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TECHNICAL AND TACTICAL TRAINING OF 14–16-YEAR-OLD JUDOKAS AND THEIR AGE-RELATED CHARACTERISTICS

*Abdurakhmonova Iroda, Lecturer
at the Department of Sports
Teaching Methodology,
Jizzakh State Pedagogical
University.*

Email:

abduraxmonovairoda813@gmail.com

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ABOUT ARTICLE

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Kalit so‘zlar: dzyudo, o‘smirlar, texnik-taktik tayyorgarlik, jismoniy rivojlanish, psixologik xususiyatlar, kombinatsion harakatlar, mashg‘ulot yuklamalari.

Ключевые слова: Дзюдо, подростки, техничеcko-тактическая подготовка, физическое развитие, психологические особенности, комбинационные действия, тренировочные нагрузки.

Abstract. At the age of 14–16, judokas enter a highly intensive period of technical and tactical development. This article is aimed at studying the relationship between physical and psychological development, training loads, and the effectiveness of combinational actions. Based on the analysis of scientific literature, the anatomical and physiological characteristics of adolescent judokas,

competition tactics, training structure, and personal qualities were examined. The results obtained through questionnaires, pedagogical observations, and statistical analysis indicate that athletes of this age possess high potential in strength and coordination abilities; however, their technical-tactical thinking and psychological preparedness are not sufficiently developed. The study substantiates the need to improve methods of teaching combined and counter techniques, to ensure age-appropriate distribution of training loads, and to enhance approaches to the development of personal qualities in young athletes.

Annotatsiya: 14–16 yoshli dzyudochilar texnik-taktik jihatdan o'ta intensiv davrga kiradilar. Ushbu maqola jismoniy va psixologik rivojlanish, mashg'ulot yuklamalari hamda samarali kombinatsion harakatlar o'rtasidagi bog'liqlikni tadqiq qilishga qaratilgan. Adabiy manbalarga tayanib, o'smir dzyudochilarning anatomo-fiziologik xususiyatlari, musobaqa taktikasi, mashg'ulotlar tuzilishi va shaxsiy sifatleri tahlil qilindi. So'rovnomalar, pedagogik kuzatishlar hamda statistik tahlillar orqali taqdim etilgan natijalar shuni ko'rsatdiki, ushbu yoshdagi sportchilar kuch va koordinatsiya ko'rsatkichlari bo'yicha katta salohiyatga ega, ammo texnik-taktik o'yinlar hamda psixologik tayyorgarlik yetarlicha shakllanmagan. Qo'shma mashqlar va qarshi usullarni o'rgatish, yuklamalarning yoshga mos taqsimlanishi va shaxsiy fazilatlarini tarbiyalash usullarini takomillashtirish zarurligi asoslab berildi.

Аннотация: В возрасте 14–16 лет дзюдоисты вступают в период интенсивного технико-тактического развития. Данная статья направлена на исследование взаимосвязи между физическим и психологическим развитием, тренировочными нагрузками и эффективными комбинационными действиями. На основе анализа научной литературы были рассмотрены анатомо-физиологические особенности подростков-дзюдоистов, соревновательная тактика, структура тренировочного процесса и личностные качества спортсменов. Результаты, полученные с помощью анкетирования, педагогических наблюдений и статистического анализа, показали, что спортсмены данного возраста обладают высоким потенциалом в показателях силы и координации, однако технико-тактическое мышление и психологическая подготовленность сформированы недостаточно. Обоснована необходимость совершенствования методик обучения комбинированным и контратакующим приёмам, возрастно-адекватного распределения нагрузок и развития личностных качеств спортсменов.

INTRODUCTION

Judo, founded by Jigoro Kano, is based on the principle of “maximum efficiency with minimum effort” and requires the athlete to redirect the opponent’s force to their own advantage, apply correct gripping techniques, demonstrate sensitivity, and make timely decisions. Judo is not only a martial art, but also a comprehensive system of personality development that integrates physical and moral-spiritual growth. Observations indicate that the age period of 14–16 years represents a critical selection and development stage for athletes, during which strength, speed, agility, and initiative develop intensively; however, age-specific limitations in the training process also exist.

According to developmental data, at the age of 15 the growth rate accelerates, with an annual height increase of 5–6 cm. The muscular and skeletal systems strengthen rapidly, although the microstructure of the skeleton has not yet fully stabilized. During this period, active development of the lower limb musculature is observed, general strength indicators increase, and there is a potential risk associated with elevated blood pressure. By the age of 16, muscle mass accounts for approximately 33% of body weight; cardiac volume reaches about 720 ml, and the functional capacity of the conductive system and lung vital capacity (approximately 3850 ml) approach adult levels. However, the ability to sustain high simultaneous energy expenditure is not yet fully developed, and maximal oxygen consumption remains at approximately 3700 ml/min. Therefore, judo training must be based on age-appropriate loads and scientifically justified principles of progressive overload.

In recent years, scientific research in judo has expanded; however, issues related to the improvement of technical and tactical training for adolescents aged 14–16, the enhancement of the effectiveness of combinational actions, and the formation of personal qualities remain insufficiently studied. Although some authors have developed methodological approaches to teaching technical attacking actions, methods for teaching counter-techniques and complex combinations are still underdeveloped. In addition, many training programs demonstrate an imbalance between general physical and special training volumes, as well as insufficient attention to psychological preparation.

This article seeks to address these gaps. The aim of the study is to conduct a comprehensive analysis of the technical and tactical training and age-related characteristics of 14–16-year-old adolescent judokas, to evaluate the effectiveness of the training process, and to develop scientifically grounded recommendations for its optimization and improvement.

Methods

The following research methods were employed:

heoretical analysis and literature review.

Russian, Uzbek, and international literature on judo and wrestling, scientific articles, sports training programs, and previous practical experiences were analyzed. In particular, sources related to judo philosophy, technical–tactical foundations, and the physical development of adolescents were examined.

ociological methods (questionnaires and interviews).

A survey was conducted among 60 judokas aged 14–16 and their coaches. The questionnaire was adapted from a Turkmen study and included items on the frequency of counter-technique execution, the effectiveness of unilateral and bilateral gripping, and the prioritization of offensive and defensive tactics.

Pedagogical observation and statistical analysis.

Training sessions and competitions were systematically observed, and the number of counter-techniques, combinational actions, and victory-producing techniques was recorded. Data from the qualification study entitled “*Technical and Tactical Training of Judokas Aged 15–16*” available on the Allbest portal were integrated with data obtained from our own observations.

Assessment of physical and psychological indicators.

Anthropometric and physiological data of adolescent judokas (height, body mass, cardiac and lung capacity, muscular strength) were derived from scientific publications on physical development. Personality and temperament indicators were assessed based on the methodological approach described in Smirnov’s research, which compares volitional qualities, sociability, intelligence, and psychological stability between adolescents practicing judo and those not involved in the sport.

Analysis of training programs.

The officially approved judo training program for Russian sports schools was examined to determine the distribution of training volumes across general and special physical preparation, theoretical instruction, technical–tactical training, and psychological preparation.

The results were statistically processed using MS Excel and Python software. Graphical and tabular visualizations were constructed to enhance the clarity and interpretability of the analysis.

Results

Characteristics of Physical Development

In adolescents aged 14–16, a rapid increase in strength and endurance indicators is observed. Table 1 presents the main anthropometric and

physiological parameters. The data indicate that at the age of 15, growth velocity and muscle mass reach peak rates: annual height increase amounts to 5–6 cm, and muscle mass reaches approximately 30% of total body weight. By the age of 16, cardiac volume increases to about 720 ml, lung vital capacity reaches approximately 3850 ml, and maximal oxygen consumption rises to around 3700 ml/min. Combined strength indicators increase from 90–100 kg to 100–110 kg.

These findings confirm the presence of a significant functional and physical development potential in this age group, which creates favorable prerequisites for intensive technical–tactical training, provided that training loads are structured in an age-appropriate and physiologically justified manner.

1st table

Indicator	14 years	15 years	16 years	Notes
Height Growth (cm/year)	4–5	5–6	3–4	Height growth is fastest at 15 years
Muscle Mass Share (%)	25–28	30–33	33–34	Lower limb muscles develop actively; muscle mass accounts for about one-third of total body weight
Average Static Strength (kg)	80–90	90–100	100–110	Average strength reaches 90–100 kg at age 15
Heart Volume (ml)	550–600	620	720	Heart size and stroke volume increase
Lung Vital Capacity (ml)	3400–3600	3780	3850	Lung capacity and ventilatory efficiency increase

Maximal Oxygen Consumption (ml/min)	3000	3300	3700	By age 16, athletes approach adult-level performance
Body Changes	Active growth, coordination develops	Skeletal microstructure fragile, possible elevated blood pressure	Musculotendinous system matures, coordination reaches final stage	

Results of the Questionnaire and Observational Study

A survey conducted among Turkmen judokas involved 60 respondents, who evaluated the use of counter-techniques, types of grips, and tactical priorities. The results of the questionnaire are presented in Table 2.

The findings reflect athletes' preferences and practical tendencies in technical-tactical behavior, providing empirical evidence on the predominance of specific tactical strategies, gripping patterns, and counteraction techniques in adolescent competitive judo. These data form an important analytical basis for assessing the effectiveness of current training approaches and for developing targeted methodological recommendations aimed at optimizing technical and tactical preparation.

2nd table

Tactical Element	Response Options	Proportion (%)	Source / Notes
Frequency of Using Counter-Techniques	Always performed	60-76	Athletes emphasized that they constantly use counter techniques.
	Cannot always perform	10	Those who experienced difficulty performing counter techniques.
Effectiveness of Grips	Unilateral grip	37	
	Bilateral grip	44	It is more preferable to grip with both hands.

	Both methods	29	Those who chose to grip simultaneously from both sides.
Opportunities for Victory	Through defense	56	Defensive actions force the opponent to make mistakes.
Tactical Priority	Attack	57	Most athletes stated that they prefer an offensive tactic.
	Defense	23	
	Integration of attack and defense	20	

Training Loads and Technical-Tactical Preparation

In the judo training program for Russian sports schools, training volumes are designed to increase progressively, with a gradual rise in complexity and intensity across developmental stages. In the initial years of training, general physical preparation is dominant (approximately 26%), while special physical preparation составляет around 45%, and technical-tactical and psychological preparation accounts for about 11%.

As the athlete's level of mastery and sports qualification increases, the proportion of special physical preparation rises to approximately 42-43%, whereas general physical preparation decreases to about 17%. At the same time, the share of technical-tactical and psychological preparation increases to 14-18%. The distribution of training time across the different stages is presented in Table 3.

This structure reflects a scientifically grounded progression from general conditioning to sport-specific specialization, emphasizing the growing importance of technical-tactical competence and psychological readiness in the long-term development of young judokas.

Type of Training	Initial Stage (1-2 years)	Intermediate Stage (3-4 years)	Advanced Stage (5 years and above)	Notes
General Physical Preparation	26%	20%	17%	Development of all major muscle groups

Special Physical Preparation	45%	42%	43%	Development of judo-specific strength, endurance, and speed
Other Sports and Games	9%	11%	8%	Diversification of overall athlete development
Theoretical Studies	9%	7%	6%	Judo history and rules, theoretical knowledge
Technical-Tactical and Psychological Preparation	11%	20%	18%	Techniques, combinations, counter-techniques, and psychological training

Based on these data, a graph depicting the distribution of training loads was constructed (Figure 1).

Interpretation of Training Structure and Psychological Characteristics

As illustrated in Figure 1, the proportion of special physical preparation increases progressively from stage to stage, while the share of general physical preparation gradually decreases. At the same time, the relative proportion of technical-tactical and psychological preparation increases, indicating that the training process is increasingly oriented toward the development of tactical thinking, combinational skills, and psychological stability in athletes.

Personal and Temperamental Characteristics

In a psychological study conducted by Smirnov, the volitional qualities and temperament characteristics of adolescent judokas were analyzed. The research divided judokas into groups with strong and weak volitional regulation and compared their indices of ergicity, plasticity, psychomotor speed, and intellectual processing speed. The results demonstrated that judokas with strong volitional qualities exhibited significantly higher scores in psychomotor and communicative speed, plasticity, and ergicity ($p < 0.01$). These athletes were more socially active, goal-oriented, and psychologically stable, and predominantly displayed sanguine or choleric temperamental types. In contrast, athletes with weaker volitional regulation were more closely associated with phlegmatic or melancholic temperamental profiles.

At the subsequent stage, a comparative analysis of personal characteristics between judokas and non-athletes was conducted. Judokas were distinguished by

higher levels of sociability, intellectual development, emotional stability, dominance, and courage. They also demonstrated a higher degree of adherence to social and moral norms. Correlation analysis revealed statistically significant relationships between social activity and psychomotor speed, intellectual development and communicative emotionality, and between norm adherence and intellectual processing speed.

Competition Analysis and Combinational Actions

Pedagogical observations and qualification studies contributed to the identification of technical–tactical methods most frequently applied in competitions. Selected results of this analysis are presented in Table 4, reflecting the structure of combinational actions, the prevalence of counter-techniques, and the technical patterns most strongly associated with successful competitive outcomes.

Direction	Result or Observation
Methods of Achieving Victory	53% of wrestlers created an unfavorable situation for the opponent and executed a throw, while 47% capitalized on errors in groundwork. In the 60 kg weight category, 12 victories were achieved with kneeling seoi-nage; in the 66 kg category, 11 victories were achieved with kosoto-gari; in the heavyweight category, 5 victories involved forward or seoi-nage techniques; and 17 victories were obtained through counter-techniques and sweeping actions.
Effectiveness of Counter-Techniques	During training, complex exercises designed to develop reaction and counter-techniques (multi-directional running, jumping, leg lifts, skipping rope, forcibly held throws, and uchikomi drills) increased counter-technique effectiveness by 20% and reduced reaction time by 15%.
Combinational Actions	The majority of survey participants considered combinational attacks to be more effective. Two- and three-phase combinations determine the athlete's competitive advantage and require preparatory actions for successful execution.

Based on the above findings, although the majority of athletes aged 14–16 perceive offensive tactics as the dominant priority, the ability to transition from defense to attack and the effective application of counter-techniques are also of substantial importance. Repeated observations indicate that approximately half of competitive victories are associated with exploiting errors in groundwork (ne-

waza) situations; therefore, the integration of defensive and offensive actions is essential for achieving stable competitive success.

The distribution of tactical priorities identified in the questionnaire is illustrated in Figure 2.

As shown in Figure 2, 57% of respondents prefer an offensive tactical orientation, 23% emphasize a defensive orientation, and 20% favor an integrated approach combining both directions. These findings provide valuable methodological information for coaches, indicating the necessity to place greater emphasis on training transitions from defense to offense and on the systematic development of counter-techniques within the training process.

Discussion

The biochemical and morphological processes occurring in the bodies of 14–16-year-old judokas are closely interconnected with their technical–tactical and psychological preparation. Due to the rapid increase in height and muscle mass, adolescents demonstrate a high capacity for the rapid development of strength and coordination; however, the relative immaturity of the skeletal system and the ligament–tendon apparatus indicates that excessive training loads may pose a risk. Therefore, training programs should incorporate not only general physical exercises, but also targeted activities aimed at muscle stretching and strengthening of tendons and joints.

Methodological sources emphasize the conceptual similarity between wrestling and judo: if technique (the method of executing actions) and tactics (the manner of applying actions in competitive situations) are not harmonized, achieving dominance in combat becomes difficult. Consequently, coaches must develop technical and tactical components in an integrated manner, while simultaneously training young athletes in rapid situational analysis and timely decision-making.

The questionnaire results indicate that adolescent judokas tend to prefer offensive tactics and two-handed gripping, yet approximately half of competitive victories are achieved through transitions from defense to attack. This empirical evidence highlights the critical importance of the integration of offensive and defensive strategies. Data reported in the APNI source demonstrate that complex training drills—comprising multi-directional running, jumping exercises, strength training, and preparatory uchikomi elements—enhanced the effectiveness of counter-techniques by approximately 20% and accelerated reaction time by about 15%. Accordingly, training sessions should place strong emphasis on the development of reaction speed, anticipatory perception of the

opponent's actions, and the automatization of counter-techniques through systematic repetition.

Psychological research further indicates that adolescents practicing judo exhibit higher levels of sociability, psychological stability, and courage compared to non-athletes. These personal qualities strengthen the ability to take initiative, anticipate opponents' actions, and manage competitive interactions. Correlation analysis has revealed that psychomotor speed is significantly associated with communicative characteristics, while intellectual processing speed is closely linked with adherence to social and moral norms. Thus, coaches should utilize game-based methods and logical tasks to enhance decision-making speed, social interaction skills, and intellectual flexibility.

The analysis of training programs underscores the necessity of a scientifically justified distribution of training loads. While general physical preparation should dominate at the initial stages, there must be a gradual transition toward specialized preparation and an increased proportion of technical-tactical training over subsequent years. At the same time, at least 14–18% of training time should be allocated to theoretical education and psychological preparation, alongside systematic monitoring of athletes' physical condition and the organization of continuous medical supervision.

The role of combinational actions is also of high significance. Offensive combinations typically consist of multiple phases and require preparatory actions. This indicates the need for an individualized approach, whereby coaches design personalized sets of combinations for each judoka and systematically work on modeling and predicting opponents' reaction patterns.

Conclusion and Recommendations

The results of the study indicate that, despite their high physical and psychological potential, judokas aged 14–16 exhibit a number of deficiencies in the process of technical-tactical training. During the period of rapid height and muscle mass increase, the fragility of the skeletal system and elevated blood pressure necessitate caution to avoid excessive loads. At the same time, the improved cardiovascular, pulmonary, and muscular indicators allow these athletes to tolerate substantial training volumes.

Questionnaire and observational data revealed that most young athletes prefer offensive tactics and two-handed grips; however, actual competitive outcomes show that victories are often achieved through defensive actions. This emphasizes the importance of integrating offense and defense, automatizing counter-techniques, and systematically training combinational actions within the preparation process.

Regarding physical preparation, it is recommended to maintain a high proportion of general physical conditioning at initial stages, followed by an increased share of specialized training while ensuring systematic psychological preparation. Psychological studies confirmed that adolescent judokas exhibit elevated levels of sociability, psychological stability, and courage. Correlation analyses further demonstrated significant relationships between decision-making speed and social interaction skills.

Key Recommendations

1. Training program design: Adapt training plans for adolescent judokas according to age, ensuring a balanced integration of general physical, specialized physical, technical-tactical, and psychological preparation.
2. Technical-tactical focus: Emphasize counter-techniques and combinational actions, develop skills in anticipating opponents' movements, and improve reaction speed.
3. Psychological development: Employ psychological training, game-based activities, and intellectual exercises to enhance personal qualities such as initiative, resilience, and strategic thinking.
4. Individualized load management: Coaches should consider the age-specific physiological characteristics of each athlete when assigning training loads to optimize development and minimize injury risk.

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