamura *et al.* [20] agreed that the production of energy throughout the lactic acid system during the performance of kata, which increases its concentration in blood after the performance.

Heshmat [21] clarifies the importance of lactic measures in Alphabetical order of the sportsmen as there is a firm relation between the level of performance and the beginning of accumulating of the lactic acid.

El-Beek *et al.* [22] explains that reduction of the store of the phosphate Creatine in the muscles and the accumulation of the lactic acid are the main 2 reasons of the fatigue resulting from the activities continue from 10 seconds to 3 minutes.

Ibrahim [5] assured that the lactic acid system is the essential energy system of the activities which required a period from 30 to 45 seconds and may continue to 90 seconds and associated with the high loading strength reached to the maximum sport activities.

Therefore it is preferred to delay the most-impact kata on the physiological transformations (in the present study) so as not to cause an increase in the percentage of the concentration of lactic acid in blood with a higher rate in the beginning of the final rounds in the competition which makes the players feels tired early and may affect the level of functional efficiency of performing the

following optional kata especially in the final round. Abdel-Maksoud [14] refers that through performing high loads, the amount of lactic acid increases to the level that the blood cannot transfer it out of the muscle.

CONCLUSION

- There is a variation between the optional kata, in the present study, in affecting the physiological variables - in the present study - because of the difference of content, nature and the degree of difficulty of performing each kata.
- The order of optional kata effect, in the present study, is not different in each physiological variable, in the present study, due to the correlation between physiological variables and their effect on each other.
- Achieving the most appropriate order for the performance of optional kata, in the present study, in the light of the physiological variables, in the present study, in the final of competitions to maintain the continuity of the player at the level of functional efficiency and to promote the performance level to achieve the best results. This is the order: Gankaku-Empi-Gojushiho sho-Unsu-Kanku sho

Recommendations:

- Guided by the results of this research in educating and guiding the coaches and the players to modify the order of their choices of optional kata, in the present study, in the final competition according to the abstracted order or part of this one to suit their abilities and aptitudes.
- Emphasizing on the importance of using physiological variables, in the present study as sustained indicators to determine the level of functional efficiency of the karate players.
- Exerting the endeavors to inform the Scientific and Technical Committee in the Egyptian Union of Karate, as well as the International Union of Karate with the results of this research to guide them to review the law of kata arbitration with regard to ordering the performance of optional kata in the final competition and consider the possibility of making the performance order mandatory according to the accredited school and its kata, which increase the credibility and objectivity of judging the degree of the players' performance as a result of evaluating all of them at the same kata in each rounds of the final ones within the competition.

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