

## Using the Length and Weight of the Body and Some Dynamic Parameters to Perform Ura Mawshi Geri Skill to Predict Kumite Players' Performance

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**Abstract:** This study aimed to identify both: 1. The kind of correlative relationship among the points of performing Ura Mawshi Geri (U. M. G.) skill and the length and weight of the players' bodies and some dynamic parameters to perform (U.M.G.) skill 2. Predictive equation is used to predict the value of performing UMG skill points with the significance of the body's length and weight and some dynamic parameters to perform it. Research sample included 8 karate players in Port Said Zone under 18<sup>th</sup>. A 3-D digital camera was used to videotape the players. The researcher used two video cameras with speed of 50 frame /sec. He also used the motor analysis and Win analysis program at Motor Analysis Unit, Faculty of Physical Education, Port Said University. Restmeter to measure the length of player and medical scales for the weight were used as well as (SPSS) program to treat data statistically. Most important findings revealed that there was an direct proportionateness between the rulers assessment points for both performing of (U.M.G.) (JP.) skill and the vertical forces in both preliminary and final preparation phase ( $F_{y_1}$ ,  $F_{y_3}$ ). There was also contrary proportionateness between JP and sagittal velocities within preliminary phase ( $V_{z_1}$ ) in addition to the variation of parameters' participation percentage under discussion in affecting (JP). The predictive equation of (JP) by function of contributed parameters is:  $(JP = 6.1827 - 0.0440 (V_{z_1}) + 0.0187 (V_{y_1}) - 0.02620 (V_{x_3}) - 0.00020 (F_{x_3}) + 0.0220 (WB.) - 0.00200 (F_{y_2})$ .

**Key words:** Fundamental Skills • Martial arts • Three-dimensional dynamic analysis

### INTRODCUTION

Not only is Karate a mean of self-defense, but it is also a sport and philosophy, a way of life [1]. Karate models examine each of these aspects and explain why educators and parents have become interested in karate as an educational tool [2-4]. Karate is an individual noncombatant sport that its art performance developed by using techniques and methods of basic offensive through the punches and kicks[5-7]. The researcher indicates that the most important considerable factors when selecting M/F karate players are that the anthropometric measures and coordinative abilities; in addition to the proper technique to utilize the required biomechanical bases to achieve highest performance level skills for males and females Egyptian' players. To achieve that, specific information should be available for high level players and to identify the decisive factor affecting the performance level of karate skills.

By reviewing related studies in the karate field in which the researcher could find, he discovered that most of these studies focused on the impact of developing physical capacities on the skillful performance level in karate [6, 8]. Meanwhile other studies handled the mechanical characteristics [3, 9]. Despite the importance of body length and weight and some dynamic parameters as effective factors of performing karate skill, the researcher noticed that information related to them was rare. Therefore, he was motivated to conduct this study as a significance to predict the Kumite performance points to (U.M.G.) in karate.

The researcher indicates that this study has theoretical importance hidden behind clarifying the correlative relation between body length and Weight and some dynamic parameters to perform (U.M.G.) with its equivalent performance points and setting predictive equation to predict the degree of performing it with significance of both body length and weight and some

Table 1: Characteristics of the Sample Research (n = 8 players)

Variables	Measure Unit	Arithmetic Mean	Standard deviation	Minimum	Maximum	Range	Skew
Weight	Kgm/s <sup>2</sup>	61.125	4.734	54.00	70.00	16.00	0.5860
Length	cm.	169.250	6.870	158.00	182.00	24.00	0.8960
Age	year	16.588	1.279	14.90	18.30	3.400	-0.1160
The training age	year	11.625	0.940	10.60	13.00	2.400	0.7850

dynamic parameters, which influence the performance of UMG skill. Regarding practical importance, it appears in utilizing the results of this study in selecting Egyptian karate players and controlling their proper weight to perform the concerned (U.M.G.) when planning for training process.

**This Study Aimed at Identifying the Following Objectives:**

- The kind of correlative relation among skill performance points of (U.M.G.) and both body length and weight and some dynamic parameters to perform that skill if it is available.
- Predictive equations are used to predict the point's value of performing (U.M.G.) with the significance of body's length and weight and some dynamic parameters to (U.M.G.) performance.

**MATERIALS AND METHODS**

**Participants:** The Subjects were Chosen from karate players of Port-Said zone of karate in old stage under 18th, which included eight players Table (1) indicates the research sample characteristics.

**Procedures:** The researcher used (3D) photography video; two "Panasonic" cameras whose speed is 50 frame / sec. for imaging subjects, Win motion analysis system in motion analysis unit in Faculty of Physical Education in Port-Said - Suez Canal University. Restmeter and medical scale were also used to measure body length (LB.) and body weight (WB.).

**The Researcher Also Used Statistical Program for Social Sciences (Spss) Which Includes the Following:**

- Arithmetic mean.
- Standard deviation.
- Range.
- Logical regression analysis

The researcher mentioned that he accepted fault occurrence possibility at the statistical Significance of (0.05).

**RESULTS AND DISCUSSION**

Tables 2 and 3 indicates that the correlation between both (LB.) and (WB.) and some dynamic parameters affecting (CG.) within the performance of (U.M.G.) skill.

Table 2: The correlation between each of length and body weight and some dynamic parameters which influenced on the (CG.) within the performance of the (U.M.G.) (n = 8 players).

Parameters	Coefficient Correlation
(JP) & (Vz <sub>1</sub> ), (Fy <sub>1</sub> ), (Fy <sub>3</sub> )	(-0.80, 0.77*, 0.77)* respectively
T <sub>1</sub> & (Fx <sub>2</sub> ), (Vz <sub>3</sub> )	(0.71, 0.79)* respectively
(T <sub>2</sub> ) & (Imy <sub>1</sub> ), (Imz <sub>2</sub> ), (Imy <sub>3</sub> ), (Vz <sub>2</sub> ), (Vx <sub>2</sub> ), (Imx <sub>2</sub> )	0.79, 0.79, 0.79, 0.83, -0.90, -0.89)* respectively
T <sub>3</sub> & (Imz <sub>1</sub> ), (Imz <sub>3</sub> )	(-0.80, -0.80)* respectively
(Vx <sub>1</sub> ) & (Fz <sub>1</sub> ), (Fz <sub>3</sub> )	(-0.96, -0.96)* respectively
(Vz <sub>1</sub> ) & (Vy <sub>2</sub> ), (Imy <sub>2</sub> ), (Fy <sub>1</sub> ), (Fy <sub>3</sub> )	(0.81, 0.81, -0.89, -0.88)* respectively
(Fx <sub>1</sub> ) & (Vz <sub>3</sub> ), (Fx <sub>3</sub> ), (WB.), (LB.)	(-0.73, 1.00, -0.78, -0.72)* respectively
(Fy <sub>1</sub> ) & (Fy <sub>3</sub> ), (Vy <sub>2</sub> ), (Imy <sub>1</sub> )	(1.00, -0.85, -0.86)* respectively
(Fz <sub>1</sub> ) & (Fz <sub>3</sub> )	(1.00)*
(Imy <sub>1</sub> ) & (Vx <sub>2</sub> ), (Imx <sub>2</sub> )	(-0.79, -0.78)* respectively
(Vx <sub>2</sub> ) & (Vz <sub>2</sub> ), (Imz <sub>2</sub> )	(-0.96, -0.94)* respectively
(Imx <sub>1</sub> ) & (Imx <sub>3</sub> )	(1.00)*
(Vy <sub>2</sub> ) & (Fz <sub>2</sub> )	(-0.98)*
(Vz <sub>2</sub> ) & (Imx <sub>2</sub> )	(-0.98)*
(Imx <sub>2</sub> ) & (Imz <sub>2</sub> )	(-0.96)*
(Vz <sub>3</sub> ) & (Fx <sub>3</sub> )	(-0.73)*
(Fx <sub>3</sub> ) & (WB.), (LB.)	(-0.80, -0.72)* respectively
(WB.) & (LB.)	(0.98)*

\* It means the value of statistical correlation significance at (0.05).

Table 3: Summary of Stepwise Regression of Length, Weight of the body and some Dynamic Parameters Affecting (CG.) Within the Performance of (U.M.G.)

Parameters	Slop parameter (B)	Standard error	Degrees of freedom	( T )	percentage contribution
Constant	6.1827	0.0020	6	3243.40*	
Vz <sub>1</sub>	-0.0440	0.0000		-1138.80*	0.64240
Vy <sub>1</sub>	0.0187	0.0000		4964.30*	0.16960
Vx <sub>3</sub>	-0.02620	0.0000		-888.50*	0.06030
F <sub>x3</sub>	0.00020 -	0.0000		-3290.80*	0.10480
BW.	0.0220	0.0000		1080.80*	0.02280
Fy <sub>2</sub>	-0.0020	0.0000		80.70*	0.00010
Total	1.000				

\* It means the value of statistical significance of correlation at (0.05).

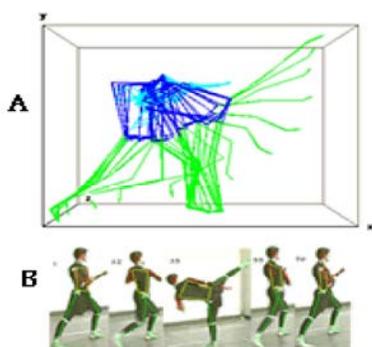


Fig. 1: Sequence frames (A), selected position of the best Performance of (U.M.G.), (B)

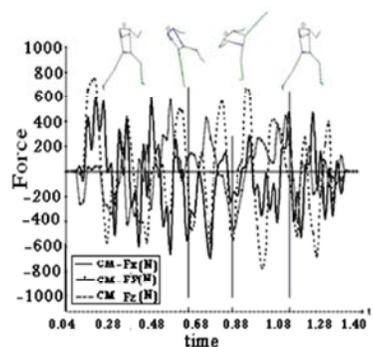


Fig. 3: The curves of (Fx, Fy, Fz) That affect (CG.) within the best Performance of (U.M.G.)

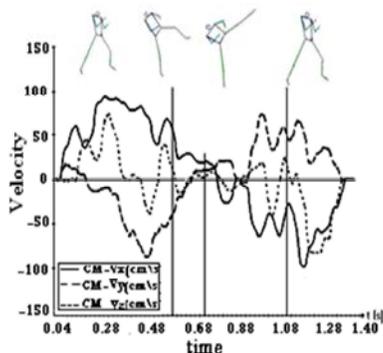


Fig. 2: The curves of (Vx, Vy, Vz) that affect (CG.) within The best Performance of (U.M.G.)

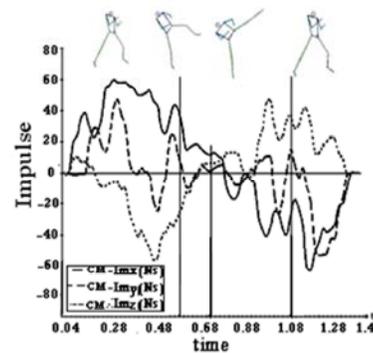


Fig. 4: The curves of (Imx, Imy, Imz) That affect (CG.) within the best Performance of (U.M.G.)

They also present a summary of logical regression analysis. Figures (1-4) also show sequence frames and performance phases of (U.M.G. (skill for the best players' performance under discussion; velocity curve affecting (CG.) in the direction of horizontal, vertical and sagittal components within the phases of performing (U.M.G. (skill, in addition to force components affecting (CG.) curve horizontal, vertical and sagittal and curved in the direction of horizontal, vertical and sagittal impulse components within the phases of performing (U.M.G.) skill for the best player under study.

Table 3 shows that (Vz<sub>1</sub>) affecting (CG.) within performing U.M.G. skill was the most parameters, under

study, contributing in performing JP skill, where it Contributed in (JP) with the portion of (64.24%), then (Vy<sub>1</sub>) of (16.96%), (Fx<sub>3</sub>) of (10.48%), (Vx<sub>3</sub>) of (6.030%), (WB.) of (2.28%), (Fy<sub>2</sub>) of (0.01%). It's worth mentioning that these parameters collectively contributed in (JP) of (100 %). Hence, the predictive equation used to predict of (JP) with significance of contributed parameters is:

$$JP = 6.1827 - 0.0440 (Vz_1) + 0.0187 (Vy_1) - 0.02620 (Vx_3) - 0.00020 (Fx_3) + 0.0220 (WB.) - 0.00200 (Fy_2).$$

Statistical results for describing research sample characteristics of table (1) indicate that there are differences among research sample participants in (LB.) and (WB.). The researcher interprets these differences

that the age group from 11 to 18 years witnesses a mutation in the growth rates for both (LB.) and (WB.). These rates consider individual properties varying from one to another and depend on many biological factors [10].

The results of statistical analysis of correlative relationship between assessment points of arbitrators to perform (JP)(U.M.G.) skill, (LB.), (WB.) and some dynamic parameters affecting (CG.) within performance phases of the skill of Table 2 indicate that there are:

A Reverse proportion between (JP) and (VZ1) affecting (CG.) and also, there is a direct proportion between (JP) and both (Fy1), (Fy3) affecting (CG.) within performing (U.M.G.). This means that the less amount of both (VZ1) affecting (CG.) and increase the amount of both (Fy1), (Fy3) affecting (CG.) when performing (U.M.G.) skill is, the more amount of (JP) is. The researcher interprets these results in the light of that the player, within preparatory phase, has to rotate his body around longitudinal, sagittal axes along with maintaining his (CG.) over the support base (front foot) preparing for the success of the main phase (kicking). This requires superiority of (Fy1) affecting (CG.) [11, 12].

Table 3 also indicates that the most contributing parameters in (JP) are (Vz1) affecting (CG.) within the performance of (U.M.G.), then (Vy1), (Fx3), (Vx3), (WB.), (Fy2), respectively. All of these parameters collectively contributed with (100%) in (JP). These results indicate to the importance of parameters affecting (JP), so the predictive equation of (JP) with performance points of the significance of contributing parameters becomes as the following:  $JP = 6.1827 \ddot{U} 0.0440 (Vz1) + 0.0187 (Vy1) \ddot{U} 0.02620 (Vx3) - 0.00020 (Fx3) + 0.0220 (WB.) \ddot{U} 0.00200 (Fy2)$ .

## CONCLUSION

### The Researcher Concluded the Following:

- A direct proportion between (JP.) and both of (Fy1), (Fy3) affecting (CG.), also a reverse proportion between (JP.) and (Vz1) affecting (CG.) were found within performing (U.M.G.).
- A direct proportion between (T1) and both of ( Fx2 ) , ( Vz3 ) affecting (CG.), also a reverse proportion between (T2) and both of (Vx2), (Imx2), affecting (CG.) were found within performing (U.M.G.) , also there was a direct proportion between (T2) and both of (Imy1), (Imz2), (Imy3), (VZ2), affecting (CG.) within performing (U.M.G.), also a reverse proportion between (T3) and both of (Imz1), (Imz3), affecting (CG.), when performance of (U.M.G.).

- A reverse proportion between (Vx1) and both of (Fz1), (Fz3) affecting (CG.) was found within performing (U.M.G.).
- A direct proportion between (Vz1) and both of (Vy2), (Imy2) affecting (CG.) and A reverse proportion between (Vz1) and both of (Fy1), (Fy3) affecting (CG.) were found within performing (U.M.G.).
- A reverse proportion between (Fx1) affecting (CG.) when performing (U.M.G.) and both of (LB.), (WB.), (Vz3), affecting (CG.) were found when performing (U.M.G) skill, there was also an direct proportion between (Fx1) and (Fx3) affecting (CG.) when performance of (U.M.G.).
- A direct proportion between (Fy1) affecting (CG.) when performing U.M.G. and (Fy3) affecting (CG.) were found when performing U.M.G. skill, also there was a reverse proportion between (Fy1), affecting (CG.) when performing (U.M.G.) and both of (Vy2), (Imy2), affecting (CG.) when performance of (U.M.G.).
- A direct proportion between (Fz1), (Fz3) affecting (CG.) was found when performing (U.M.G.).
- A reverse proportion between (Imy1) and both of (Vx2), (Imx2) and affecting (CG.) were found when performing (U.M.G.).
- A reverse proportion between (Vx2) and both of (Vz2), (Imz2) affecting (CG.) were found when performing (U.M.G.).
- A Direct proportion between (Imx1), (Imx3) affecting (CG.) was found when performing (U.M.G.).
- A reverse proportion between (Vy2), (Fz2) and affecting (CG.) was found when performing (U.M.G.).
- The proportion of parameters' contribution under study differed in its impact on assessment points of arbitrators for performing (JP.) and was descending ordered according to its relative importance as follows:
  - Sagittal velocities' components within preparation phase (Vz1), affecting (CG.) when performing (U.M.G.) skill with (64.24%) within preliminary phase.
  - (Vy1), affecting (CG.) with (16.96%). when performing (U.M.G.) within preliminary phase.
  - (Fx3) affecting (CG.) with (10.48%). when performing (U.M.G.) within the main phase.
  - (Vx3), affecting (CG.) with (6.030%). when performing (U.M.G.) within final phase.
  - (WB), affecting (CG.) With (2.28%). when performing U.M.G.
  - (Fy2), affecting (CG.) with (0.01 %)(. when performing (U.M.G.) within the main phase.

All these parameters collectively contributed with (100%), which considers a very high percentage, in the amount of assessment points to perform (U.M.G.) skill, so the predictive equation of (JP) with the significance of contributing parameters has become as the following:  $(JP = 6.1827 - 0.0440 (Vz1) + 0.0187 (Vy1) - 0.02620 (Vx3) - 0.00020 (Fx3) + 0.0220 (WB.) - 0.00200 (Fy2))$ .

Abbreviations	Symbols
The time at the end of preparation phase	T <sub>1</sub>
The time at the end of main phase	T <sub>2</sub>
The time at the end of final phase	T <sub>3</sub>
Center of gravity of the body	CG.
Judges' points	JP
Horizontal velocities components within preparation phase	V <sub>x1</sub>
Vertical velocities components within preparation phase	V <sub>y1</sub>
Sagittal velocities components within preparation phase	V <sub>z1</sub>
Horizontal forces components within preparation phase	F <sub>x1</sub>
Vertical forces components within preparation phase	F <sub>y1</sub>
Sagittal forces components within preparation phase	F <sub>z1</sub>
Horizontal impulse forces components within preparation phase	Im <sub>x1</sub>
Vertical impulse forces components within preparation phase	Im <sub>y1</sub>
Sagittal impulse forces components within preparation phase	Im <sub>z1</sub>
Horizontal velocities components within main phase	V <sub>x2</sub>
Vertical velocities components within main phase	V <sub>y2</sub>
Sagittal velocities components within main phase	V <sub>z2</sub>
Horizontal forces components within main phase	F <sub>x2</sub>
Vertical forces components within main phase	F <sub>y2</sub>
Sagittal forces components within main phase	F <sub>z2</sub>

Abbreviations	Symbols
Horizontal impulse forces components within main phase	Im <sub>x2</sub>
Vertical impulse forces components within main phase	Im <sub>y2</sub>
Sagittal impulse forces components within main phase	Im <sub>z2</sub>
Vertical velocities components within final phase	V <sub>y3</sub>
Sagittal velocities components within final phase	V <sub>z3</sub>
Horizontal forces components within final phase	F <sub>x3</sub>
Vertical forces components within main phase	F <sub>y3</sub>
Sagittal forces components within final phase	F <sub>z3</sub>
Horizontal impulse forces components within final phase	Im <sub>x3</sub>
Vertical impulse forces components within final phase	Im <sub>y3</sub>
Sagittal impulse forces components within final phase	Im <sub>z3</sub>
Weight of body	WB.
Length of body	LB.
Ura Mawshi Geri	UMG

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