



Original Article

The Effect of Functional Training on Pulse Rate, Blood Pressure and Performance of Kanku Sho Kata Sections

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Abstract

This study investigated the impact of functional training on blood pressure, pulse rate, and the performance of Kanku Sho kata sections, the authors used an experimental approach with a single group, conducting pre- and post-measurements, the participants were selected from kata competitors and members of Egypt's national karate team qualifiers (senior category, under 18 years old) registered with the Egyptian Karate Federation, for 12-week functional training program consisted of 48 sessions, incorporating high- and low-intensity methods to enhance physical and technical performance, the results revealed statistically significant differences (at a 0.05 significance level) between pre- and post-test scores in performance of Kanku Sho kata sections, The average performance grades showed notable improvements, with enhancement rates of 15.32%, 17.80%, 11.09%, 12.61%, and 17.72%, respectively. Additionally, blood pressure (systolic and diastolic) improved by 5.12% and 7.17%, while pulse rate increased by 6.08%.

Keywords: *Functional Training, Kata Sections, Kanku-Sho Kata, Blood Pressure, Pulse rate.*

Introduction

karate has recently seen significant updates to the international rules governing Kata competitions, adapting to global changes and advancements especially after karate's inclusion in the Tokyo 2020 Olympic Program, Key modifications have been made to the performance evaluation process, particularly in how judges determine and submit their final scores, under the new system, judges electronically submit one of ten possible scores



(10) after assessing performance in one distinct phases: Technical Performance and Athletic Performance. (Roules, 2024)

Elabyari.I (2020) in the development of scientific research and studies, the tools and means of training have been devised that have helped to bring about training situation from the improvement of the technical and physical level of players in the least possible time through specialized training programs to contribute to the development of performance. (ElEbiary, 2020)

According to Al Khamisi.y (2022), kata competition is a key discipline in karate, distinguished by the stylistic diversity across major schools such as **Shotokan, Chito-ryu, Wado-ryu, and Goju-ryu**, this variety not only enhances competitive excitement but also drives continuous improvement in performance standards, as athletes progressively refine their skills each year in pursuit of excellence, nations increasingly compete to secure the highest number of achievements in this dynamic sport.(Al-Khamisi, 2022)

Kata sections is the part of the kata that contains a set of consecutive motor skill methods with the same wholesale kata sequence with kata rhythms (tempo), some of which can be minimally altered by players to demonstrate their artistic and mathematical ability. (ElEbiary, 2020)

Modern training prioritizes movement patterns over isolated muscle training, Functional training which replicates natural, activity-specific motions is considered one of the most effective methods for enhancing bodily movement and optimizing athletic performance in competitive sports. (Santana, 2015)

Functional training represents a contemporary training approach that integrates sport-specific conditioning with physical preparation. Its foundational philosophy emphasizes enhancing strength, muscular capacity, and other physical attributes essential for executing fundamental movement patterns that align with athletic demands. This methodology focuses on multi-joint exercises performed across various movement planes, contrasting with traditional isolated muscle training or segmented body-part exercises that characterized conventional strength training approaches. (Boyle, 2010)

Functional training is a category of exercises that simulate movements from daily life or sport-specific activities, they contend that these functional movements establish a fundamental movement foundation, enabling athletes to progress to greater physical demands and more sophisticated motor skills. (Boyle, 2010)



According to the study objectives which is to test the effect of functional training on blood pressure, pulse rate and performance level of Kanku Sho Kata Kata sections in Karate, the authors designed functional training exercises from basic skills of kata performance, considering the performance evaluation criteria using different tools and training devices. The reason is that all kinds of movements have pattern of human movements.

Study Hypotheses:

There are statistically significant differences between the averages of the pre- and post-measurements for (experimental group) in blood pressure, pulse rate and Performance of Kanku Sho Kata Sections in favor of the post-measurement.

Materials and Method

The author used the experimental method of one group with pre- post measurement design.

Participants

Fifteen kata players were selected from participants in the Egypt National Team Qualifiers (kata competition) under 18 years old. The main study group was 5 players. The rest 10 players were divided into two groups for the pilot study, each group consisted of (5) players, one was (Distinguished), the other was (non- distinguished).

Homogeneity of the participants groups

Table (1) shows that the values of the skewness coefficients were between (± 3), ranged between (1.1: 0.2) which verified the homogeneity of the group of participants.

Table 1 The normality of the distribution of the research community (N=15)

Variables	measurement Unit	mean	Median	St.Dv	skewness
Age	Cm	175.84	175.00	5.23	0.60
Length	Kg	72.21	72.00	6.71	0.60
Weight	year	19.36	19.00	0.65	1.15
Training Age	Cm	4.61	5.00	1.02	- 0.71

Main Study

Training Program

The training program includes a series of physical preparation and technical preparation trainings, using functional trainings, The authors surveyed the opinions of the experts, The basic aspects of the preparation of the program were identified from the trainings used and the training modules, as shown in table (2)



The plan for applying the research experiment has been implemented considering the uniformity of circumstances during the conduct of (pre- post measurements).

Table 2. Training Program Outlines

Content	Variables
Special preparation period	Program implementation period
(12) Week	Duration of program implementation
(2) Weeks	General preparation phase
(6) Weeks	Special preparation phase
(4) Weeks	Pre-Competition
(4) Training modules	Number of training units during the week
(48) Training Module	Number of training modules
(75 min)	Time of the main part of the training module
(3600) min (60) Training hours	Total Program Time
(1:1) (1: 2)	Load Formation

Table 3. Time Plan of Study Measurements and Application

Measurements and Application	Mission	Date
Pre- measurements	Functional fitness variable	2025/12/11
	Performance level	2025/12/12
Training Program	session (4) - week (12)	2025/12/13
Post measurements	Functional fitness variable	2025/12/15
		2025/3/8

The proposed training program

Table 3. Time Distribution of The Training Programme on the Module Parts

Training session Parts		Percentage Ratio	time per minutes	Time per Hours
Main part	Physical Preparation	%30	1080	18
	Skill Setting	%20	720	12
	Kata Sections	%20	720	12
	Kanku sho kata	%30	1080	18
		%100	3600	60



Table 4. Dynamic of Time Distribution of Training Program

Weekly load intensity%				Daily load intensity %				Num. units	Num. week	Physical	Skills	sections	kata	Total time		
Low	Medium	Heavy	Max	Low	Medium	Heavy	Max								Duration (min)	
65				56				1		37	22	8	8	75		
				72				2		37	22	8	8	75		
				60				3		37	22	8	8	75		
		82		72				4	1	37	22	8	8	75		
				74				5		37	22	8	8	75		
					84			6		37	22	8	8	75		
						90		7		37	22	8	8	75		
							80		8	2	37	22	8	8	75	
75					73			9		23	15	15	22	75		
						83		10		23	15	15	22	75		
					71			11		23	15	15	22	75		
					73			12	3	23	15	15	22	75		
		85				81		13		23	15	15	22	75		
						84		14		23	15	15	22	75		
							92	15		23	15	15	22	75		
						83		16	4	23	15	15	22	75		
			92				98	17		23	15	15	22	75		
					79			18		23	15	15	22	75		
							96	19		23	15	15	22	75		
								95	20	5	23	15	15	22	75	
											21		23	15	15	22
72					78			22		23	15	15	22	75		
					64			23		23	15	15	22	75		
						80		24	6	23	15	15	22	75		
					66			25		23	15	15	22	75		
						76		26		23	15	15	22	75		
							86		27		23	15	15	22	75	
								94		28	7	23	15	15	22	75
									96		29		23	15	15	22
			96			89		30		23	15	15	22	75		
							99	31		23	15	15	22	75		
								97	32	8	23	15	15	22	75	
									99		23	15	15	22	75	
											33		15	11	19	30
78						86		34		15	11	19	30	75		
					69			35		15	11	19	30	75		
						75		36	9	15	11	19	30	75		
						82		37		15	11	19	30	75		
							89		38		15	11	19	30	75	
								99	39		15	11	19	30	75	
								93		40	10	15	11	19	30	75
								99		41		15	11	19	30	75
			95			89		42		15	11	19	30	75		
							99	43		15	11	19	30	75		
								97		44	11	15	11	19	30	75
								99		45		15	11	19	30	75
72					87			46		15	11	19	30	75		
					64			47		15	11	19	30	75		
						80		48	12	15	11	19	30	75		
							66					15	11	19	30	75

Homogeneity of the participants groups

The authors also ascertained the moderate distribution of post- measurements data as shown in a table (5)



Table (5) Moderate distribution of Pre - measurements

Test	variables		Unit	mean	Median	SD	Skewness
Elec. Blood pressure device	blood pressure	sys	Puls/min	117.20	120	6.27	1.34
		dia	Puls/min	69.80	70	0.40	1.50
	Pulse rate		pulse	72.40	72	2.73	0.44
Sections (1)	Performance of Kanku Sho Kata Sections		point	6.66	6.70	0.10	1.18
Sections (2)			point	6.75	6.73	0.13	0.51
Sections (3)			point	6.85	6.84	0.04	0.83
Sections (4)			point	6.96	6.94	0.06	1.23
Sections (5)			point	6.65	6.61	0.11	1.08

* Tabular value of "Z" at (0.05) = 1.96

It is clear from Table (5) that the values of the skewness coefficients were between (± 3), ranged between (1.50: 0.44) which indicates that the measurements of the total sample of the research in the variables under study fell under the normal curve, which indicates the homogeneity of the individuals of the total groups of participants in these variables.

Statistical Analysis

According to the objectives and hypotheses of the study, the author used the following statistical treatments: Mean - Standard Deviation St.dev. - Median - Skewness - Test (z Test) - Improvement percentage.

Results

Based on the research's objectives and assumptions, the authors presented the findings and discussed them in line with the data obtained as shown in table 6.

Table 6. Significance of differences between pre- and post-measurement (n= 5)

Test	variables	Unit	pre		post		Mean Diff.	z. value	Improv-ement
			Mean	St.Dv	Mean	St.Dv			
Blood pressure	sys	Puls/min	117.2	6.27	123.2	4.12	6-	1.91	%5.12
	dia	Puls/min	69.80	0.40	74.8	4.71	5-	25	%7.16
Pulse rate		pulse	72.40	2.73	68	2.10	4.40	3.23	%6.08
Sections (1)	Performance of Kanku Sho Kata Sections	Point	6.66	0.10	7.68	0.21	1.02-	20	%15.32
Sections (2)		Point	6.75	0.13	7.95	0.02	1.20-	18.54	%17.80
Sections (3)		Point	6.85	0.04	7.61	0.18	-0.76	41.84	%11.09
Sections (4)		Point	6.96	0.06	7.84	0.06	-0.88	30.01	%12.61
Sections (5)		Point	6.65	0.11	7.83	0.12	1.18-	22.41	%17.72



* Tabular value of "Z" at (0.05) = 1.96

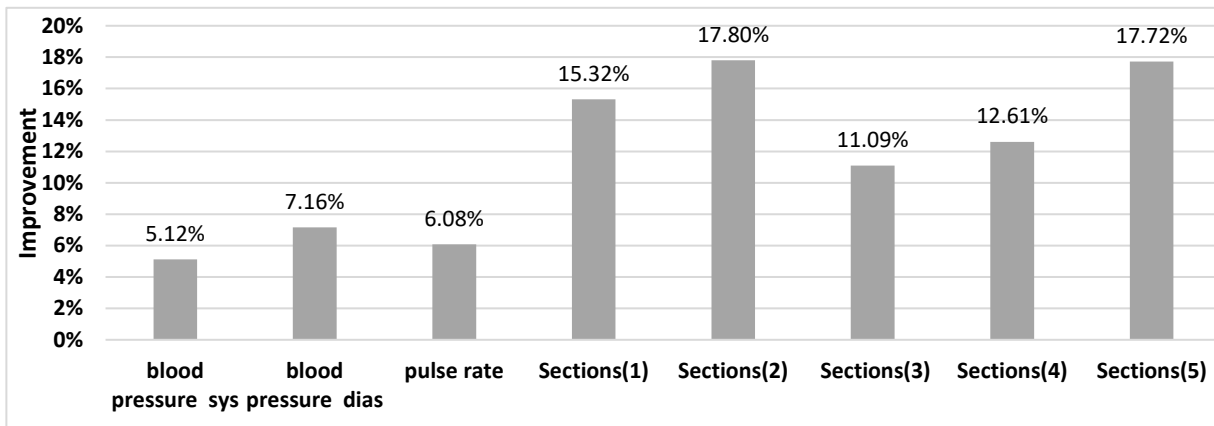


Figure 1. Difference between the two measurements (pre and post) measurement

Table No. (6) shows that there are statistically significant differences at level of (0.05) between the average values of the (pre - and post-measurements) for the participant of the experimental group in the blood pressure, pulse rate and Performance of Kanku Sho Kata Sections.

Discussion

The lowest value for "z" (1.96) was in blood pressure and the largest value for calculated "z" (41.84) for the movement sections (3), The calculated value of "z" was greater than the tabular value of "z" at the level of Table (5) indicating the achievement of the imposition: There Are Statistically Significant Differences Between The Averages Of The Pre- And Post-Measurements (Experimental Group) In Blood Pressure, Pulse Rate, Performance of Kanku Sho Kata Sections in Favor of Post-Measurement, there is a discrepancy in the rates of improvement between the average (pre- post measurements) of the experimental research group in the variables, where the highest rate of improvement of the variable Performance of Kanku Sho Kata Sections (2) was 17.80%, while the blood pressure variable achieved the lowest rate of improvement (5.12%).

This is consistent with the indications of AL-Farouk.A (2017) that it is important that training programs contain trainings performed in conditions like skilled and competitive performance to improve their technical efficiency through the requirements of specialized activity. (AL-Farouq, 2017)

The significant improvements observed between pre- and post-test measurements can be attributed to the carefully designed training program, which incorporated specialized physical conditioning tailored to the technical demands of kata performance. By integrating sport-specific exercises that precisely replicated competitive movement patterns and timing requirements, the program simultaneously developed both physical capacities and technical execution. The scientifically structured regimen followed periodized principles to progressively enhance the specific motor skills and physiological



variables critical for kata competition, ultimately leading to measurable gains in performance quality and execution precision under simulated competitive conditions, which led to an improvement in the Performance of Kanku Sho Kata Sections under study in the Post measurement of the Pre- measurement of my research sample.

Conclusion

objectives and mandates and within the limits of the research sample, based on statistical treatments, and what the research results indicated. The authors was able to conclude that:

1. The blood pressure rate (systolic- diastolic), pulse rate improved contraction and simplicity as follows (5.12% - 7.16% - 6.08%).
2. Pulse rate improved contraction and simplicity as follows (6.08) %
3. Improving Performance of Kanku Sho Kata Sections, the first was a movement Section (5) of 17.72%. The last score was a movement Section (3) of 11.09%.

Recommendations

1. Use functional trainings to improve the performance level of the Kanku Sho wholesale of internationally listed kinetic aesthetics.
2. Applying similar training programs to all age classifications in the international tournaments

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