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The relationship between the weight classes and competitive activity of judo athletes

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Abstract

The aim of this work is to compare competitive activity of different weight category judokas. The indicators of competitive activity (*attacks, defenses and counter attacks*), penalties and their reasons, ratios of scores that obtained in standing fight and groundwork fight and the attributes of the most frequently used techniques by different weight category judokas were defined. The results of the study show that attacks and defenses were implemented much more by the lightweight and middleweight category judokas. Penalties for “Non Combativity” were given for lightweight (40.6%) and heavyweight (52.0%) judokas, while, “Avoid grip” was given most times for middleweight athletes (28.8%). The lightweight and middleweight category athletes were achieved mainly in standing fight, 95% and 86%, respectively. There were frequently performed Uchi-mata (41%, $P<0.05$) throws by the lightweight and Seo-i-nage was mostly used by middleweight (33%, $P<0.05$) and heavyweight (33%, $P<0.05$) category athletes. The results of this paper can be applied to practical work and planning training process, especially technical-tactical and physical training of the judokas.

Keywords: Judo, competitive activity, weight categories, planning training

Introduction

Judo is an acyclic and high-intensity, Olympic and Paralympic sport in which during the struggles both physical and psychological capabilities of the athletes play a crucial role. During the judo fights, athletes are required to be technical-tactical and practical experienced in order to obtain demanding results. For this reason, most of the theories of this field are however focused on explaining combat activity of judo athletes (Franchini *et al.*, 2005) [1]. It is permitted during the contests to be hold different struggles containing various weight categories. Moreover, the findings confirm that the diverse technical actions are used by judo athletes in contests (Miarca *et al.*, 2016) [2]. Other studies show that changing competitive indicators of the judokas (*attacks, defenses and counter attacks*) depends on several factors (Brito *et al.*, 2016).

According to the current Refereeing rules of the IJF-International Judo Federtion, athletes have a chance to get ippon and wazaari scores. Besides, referees may give penalties (*shido and hansoku make*) for some passive and prohibited activities. The first and the second penalties are not considered as a score and the third penalty (*hansoku make*) identifies the winner or loser of the contest (www.ijf.org) [4]. Previous studies define that in international competitions, 20.7% of combats finished with penalties (Escobar-Monila *et al.*, 2014) [5] and penalties have great importance and both men and women has own different values (Segedi *et al.*, 2014) [6].

There is further problem with analyzing of judo contests. Judo struggles can be analyzed using different parameters. It was suggested as a time-motion structure, technical variety (types of techniques), scores and their efficiency index and penalties and others (Miarca *et al.*, 2010) [7]. Various approaches were implemented by researches, while interests to investigate this field of study have not yet been decreased. Despite this, investigating judo struggles in a new style is still controversial topic. The recent studies confirm that the judo combats have multifaceted aspects and several factors impact judo athletes' competitive activity (Escobar-Monila *et al.*, 2014; Bayram and Sukuri., 2017) [5, 8].

The literature review shows that there were not studies in which was observed technical-tactical variables (*attacks, defenses and counterattacks*), type of penalties and cause,

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percentage of the most frequently used techniques by weight category. Additionally, comparison of the rate of standing fight (Nage Waza) and fight in ground (Katame Waza) could be useful tool for coaches and judokas in preparing system. Previous studies have emphasized that using this approach has not been yet experienced in the same time. As far as we know previous research has investigated certain aspects of the judo combats. This approach gives a significant advantage because the comprehensive study can give reliable findings about the present contest trends of judo competitions. Our hypothesis was that athletes in different weight categories present the different competitive actions. There for, the main purpose of this study is to compare of competitive indicators of high level judo athletes by weight categories.

1. Methods

Data Sample

The 700 struggles among male judokas were reviewed during the National Judo Championships of Uzbekistan, 2017-2019. The competitive activity were defined as: a) attack-technical movement directed to defeat the contestant-Uke (*with and without a score*); b) defense-technical movement directed to defend oneself from the attacks of the opponent-Tori; c) counter attacks-technical action directed to implement the attack at the same time of defending from attacks; d) penalties given by the referee and their causes; e) ratios of scores that obtained in fight in standing (Nage Waza) and groundwork fight (Katame Waza); and, f) the most frequently used throwing techniques. All acquired data was classified as following weight categories: lightweight (-60kg, -66kg,-73kg); middleweight (-81kg, -90kg); heavyweight (-100kg, over 100kg). The table-1 below shows the analyzed competitions during the 2017-2019 years.

Table 1: Analyzed competitions during the 2017-2019 years

№	Title	Place
1	Seniors National Championship of Uzbekistan	Tashkent-2017
2	Juniors National Championship of Uzbekistan	Samarkand-2017
3	Seniors National Championship of Uzbekistan	Tashkent-2018
4	Juniors National Championship of Uzbekistan	Samarkand-2018
5	Seniors National Championship of Uzbekistan	Tashkent-2019

Statistical Analysis

Data is presented as a mean and standard deviation ($M \pm SD$). The ANOVA was used to identify the values and differences of the samples. When differences were found between the groups the students T-test was carried out. The significance level was set at $P < 0.05$. In this investigation personal information of the athletes was not used, there are no ethical issues in analyzing or interpreting these data.

2. Results

Table 2 presents quantitative indicators of different technical-tactical activities of combat activity. It can be seen from the table below, there were found differences between attacks, defenses and counter attacks by weight categories. In contrast to heavyweight category judo athletes, the attacks were implemented more by lightweight and middleweight category judo athletes, 6.11 ± 3.42 and 4.88 ± 2.38 ($P < 0.05$), respectively. Significant differences were obtained in defensive actions between the three weight category judokas. The rest of attacks and defenses of heavyweight category judo athletes showed much lower grade than the other two weight divisions (4.06 ± 2.13 , 3.83 ± 3.62). Additionally, there were observed significant differences between the groups on counterattack actions. Differences were found in lightweight and middleweight category and lightweight and heavyweight category judokas ($P < 0.05$).

Table 2: Attacks, defenses and counterattacks of judo athletes by weight categories (n=700, $P < 0.05$)

Weight categories	Technical-tactical actions								
	Attacks			Defenses			Counter attacks		
	Mean	SD	P value	Mean	SD	P value	Mean	SD	P value
Lightweight (n=320)	4.88	2.38	.05	4.55 [#]	3.43	.05	1.92 [^]	1.04	.05
Middleweight (n=200)	6.11 [*]	3.42	.05	4.88 ^{##}	3.42	.05	1.2	0.4	.05
Heavyweight (n=180)	4.06 ^{**}	2.13	.05	3.83	3.62	.05	1.25 ^{^^}	0.43	.05

Notes: *statistical significance between the lightweight and middleweight; **statistical significance between middleweight and heavyweight; [#]statistical significance between the lightweight and heavyweight; ^{##}statistical significance between the middleweight and heavyweight; [^]statistical significance between the lightweight and middleweight; ^{^^}statistical significance between the lightweight and heavyweight. $P < 0.05$.

As shown table-3, overall 450 penalties were given by the referees during the observations. Lightweight and middleweight category judokas were penalized much more than the heavyweight judokas. In general, for all weight categories the penalty types of "Non Combativity" (37.3%), "False attack" (16.2%) and "Avoid grip" (21.8%) were taken by the athletes. Lightweight and heavyweight category judokas were frequently penalized with "Non Combativity",

40.6% and 52.0%, respectively. In contrast, the middleweight athletes were the most given "Avoid grip" (28.8%). Furthermore, penalties for "Defensive posture", "Escape with head" and "Outside-contest area" were obtained with least number for athletes. Overall, 6 types of penalties were frequently given by the referees during the observations (see Table 2).

Table 3: Ratios of penalties and their causes by weight categories (n=700)

№	Penalties	Lightweight		Middleweight		Heavyweight		Total	
		number	%	number	%	number	%	number	%
1	Non-combativity	73	40.6	38	23.8	57	52.0	168	37.3
2	False Attack	28	15.6	27	16.9	18	16.0	73	16.2
3	Avoid grip	48	26.7	46	28.8	4	3.7	98	21.8
4	Outside-contest area	12	6.7	8	5.0	7	6.0	27	6.0
5	Defensive Posture	3	1.7	9	5.6	16	14.5	28	6.2
6	Escape with head	4	2.0	18	11.0	5	4.5	27	6.0
7	Others	12	6.7	14	8.8	3	2.7	29	6.4
	Overall	180	100	160	100	110	100	450	100

Figure 1 shows ratios of scores that obtained in standing fight (Nage Waza) and fight in ground (Katame Waza) among weight divisions. It can be seen from the figure, the most effective scores taken with throwing techniques by lightweight and middleweight category judokas. The majority parts of the scores were obtained in Nage Waza techniques for

lightweight and middleweight 95% and 86%, respectively ($p < 0.05$). It was consisted 76% Nage Waza techniques for heavyweight category judokas ($p < 0.05$). The lightweight judokas were implemented more standing techniques comparing to other two weigh category athletes.

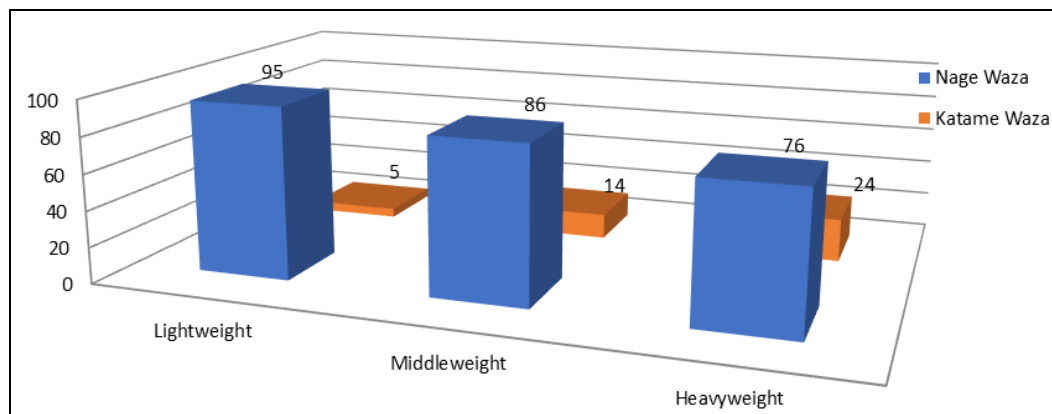


Fig 1: Ratios of Nage Waza and Katame Waza techniques by different weight categories (%), $n=700$, $P < 0.05$

The most frequently used techniques among various weight categories were shown in Figure 2. It can be seen from the results that the lightweight category judokas were mostly performed Uchi-mata (41%, $p < 0.05$) and O-uchi-gari (16%, $p < 0.05$) techniques, while, the Seoi-nage were the most used by middleweight and heavyweight category athletes, 33% and 23%, respectively ($p < 0.05$). Furthermore, O-uchi-gari (16%,

$p < 0.05$) and Ko-uchi-gari (11% and 15%, $p < 0.05$), Sodetsurikomi-goshi (11% and 15%, $p < 0.05$) techniques by middleweight and heavyweight category athletes were used significantly (see Figure 2). There were observed statistically significance for all indices. In general, 8 throwing techniques were mostly performed by all weight divisions.

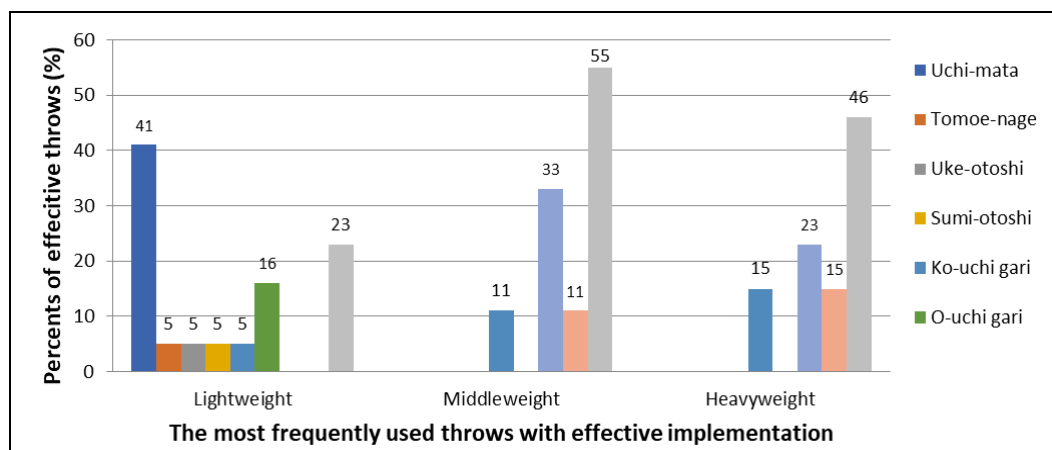


Fig 2: Effective throwing techniques by weight categories during the Uzbekistan Championships, 2017-2019 ($n=700$, $P < 0.05$)

3. Discussion

This study had purpose to compare competitive activity of judo athletes by weight divisions. On the bases of the obtained results significant results were observed between the different weight categories in their technical-tactical actions, penalties, throwing techniques and ratios of the fight styles (Nage Waza or Katame Waza).

It is important to highlight that the most technical-tactical actions (attacks, defenses and counter attacks) were used by the lightweight and middleweight category athletes than the heavyweight. Another promising finding is that all weight division were used defensive actions significantly less than the attacks and counter attack activities. The previous studies found that rate of attacks, defenses and counter attacks in judo struggle depends with several factors such as weight, sex, gender and others (Brito *et al.*, 2017) [3]. A similar conclusion was reached by previous findings with our results. It can be

conclude that these indices are connected directly by weight division of the athletes.

From these results it is clear that there were also important to explain penalties and their causes. “Non-combativity” was most commonly accepted by lightweight and heavyweight category athletes. Also, lightweight and middleweight contestants were penalized dramatically high for “Avoid grip” activity. While, heavyweight judokas were penalized for “False attack” comparing than the other two weight category athletes. Overall, the three types of penalties (“Non-combativity”, “Avoid grip” and “False attack”) were taken for all weight categories. These findings could be introduced due to preparing stage of the athletes and struggle strategy. On the other hand, the penalties and their reasons could be tactical way to win the fight. It could be considered in a training period, especially, improving of tactical performance of the athletes.

Ratios of standing fight and fight in ground could be clear indication about struggle dynamics. Our results demonstrated that standing fight techniques were used the most dramatically by lightweight and middleweight category athletes than the heavyweight. There were found only 5% of the scores were obtained with groundwork fight by lightweight category athletes. These results were shown in the other studies (Adam and Szczepanska, 2011) ^[9], in which authors calculated Nage Waza (86.47%) and Katame Waza (13.53%). Contrary to the findings to other studies there were identified noticeable findings with previous studies. It is interesting to note that in our observation, the high percentages of scores were taken by using throwing techniques (Nage Waza). This could be clear example for coaches about the need to prepare of athletes very well for fight in standing but not forgetting a specific preparation to face the groundwork fight situation.

It is worth to note, that the previous evidences relies on analyzing the throwing techniques in general bases and the weight divisions were not divided. Our results showed that Uchi-mata and O-uchi-gari throwing techniques were dominant for lightweight judo contestants. Seoi-nage, Ko-uchi-gari and Sode-tsurikomi-goshi techniques were used mostly by the middleweight and heavyweight category athletes. This is interesting to note that previous studies analyzed the frequently used techniques in London -2012, which was separated as a biomechanical classification (couple of force and lever based techniques) (Sterkowicz, et.al., 2013). In general, techniques based on a couple of forces were used less frequently (36.6%) than the techniques used with physical lever (60.5%).

4. Conclusion

This knowledge contributes to create a new paradigm of the competitive model of judo fighters. The results indicate that the lightweight and middleweight category athletes presented high technical-tactical actions during the observation. However, there were observed low values of counter attacks for all weights. The main parts of scores were taken by using the standing techniques for lightweight and middleweight category athletes. The analysis of the most commonly used throwing techniques and taken penalties provides a clear picture of current judo contests. The results of this paper can be applied to practical work and planning training process, especially, technical-tactical and physical training.

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