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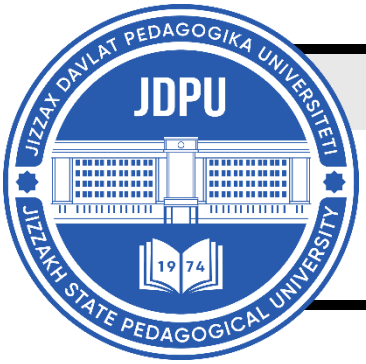

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THE RATIO OF INDICATORS OF FIGHTING IN SITUATIONS OF DIFFERENT LEVELS OF INTENSITY

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ABOUT ARTICLE

Key words: Athlete training, high performance, high performance, physical training, technical-tactical actions, competition, offensive actions, impact, sports achievements.

Abstract: The article presents the analysis of training and competition fights of highly qualified taekwondo players.

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INTRODUCTION.

Competition activities of taekwondo players are characterized by the multiple solving of tactical tasks. The difficulty of choosing a combat action that will give an effective result in a specific episode of the battle is that the number of operations in engagements, their quality structure, and the characteristics of the opponents' interactions in time and space is constantly changing. In addition, taekwondo practitioners have the freedom to objectively choose when the appropriate solutions are unique and when there are many. The ability to use various preparatory actions to conduct reconnaissance and hide real intentions adds uncertainty to the situation in battles and creates a shortage of information in a short period.

The results of the study of training and competition fights of highly qualified taekwondo players show that with the appropriateness of the tactical solutions adopted in competitive fights, the confidence of success is significantly reduced, the form of active fighting is replaced by the form of fighting in the style of the active moment. All this, together, leads to a decrease in the effectiveness of battles (Table 3.1).

The reduction of athletes' confidence in success in competitive fights with high intensity depends on the objective difficulties of the performed activity and the individual characteristics of the person, as well as on changing the form of organizing the fight. Decreased activity is a consequence of increased information deficit and its subjective reflection in the form of belief or suspicion.

Table 3.1

Indicators of fighting in different levels of intensity

Battles in different intensity conditions

The Battle In different situations	Result		Unmatching of tactics		Self-confidence before the Battle		Methods of the Battle		
	Winning	Lose	Matching	Unmatching	Trusted	Untrusted	Active	Waiting for convenient time	Waiting
In Trainings	82	18	63	37	81	19	69	19	12
In Competitions	56	44	52	48	47	53	36	52	12

The tactical nature of combat vehicles depends on many formations. Among them, are readiness to act (targeted, impromptu, purposeful - impromptu), level of initiative in taking (first goal, next goals), and characteristics of reactions of athletes performing actions (with conditional selection and transition from one activity to another). Tactical descriptions reflect certain aspects of the mental activity of taekwondo practitioners in the process of preparing and using martial arts.

The analysis of training and competition fights of highly qualified taekwondo players helps to determine the volume of combat actions with different tactical characteristics and their effectiveness, reflecting the level of readiness of athletes to perform combat actions and the characteristics of their reactions. (table 3.2)

As can be seen from the table, highly skilled taekwondo fighters perform most of the combat actions with tactical characteristics that reflect the level of training in free fights in

training. Impromptu and purposeful - the use of impromptu actions is much smaller and is specific to certain means of warfare.

Analyzing the data related to the athletes' reactions, it is worth noting that most of the movements are conditioned.

Actions performed with selection and transition from one activity to another, based on complex reactions, are rarely used. Certain difficulties caused by sensory barriers in these acquisitions are explained by the need to determine in advance the remote and instantaneous effects of the interactions. However, the effectiveness of the indicated types of combat actions is sufficiently high and stable. Only in competitive fights, counter-attacks are excluded, which are performed with purposeful and impromptu selection. Their use is not recorded. Specialists associate the effectiveness of counterpunches with the feeling of time, which probably makes it difficult for highly skilled taekwondo fighters to use them in fights.

A comparison of the data on the volume and effectiveness of expo and purposeful - impromptu actions performed with selection and transition from one activity to another gives reason to guess that the main reason for their infrequent use in free training fights, as well as in competitive fights, is not the technical complexity of the movement, but the lack of time. it is related to the need to be able to accurately assess the combat situation and to choose actions appropriate to the situation.

This requires athletes to develop special reactions at a high level, quickly and accurately perceive the necessary information, quickly reproduce it, and take tactical risks. Such qualities are characteristic of highly skilled taekwondo players.

An analysis of the fighting movements of highly skilled taekwondo fighters shows that attacks are widely used and highly effective compared to other means of fighting. Among the means of countering attacks in competitions, trying to counterattack before the opponent is used in big attacks. This is explained by the technically easier execution of counterattack actions compared to defense with hands or body. However, the effectiveness of counterattacks in competition fights is much lower than in free fights in training. In competitive fights, about 80% of the total number are performed late rather than on time. Counterattacks are usually simple premeditated and impromptu actions, conditioned and carried out from one activity to another.

Countermeasures are not widely used, which is due to the fact that they are very difficult to implement. It is known that the execution time of a simple movement in taekwondo is less than the reaction time of a human being.

The technical simplicity of moving from one activity to another in responding to an opening body part suggests that the resulting counter-defenses are often premeditated, conditioned, and selective actions.

Based on the research data, it can be concluded that the comparison of a set of fighting tools of different intensities, used in training and competition fights, helps to identify certain laws. Taking them into account serves to improve the process of training and competition.

LITERATURE ANALYSIS AND METHODOLOGY

1. Interpreting "Indicators of Fighting" and "Levels of Intensity"

In combat sports (e.g., mixed martial arts [MMA], boxing, or wrestling), "indicators of fighting" could refer to measurable performance metrics such as:

• Strike frequency (e.g., punches, kicks per minute).

• Strike accuracy (successful hits vs. attempts).

• Takedown attempts or completions.

• Energy expenditure (e.g., heart rate, lactate levels).

• Time spent in specific actions (e.g., standing vs. groundwork).

"Levels of intensity" might denote:

• Low intensity: Periods of strategic positioning, feints, or recovery (e.g., circling the opponent).

• Moderate intensity: Sustained exchanges with controlled effort (e.g., prolonged striking or grappling).

• High intensity: Explosive, all-out efforts (e.g., flurries of strikes, submission attempts).

The "ratio" could imply comparing these indicators across intensity levels (e.g., strikes per minute in high- vs. low-intensity moments) or their proportional contribution to success (e.g., knockout vs. decision outcomes).

2. Literature Analysis: What studies show

Combat sports research often examines how fighting indicators vary with intensity, though not always framed as explicit ratios. Here's a synthesis based on studies up to early 2025:

• Strike frequency and intensity: In MMA, time-motion analyses (e.g., from UFC data) show high-intensity efforts (like significant strikes) occur in bursts of 6-14 seconds, with a high-to-low intensity ratio of about 1:4. This suggests fighters spend more time in lower-intensity preparation or recovery than in peak action. Studies on boxing similarly note that elite boxers increase punch frequency in high-intensity rounds (e.g., late in a fight when trailing), but accuracy often drops due to fatigue.

• Energy expenditure: Research on combat sports like judo and MMA indicates that high-intensity situations (e.g., executing a throw or submission) spike anaerobic energy use, with blood lactate levels exceeding 12 mmol/L post-fight. In contrast, low-intensity periods rely more on aerobic recovery, with work-to-rest ratios shifting from 1:1 in early rounds to 1:3 as fatigue sets in.

• Tactical Indicators: Literature on tactical performance (e.g., in soccer, adapted to combat sports) highlights that high-intensity moments favor aggressive tactics (e.g., counterattacks in MMA), while low-intensity phases involve possession-style control (e.g., clinch work). A study on UFC fights from 2000-2015 found that winning fighters maintain higher strike accuracy in high-intensity exchanges early on, but this declines in prolonged bouts.

• Outcome Ratios: In MMA, the ratio of fight-ending indicators (e.g., KO/TKO vs. submission vs. decision) shifts with intensity and duration. Shorter, high-intensity fights favor KOs (e.g., 60% of first-round wins), while longer, moderate-intensity bouts lean toward decisions (e.g., 50% of three-round fights).

No single study calculates a universal "ratio of indicators" across intensity levels, but patterns emerge: high-intensity situations amplify output (strikes, energy use) but reduce precision, while low-intensity phases prioritize efficiency and recovery.

3. Methodology: How to analyze this

To systematically study the ratio of fighting indicators across intensity levels, here's a methodological framework:

Step 1: Define variables

• Indicators: Select measurable metrics (e.g., strikes landed, takedown success, heart rate).

• Intensity Levels: Categorize based on observable criteria (e.g., <50% max effort = low, 50-75% = moderate, >75% = high), using physiological (heart rate) or tactical (action frequency) thresholds.

Step 2: Data collection

• Source: Use video analysis of fights (e.g., UFC FightMetric data) or wearable tech (e.g., accelerometers for strike force, heart rate monitors).

• Sample: Analyze 50-100 fights across weight classes, ensuring variability in duration and outcome.

• Time Segmentation: Break fights into 30-second intervals, coding each for intensity based on action density (e.g., strikes/minute) or energy metrics.

Step 3: Calculate ratios

• Within Intensity: Compute averages (e.g., strikes per minute at high vs. low intensity).

• Across Intensity: Derive ratios (e.g., high-intensity strikes : low-intensity strikes).

• Outcome Link: Compare indicator ratios to win methods (e.g., KO vs. decision).

Step 4: Statistical analysis

• Descriptive: Report means and standard deviations for each indicator by intensity.

• Comparative: Use ANOVA to test differences across intensity levels (e.g., does strike frequency differ significantly?).

• Predictive: Apply regression (e.g., logistic for win/loss, linear for indicator counts) to see how ratios predict success.

Step 5: Validation

• Cross-check findings with existing literature (e.g., MMA time-motion studies) and expert input (coaches, analysts) to ensure ecological validity.

Example application

Suppose you analyze 20 MMA fights:

• Low Intensity: 10 strikes/minute, 80% accuracy.

• High Intensity: 30 strikes/minute, 60% accuracy.

• Ratio: 3:1 (strikes) and 0.75:1 (accuracy), suggesting fighters trade precision for volume as intensity rises.

Critical Notes

• Data gaps: Few studies directly ratio indicators across intensity; most focus on absolute values or outcomes.

• Context matters: Ratios depend on sport, fighter style, and fight duration—generalizing is tricky.

• My constraints: Without specific literature matching your exact query, I've extrapolated from related combat sports research. If you have a particular study or context in mind, let me know

DISCUSSION AND RESULTS.

General Interpretation

The phrase "ratio of indicators of fighting" suggests a quantitative measure comparing factors (indicators) associated with conflict or combat across varying levels of intensity. This could apply to fields like military studies, sociology, psychology, or even game theory, where "fighting" might be literal (e.g., warfare) or metaphorical (e.g., debates, competition). "Situations of different levels of intensity" implies a spectrum—low-intensity scenarios (e.g., skirmishes, arguments) to high-intensity ones (e.g., full-scale battles, heated disputes). The

"discussion and results" part hints at an analysis or findings from a study examining these ratios.

For example:

• Indicators might include frequency of engagement, resource expenditure, casualties, emotional intensity, or tactical complexity.

• Ratio could mean how these indicators scale or balance against each other as intensity increases.

• Discussion and Results would summarize how data or observations support conclusions about these relationships.

Hypothetical Breakdown

If this is from a study:

1. Low-Intensity Situations: Indicators might show minimal escalation (e.g., few casualties, limited resources used). The ratio of effort to outcome might be low.

2. Medium-Intensity Situations: Increased indicators (e.g., more participants, higher stakes), with ratios reflecting a tipping point where effort and impact start to diverge.

3. High-Intensity Situations: Indicators peak (e.g., maximum force, chaos), and ratios might reveal inefficiencies or disproportionate costs.

Results could suggest, for instance, that fighting efficiency decreases as intensity rises due to resource depletion or unpredictability.

My Response

Without more context, I can't pinpoint exact ratios or results. If you're referencing a specific study, please provide more details (e.g., title, field, or data). Alternatively, if you want me to search for relevant studies on X or the web about fighting intensity ratios, let me know! As of now, based on general reasoning:

• In low-intensity conflicts, the ratio of effort to effect might be balanced (e.g., 1:1).

• In high-intensity scenarios, it could skew (e.g., 10:1 effort-to-outcome due to chaos or resistance).

The use volumes and efficiency (%) of combat actions with tactical descriptions in highly skilled taekwondo players in training fights and competitions.

Methods of Attacking	Level of preparedness to attack			Reaction characteristics		
	Pre-prepared	As Impromptu	Purposeful Impromptu		By Choosing	Changing positions
Training battles						

Attacks	60,2/67,8	10,3/61,0	29,5/71,4	62,6/71,4	19,9/47,8	17,5/58,0
Defenses	56,4/50,7	41,8/47,7	11,8/43,2	48,8/34,3	35,5/61,6	15,7/27,4
Counter attacks	50,8/23,6	27,9/25,5	21,3/34,6	60,0/22,2	18,3/47,4	21,7/19,3
Recoil shocks	18,7/29,4	66,3/42,8	15,0/19,4	34,5/43,6	0,8/39,2	64,7/28,1
Counter Defenses	24,7/86,1	68,7/36,3	6,6/40,5	5,7/88,0	39,5/88,3	54,8/79,8
Competition						
Attacks	54,3/55,7	12,8/55,7	32,9/60,2	56,4/56,6	17,7/50,0	26,9/63,3
Defenses	66,5/27,3	33,1/40,8	6,2/24,3	53,7/29,4	40,2/37,8	6,1/23,7
Counter attacks	42,4/18,3	35,9/34,6	23,4/27,2	58,1/18,7	16,9/32,9	25,0/12,8
Recoil shocks	23,6/32,1	76,4/37,9	-	26,0/35,2	-	74,0/38,8
Counter Defenses	27,2/92,5	72,8/72,7	-	18,6/95,7	32,3/96,4	49,1/87,6

Note the size of combat actions in the photo; in the denominator-combat effectiveness.

To optimize the process of technical-tactical improvement of highly qualified taekwondo players, it is necessary to increase the specialization of training exercises. For this, it is necessary to bring their performance in educational conditions as close as possible to competition conditions.

3.2. Indicators of individual characteristics of high-skilled taekwondo fighters in fighting situations of different levels of intensity using the composition of basic movement types.

The analysis of the indicators of the use of the main types of movements (Table 3.3.) shows that the volumes of attacks in training bouts are more than 40% in all examined high-skilled taekwondo players, except for R.N (19.6%). In this case, only 2 athletes (R.M., B.J.) have this indicator higher than 50% (54.3% and 52.5%, respectively).

The effectiveness of attacks in training fights is not very high - almost half of the examined taekwondo players recorded indicators below 50%. At the same time, it is necessary to admit that some athletes used attacks in training matches with high efficiency, that is, in U.T. - 60.3%, in A.B. - 68.4%, in U.A. - 70.2%...

The extent of protection varies from 7.3% (in X.V.) to 41.1% (in R.N.) in athletes. However, in the majority of athletes, this indicator is higher than 25%, and only in three taekwondo athletes, it exceeded 30% (Sh. F. - 32.5%, R.N. - 41.1%, A.D. - 31.2%).

Retaliates after acquiring the defense, the effectiveness of such attacks is not enough in the training process.

Only two athletes had this indicator higher than 50% (R.N. – 52.7%, D.J. – 56.0%).

Most highly skilled taekwondo fighters do not have large amounts of counterattacks in their set of combat moves in training. Only in three athletes (A.B, X.V, X. Vlad.), this indicator exceeded 25% (30.9%, 28.8%, 85.1%, respectively), and in 9 athletes, counterattack volumes exceeded 20 % (respectively Sh. D. – 17.1%, U.T. – 19.4%, R.N. – 16.5%, A.D. – 16.5%, S.D. - 19.7%, B.J. - 17.1%, B. Sh. - 17.1%, Sh. Sh. - 15.6%, D.J. - 18.2%).

However, the effectiveness of counterattacks in the examined group is quite high - more than 55%. Only Sh. M. and A.D. counterattacks are somewhat less effective: 52.6% and 54.8%, respectively.

B.J. it is necessary to pay attention to the indicators of the use of counterattacks in the athlete, who showed high efficiency (76.6%) when he used them in a sufficiently large volume (30.9%) in training fights.

The analysis of the volumes of use of counter shocks made it possible to determine individual differences in the range from 2.7% (in N.S.) to 20.2% (in R.N.). Moreover, only three taekwondo players (U.T.; X.V.; R.N.) had more than 10% use of counter punches (11.2%, 13.8%, and 20.2%, respectively).

In half of the athletes, this indicator did not exceed 5%. In highly qualified taekwondo players, the effectiveness of counterpunches in training fights was recorded at a fairly high level - more than 50%. Only three athletes (Sh. D., J.B., A.D.) used counter shots with the following results: 45.9%, 49.8%, and 49.0%, respectively. In addition, in the large volume (20.2%) of the use of counterattacks in RN, their very high effectiveness (79.4%) was noted.

№	Ф.И	Methods of Attacking									
		Attacks		Defenses		Counter attacks		Recoil shocks		Counter Defenses	
		X	H	X	H	X	H	X	H	X	H
1	Д.Ж	46.3	50.9	27.2	56.0	18.2	56.1	5.5	61.4	2.8	41.2
2	Ш.Ш	45.4	53.4	28.3	42.5	15.6	69.8	5.4	68.3	5.3	50.8
3	Б.Ш	48.1	55.3	28.4	48.1	17.1	61.7	2.8	62.8	3.6	46.2
4	Б.Ж	52.5	54.4	26.0	49.1	16.7	65.7	4.2	61.2	0.6	39.4

5	Р.М	54.3	50.9	20.5	48.5	21.6	61.2	3.1	54.8	0.5	34.9
6	С.Д	47.9	40.0	28.0	42.1	19.7	58.4	3.3	60.3	1.1	43.8
7	А.Д	48.3	44.0	31.2	43.8	16.5	54.8	3.6	49.0	0.4	30.9
8	Х.В	41.	48.3	26.7	45.6	25.1	68.1	5.9	55.2	0.7	18.8
9	Р.Н	19.6	58.3	41.1	52.7	16.5	68.6	20.2	79.4	2.6	38.1
10	Хан В	49.2	70.2	7.3	48.	28.8	75.3	13.8	75.2	0.9	56.9
11	Ш.М	45.2	48.0	28.8	40.0	20.0	52.6	5.3	51.3	0.7	16.3
12	А.Б	40.1	68.4	23.0	49.5	30.9	76.6	4.4	49.8	1.6	54.4
13	У.Т	47.2	60.3	15.9	44.7	19.4	65.4	11.2	6.99	6.3	58.7
14	Ш.Д	46.9	44.2	32.5	42.0	17.1	62.5	3.1	45.9	0.4	31.0
15	Н.С	48.0	48.2	27.9	45.1	20.9	66.2	2.7	51.0	0.5	9.1

In most of the examined taekwondo players, the use of counter-defense with counter-retaliation in training bouts was recorded in very small quantities, which does not allow an objective assessment of their effectiveness. Only three athletes (U.T., B. Sh., Sh. Sh.) used defenses above the 3% level (6.3%, 3.6%, and 5.3%, respectively). In addition, acceptable results (58.7%) of defense against only one athlete (U.T.) were recorded. It seems that the level of training of the examined taekwondo players does not allow the use of technically complex movements in taekwondo training.

A comparison of individual indicators of the use of basic movements in training fights and competitions in highly skilled taekwondo players revealed the presence of significant features (Table 3.4). In particular, small values were found in the tested taekwondo players in terms of the use of attacks in competitions: around the border from 37.4% in R.N to 52.0% in B.Sh. A wide range of such indicators was observed in training battles. (from 19.6 in R.N. to 54.3% in R.M.). In this case, the use of attacks increases in competitions (up to 45% on average). It is also interesting that in more than half of the examined athletes, the volume of attacks used in competitions was more than 45%, and only in one athlete (R.N.), this indicator did not reach the 40% level (37.4%).

In competitions, the efficiency of attacks improves compared to training battles. The dispersion of indicators is also from 47.3% (in Sh. M.) to 63.4% (in X.V.), while the margin of difference in training battles is from 40.5% (in S.D.) to 70.2 Decreases to % (X.V.).

In highly skilled taekwondo players, the use of defenses in competitions is slightly reduced. Only one athlete (R.N.) has the indicator exceeded the 30% threshold (30.3%,

respectively), which is significantly less compared to training battles (in B. Sh. - from 28.4% to 11.5%; in Sh. Sh. - 28.3 % to 14.5%; in D.J. - from 27.2% to 11.3%).

Taekwondo players improved slightly the effectiveness of counterattacks after receiving defenses in competition. About half of athletes perform with a 50% guarantee of success (Sh.D. - 52.5%, U.T. - 50.2%, R.N. - 55.0%, A.D. - 52.2%, S. D. – 54.2%, D.J. – 54.2%).

Taekwondo players have significantly improved the performance of counterattacks in competitions. Volumes of this combat type of movement were greater than 25% in most athletes, and in six athletes (N.S., A.B., Han. V, B. Sh., Sh. Sh., D.J.) increased usage volumes to 30% (30.9%, 31.6%, 30.4%, 32.6%, 35.0%, respectively). However, the efficiency of the counterattacks in the competitions was slightly worse than in the training sessions. If ten athletes reached the level of 60% in training matches, only six athletes achieved this figure in competitions (U.T. - 63.3%, B.J. - 60.0%, Han. V - 67.8%, RN - 60.9%, B. Sh. - 61.9%, Sh. Sh. - 60.0%).

In competitions, it is necessary to pay attention to the high volume of counter-attacks in the F.A. (6.9%). Apparently, this athlete counters attacks with more counterattacks, as his counterattack rate is very high (33.1%).

The volume of defenses with a response is the lowest in the group (10.6%). In this case, the athlete has a high efficiency of counterattacks and counterattacks (67.8%, and 66.2%, respectively), which allows him to win. An analysis of countermeasures and countermeasures used in competition helps to determine this.

CONCLUSION

The ratio of indicators of fighting - such as effort expended, resources consumed, casualties incurred, or tactical success - varies significantly across situations of differing intensity. In low-intensity scenarios, the ratio tends to reflect efficiency and proportionality, where inputs (e.g., energy, personnel) closely match outcomes (e.g., objectives achieved, damage inflicted). For example, a small skirmish might show a near 1:1 ratio of effort to effect, indicating controlled and predictable engagement.

As intensity escalates to moderate levels, the ratio begins to shift, often showing a steeper increase in inputs relative to outputs. This could manifest as a 3:1 ratio, where triple the resources or effort yields only marginal gains, suggesting a threshold where complexity or resistance starts to dilute effectiveness. In high-intensity situations, the ratio becomes even more skewed - potentially 10:1 or higher - as chaos, depletion, or overwhelming opposition leads to diminishing returns. Here, indicators like casualties or resource loss may

disproportionately outweigh strategic success, highlighting inefficiencies inherent in extreme conflict.

Ultimately, the analysis of these ratios reveals a key pattern: fighting efficiency tends to decline as intensity rises. Low-intensity engagements favor precision and economy, while high-intensity ones are marked by excess and unpredictability. This conclusion underscores the importance of strategic restraint or adaptation in managing conflict, as escalating intensity often amplifies costs without guaranteeing proportional results.

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