



# Proceedings book

June 20 -21. 2016.  
Poreč - Croatia

3rd European Science of Judo Research Symposium  
2nd Scientific and Professional Conference on Judo

# Applicable research in judo

Editors: Hrvoje Sertić, Sanda Čorak, Ivan Segedi



3<sup>RD</sup> EUROPEAN SCIENCE OF JUDO RESEARCH SYMPOSIUM  
&  
2<sup>ND</sup> SCIENTIFIC AND PROFESSIONAL CONFERENCE ON JUDO:  
  
„APPLICABLE RESEARCH IN JUDO”

PROCEEDINGS BOOK

**Editors:**

**Hrvoje Sertić, Sanda Čorak and Ivan Segedi**

**Conference organizers:**

European Judo Union

Croatian Judo Federation

Faculty of Kinesiology, University of Zagreb, Croatia

JUNE 20 - 21. 2016, POREČ – CROATIA

**Publisher:** Faculty of Kinesiology, University of Zagreb, Croatia

**For the Publisher:** Damir Knjaz, Dean of the Faculty of Kinesiology,  
University of Zagreb, Croatia

**Editors:** Hrvoje Sertić, Sanda Čorak and Ivan Segedi

**Layout and Cover:** Tangir, Samobor, Croatia

**Printed by:** Tangir, Samobor, Croatia

**Edition:** 200 copies

A CIP catalogue record for this book is available from  
the National and University Library in Zagreb  
under the number: 000936085

**ISBN:** 978-953-317-044-2

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do not necessarily represent those of the conference organizers and the publisher.

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## FOREWORD

European Judo Union, Croatian Judo Federation and Faculty of Kinesiology, University of Zagreb (Croatia) are organizing this joint research conference for the very first time. This kind of collaboration of the sport umbrella organisation, national sport federation and leader academic institution can be considered as the historic event that is contributing to developing judo sport through organisational, competitive and scientific aspect.

Collaboration of research and practice making a specific symbiosis under the leadership of European Judo Union and judo researchers from Europe can contribute to further improvements of our sport in Europe and throughout the world.

We believe that application of scientific knowledge and conclusions that can be implemented directly in the training process can improve the judo from various perspectives and have positive impacts on popularity and media attractiveness of judo.

Therefore, we would like this conference to become a traditional event for several reasons:

- ✓ We are of the opinion that – as judokas, as former athletes, as coaches and today as researchers – we want to continue highlighting the need of stronger connection between theory and practice in judo,
- ✓ Faculty of Kinesiology the *Department of Judo* has cooperated exceptionally well with the Croatian Judo Federation, combining scientific research and practice, thereby confirming its scientific achievements, and ultimately contributing to the performance of the top-level results of Croatian judokas,
- ✓ It is important to encourage collaboration and connection of all those who deal with and wish to engage in research in judo and/or use the research results,
- ✓ Education is also the conference goal, therefore we would like to contribute to education of coaches, competitors and other sport officials in judo and to
- ✓ Highlight multidisciplinary aspects of judo that can be studied not only from the standpoint of physical education and kinesiology, but also from the standpoint of anthropology, psychology, sociology, economics, management, history, education and other scientific disciplines.

Therefore, the ultimate goal of this conference is to establish a **permanent network and communication of researchers in judo as well as those who use these results**. Our meeting at the conference, in order to share our knowledge, insights and experiences, having in mind development and progress of judo is a step to achieve that goal.

Thank you all for coming and your contribution, your active participation in presenting your research results and willingness to share your expert knowledge – we believe that we all have the same and very worthy goal - **to continuously improve the quality and value of our sport - JUDO**.

**Franco Capelletti**

*Prof. Hrvoje Sertić, PhD*

**Sanda Čorak, PhD**



## CONTENTS

KATAME NO KATA - OSAE-KOMI WAZA: METHODOICAL VALUE IN PRACTICING MOTORIC MOVEMENTS OF NE-WAZA Slaviša Bradić, Mike Callan .....	7
SARAH MAYER AND THE KŌDŌKAN: EARLY EUROPEAN WOMEN'S JUDO IN JAPAN Mike Callan, Amanda Spenn .....	12
IS THERE A DIFFERENCE BETWEEN YOUNG JUDOKA AND KARATAS IN SOME DIMENSIONS OF SOCIAL SUPPORT Damir Crnjac, Ninoslav Šilić, Mate Brekalo .....	16
ANALYSIS OF WEBSITES: THE CASE OF NATIONAL JUDO FEDERATIONS IN EUROPE Sanda Čorak, Snježana Boranić Živoder .....	19
ADAPTED UTILITARIAN JUDO (JUA): PROGRAM TO IMPROVE HEALTH AND QUALITY OF LIFE FOR OLDER ADULTS: JUDO BLACK BELT OF EXPERIENCE DelCastillo-Andrés O., Campos-Mesa M.C., González-Campos G, Castañeda C., Chacón-Borrego F., Corral J.A., Portillo L., Toronjo T., Toronjo-Hornillo L. ....	23
COMPARISON OF DIFFERENT GRIP CONFIGURATIONS DURING THE EXECUTION OF THROWING TECHNIQUES FOR FEMALE SENIORS AT NATIONAL CHAMPIONSHIP OF BOSNIA AND HERZEGOVINA IN JUDO Husnija Kajmović and Izet Rađo .....	27
DISCRIMINANT VALIDITY OF JUDO-SPECIFIC TESTS IN MALE JUDOKAS Goran Kuvačić, Saša Krstulović, Dragan Crnov .....	31
ANALYSIS OF RATE FORCE DEVELOPMENT, POWER AND RESISTANCE EXPLOSIVE STRENGTH INDICATORS IN TOP ELITE vs. ELITE MALE JUDOKAS Luís Monteiro .....	36
THE TRANSITION TO NEWAZA IN A SAMPLE OF HIGH LEVEL JUDO COMPETITION Pierantozzi Emanuela, Calmet Michel, Franchini Emerson .....	40
BALANCE DIFFERENCE BETWEEN JUDOKAS OF DIFFERENT QUALITY LEVEL Segedi Ivan, Sertić Hrvoje .....	45
SOMATOTYPING AND SUBCUTANEOUS ADIPOSE TISSUE PATTERNING USING THE NOVEL ULTRASOUND MEASUREMENT TECHNIQUE IN MALE AND FEMALE ELITE JUDOKAS Marietta Sengeis, Wolfram Müller, Paul Störchle, Alfred Führhapter-Rieger .....	49
TECHNICAL ANALYSIS OF CROATIAN NATIONAL CHAMPINSHIP FOR SENIORS Sertić Hrvoje, Cetinić Marko, Ivan Segedi .....	55
RELATION BETWEEN MOTORIC AND PSYCHOLOGICAL CHARACTERISTICS OF YOUNG JUDOKAS Sanja Smojver-Ažić, Matija Jug-Dujaković, Slaviša Bradić, Vladimir Takšić, Veno Đonlić .....	59

UNDER 73 KG CATEGORY ISOKINETIC QUADRICEPS AND HAMSTRING STRENGTH PROFILE OF YOUTH JUDOKAS Jožef Šimenko, Rauter Samo, Vedran Hadžić .....	65
JUDO: A PEDAGOGICAL TOOL FOR STUDENTS WITH NON-VISIBLE DISABILITIES Birgitte Ursin .....	70
AN ESTIMATION OF EFFORTS' INTENSITY DURING THE COMPETITION AND TRAINING IN FEMALE JUDO ON THE BASIS OF DETERMINING A CONCENTRATION OF LACTIC ACID IN BLOOD Wiesław Blach .....	74
RELATIONSHIPS BETWEEN SPECIAL JUDO FITNESS TEST (SJFT), FLEXIBILITY AND SOME VARIABLES OF LOWER-UPPER BODY ON YOUNG JUDOKAS Ender Eyuboğlu, Ali Özkan .....	76

# KATAME NO KATA - OSAE-KOMI WAZA: METHODOLOGICAL VALUE IN PRACTICING MOTORIC MOVEMENTS OF NE-WAZA

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## ABSTRACT

*Kata* are formal exercises intended for practicing judo developed primarily by the founder of judo, Dr. Kanō Jigorō in harmony with the tradition of other martial arts (Kodokan, 2014; Kotani, 1970; Leggett, 1963; Otaki & Draeger, 1983; Yerkow, 1956). *Katame-no-kata* (Grappling Forms) was created after *Nage-no-kata* and is made up of fifteen representative techniques (originally ten until 1915), divided into three sets; *osae-waza*, *shime-waza* and *kansetsu-waza* (Bennett, 2009). In 1906 when the Butoku Kai *kata* were being formulated, Kanō submitted the fifteen techniques of *katame-no-kata* used by the Kōdōkan for consideration; they were accepted after some minor modifications (Bennett, 2009).

One of the reasons why Kōdōkan Judo has become so widespread in Japan and around the world is because *randori* and *kata* are ideal forms of exercise (Kano, 2005). Practicing *katame-no-kata* today is commonly in order to pass to *dan* grade and for *kata* competitions. Does *osae-komi-waza* as in *katame-no-kata* have a methodological, pedagogical and realistic value in teaching and practicing motoric movements in practicing *ne-waza* or not?

Are the techniques listed in that group applicable and realistic, or have they remained just a part of historic and traditional character of the growth of judo?

**Key words:** *katame-no-kata*, *osae-komi-waza*, *Kōdōkan*, *method*, *motoric movements*

## INTRODUCTION

Many acknowledged masters have analysed *kata* and made statements about the value of *kata* practicing (Kawaishi, Gailhat, & Harrison, 1957; Kodokan, 2014; Kotani, 1970; Leggett, 1963; Otaki & Draeger, 1983; Yerkow, 1956). An analysis of the technical information presented by these authors, relating to the first set of *katame-no-kata* (*osae-waza*), offers the potential value and the goal of practicing *katame-no kata*.

The importance of practicing *kata* and their effects on judokas development has been mentioned since the very emergence of judo (Yokoyama & Oshima, 1915).

At first, Kanō emphasized *randori*, but then realized that trainees needed *kata*, (set forms), a „grammar” that would help them build the balanced approach to training that Kanō wanted for his Kōdōkan judo trainees. Also, *kata* provided Kōdōkan members with a safe method for practicing the techniques prohibited or not practical in *randori* (Hoare, 2009; Stevens, 2013). Apart from *randori*, *kata* practice is also an important part of a judo curriculum (Bennett, 2009).

*Kata*, which means „form”, is a system of prearranged movements that teach the fundamentals of attack and defence. In addition to throwing and holding (also practiced in *randori*), it includes hitting, kicking, stabbing, slashing and a number of other techniques. These latter occur only in *kata* because it is only in *kata* that the movements are prearranged and each partner knows what the other will do (Kano, 1986).

Each form (*kata*) is the result of many years of study and practice by ancient masters. It is with this spirit and using these techniques in practice that you will acquire improvements in your training (Mifune, 1956). Mifune



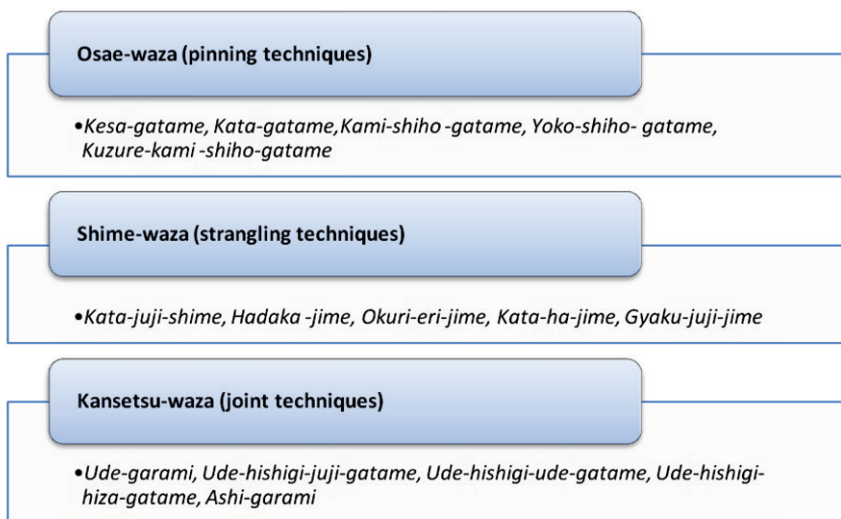
concluded with a concern about the student's deficiencies in *katame-waza*. He agreed to intensify all *kata* study and to make *kata* instruction a regular teaching function at Kōdōkan, on a twice-a-week basis. All students specially took part in the practice of *katame-uchi awase* (*katame-no-kata*) (Otaki & Draeger, 1983).

Also in more modern times, the importance and role of practicing *kata* is highlighted very often (Kodokan, 2014)

*„I myself am not very good at it but kata is very good for the learning of judo theory and a wide range of techniques“* (Yamashita, 1993).

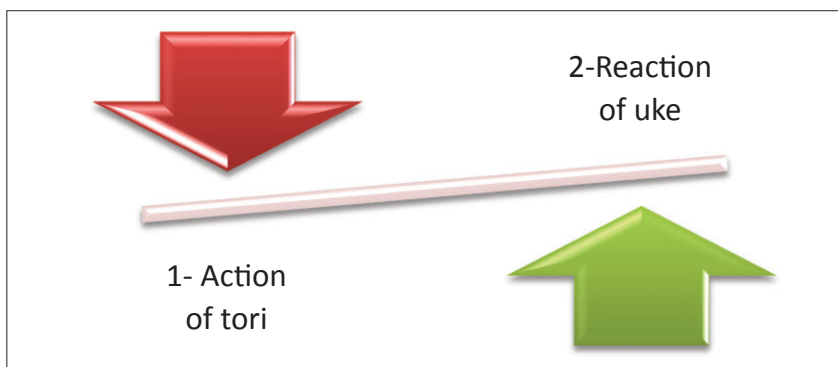
*Randori* alone makes it difficult for trainees develop a wide variety of techniques due to the heavy resistance of an opponent. Generally, attacks must be confined to a favoured side and there is little chance for other development. To eliminate this, judoka are advised to include *uchikomi* and *kata* in training schedules. Preserving a study of *kata* will provide a stable basis for free-style judo. The fundamentals learned during *kata* practice must be put to use in *randori* (Ishikawa & Draeger, 1962).

## DISCUSSION



**Figure 1.** Katame-no kata techniques

*Katame-no-kata* contains numerous of elements and techniques that are used in fight on the ground and also contains a knee joint lock that is forbidden in today's sport fight (*Ashi-garami*).



**Figure 2.** Display of balance between action and reaction

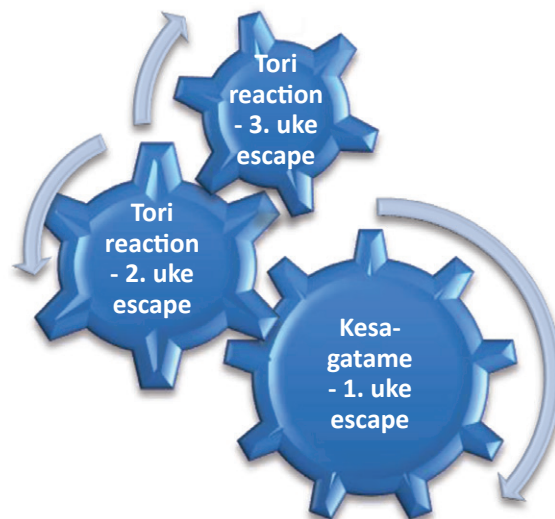
### Osae-komi-waza contains the following elements:

- ✓ Grappling holds- 5 holds
- ✓ Escape from grappling holds – 15 escapes
- ✓ Reactions on escape from grappling holds and their connection -15 reactions and their connections

In total 35 technical elements!

Considering the educational process of *osae-komi-waza*, if we ignore the ritual part (entry ceremony, movement, and distances), the structural form of grappling holds is in harmony with a methodological and logical approach. What the learning informs is the importance of practicing *uke* reaction, the escape techniques from the holds. This additional element enriches and expands logical and situational learning, equally for *uke* and *tori*. A further step is *tori* reaction to *uke* escape, which needs to be realistic and logical (Kawaishi et al., 1957; Kodokan, 2014; Kotani, 1970; Leggett, 1963). That includes technical, motoric movements and coordination between partners' through action and reaction in a combined sequence. Each grappling hold includes 3 methods of realistic escape, and every method follows *tori* reaction to *uke*.

**Kesa-gatame example:** 1. *uke* escape - *tori* reaction. 2. *uke* escape - *tori* reaction. 3. *uke* escape -*tori* reaction – surrender.



**Figure 3.** Review of connectivity between action and reaction in kesa-gatame technique



**Picture 1.** Kesa-gatame – Uke first escape and reaction of tori

All the actions of *tori* need to be connected with *uke* actions and vice-versa.

**Practicing motoric movements of *tori*:**

- ✓ 5 grappling holds (*Kesa-gatame*, *kata-gatame*, *kami-shiho-gatame*, *yoko-shiho-gatame*, *kuzure-kami-shiho-gatame*)
- ✓ 15 connected and logic reactions on every attempt to control *uke*

**Practicing motoric movements of *uke*:**

- ✓ 15 different escapes from grappling holds (*Kesa-gatame*, *kata-gatame*, *kami-shiho-gatame*, *yoko-shiho-gatame*, *kuzure-kami-shiho-gatame*)
- ✓ 15 connected and logic reactions on every attempt to control *tori*

**Table 1.** Comparison of action and reaction between *tori* and *uke* in technique *kesa-gatame*

Tori	Uke
Demonstrates <i>kesa-gatame</i> -weak spot-free hand of <i>uke</i>	Reacts by release catching <i>tori</i> by the hand with the attempt of rotation
Reacts on the attempt of release straddling <i>uke</i> -weak spot raised flanks	Responds by pushing its knee between the body of <i>tori</i> and <i>tatami</i>
Lowers flanks sitting with the position „ <i>kesa</i> ” - weak spot, incomplete control	Catches <i>tori</i> for the back and performs attempt to release „by a bridge”
Straddles <i>uke</i> and places a hand on <i>tatami</i> blocking release	Surrender

## CONCLUSION

Although the perception of the majority of coaches is that *kata* are something unusable in a modern judokas training, the reality is completely different (G. Gleeson, 1987; G. R. a. Gleeson, 1967). *Kata* are not just a form and historical tradition, they also have multiple roles in the structure and culture of judo (Kawaishi et al., 1957). Training and education of coaches, and teaching judokas to practice *kata* or parts of *kata* is surely useful in multiple ways. Part of that tradition is centred on the convenience of judo training, which increases the interest for learning *kata*, and then the learning itself enriches judokas with new skills and self confidence in the whole structure of judo.

A fundamental value of learning *kata* is in development of a natural sequence based on developing a sense of the changing movements, caused between actions and reactions of *tori* and *uke*.

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## SARAH MAYER AND THE KŌDŌKAN: EARLY EUROPEAN WOMEN'S JUDO IN JAPAN

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### ABSTRACT

Sarah Mayer was the first foreign woman in Japan to be awarded a shōdan (black belt) for judo. She was awarded shōdan by Isogai Hajime at the Dai Nippon Butoku Kai in March 1935, having earlier trained at the Kōdōkan, and met Professor Kano. Mayer is an important figure in the history of women's judo internationally. This research focusses on Mayer's relationships with senior figures in the Kōdōkan at that time. Hatta Ichiro, Samura Kaichiro, Mifune Kyuzo, Isogai Hajime and Nagaoka Hideichi. Four of whom went on to be awarded 10<sup>th</sup> dan. There is discussion about the 50<sup>th</sup> Anniversary of the Kōdōkan.

Based on original primary biographical research material, understanding her relationships gives insight into global gender issues in sports history. Sources include: Kōdōkan Library and Archive, National Archives of UK, and Mayer Letters in the Bowen Archive, Bath

The way Mayer was treated in Japan was highly unusual. She was not separated from the men, but expected to fight against and even bathe with them. All of the male teachers under whom she learnt in Japan, accepted her, not as a woman, but as if she had no gender, despite her being attractive and feminine in western terms. The research is presented in the context of the positive influence made by women's sport on the struggle for female emancipation during the early 20th century. Her journey is an important example of historical global interaction in the sporting arena. The efforts of Mrs. Mayer led the way for all the female judoka in Europe.

**Key words:** judo, Kōdōkan, history, women, Kano, biography, gender

### SARAH MAYER

Mrs Sarah Mayer was an English woman who visited Japan in the 1930s to practise judo. Several authors have commented on her life. (Brousse, 2015; Callan & Spenn, 2009, 2011; Miarka, Marques, & Franchini, 2011; Mizoguchi, 2013; Williams, 2014) She is most famous as the first western woman to achieve the grade of shōdan whilst in Japan. (Anon, 1935)

This paper focusses on the interaction of Mrs Mayer with five highly respected senior judoka from the Kōdōkan, Tōkyō, the institution founded by Professor Kano Jigoro in 1882 as a place to study the way of judo. The five individuals discussed in this paper are; Hatta Ichiro, Mifune Kyuzo, Samura Kaichiro, Nagaoka Hideichi and Isogai Hajime. (Callan & Spenn, 2016)

### HATTA ICHIRO

Sarah had met Hatta Ichiro in London when he had visited the Budokwai. They had got on very well and Ichiro was pleased that Sarah was visiting his country. She received letters from him inviting her to Tōkyō. He insisted that she stay with him at his parent's home. So she accompanied him back to his house in Setagaya.

Hatta Ichiro was a graduate of Waseda University, who practiced judo at the Kōdōkan. He was known as a hard trainer. (Leggett, 1952) Hatta was to go on to found the All-Japan Wrestling Association. (Nagashima & Tomozoe, 2015)

A short time later Professor Kano, arrived back after an extensive trip abroad promoting judo. (Bennett, 2009) Sarah was anxious about meeting this most important of all the judo men, but Hatta said it was essential that she did so.

*„I met Professor Kano for the first time. I had expected to meet a very aloof person for everyone seems to stand in such awe of him that I felt quite nervous. Instead I found a charming old gentleman with European manners who greeted me warmly and made me feel quite at home.” (Mayer, 1934)*

She found him a charismatic man, and he seemed genuinely interested in Sarah’s progress in judo.

*„He seems most anxious to help me and asked me whether I only wished to get some practice or whether I wanted to learn as much about the real meaning of judo as was possible in a short time. I told him that I was as much interested in the philosophical side as in the actual practice which seemed to please him and he asked me to come again when he had had time to formulate a plan for my study.” (Mayer, 1934)*

Sarah had avoided the Kōdōkan, as they would not allow her or any other women in to the main dojo. The women’s dojo seemed to her like a „young ladies school” but after meeting Sarah, Professor Kano was very happy for her to join in with the men’s practice sessions and „gave orders” that she should be allowed access to the main dojo. He also told her that she should practice with Mr Mifune and with Mr Hatta whenever possible, and he was insistent that she practice her kata in all its forms as he believed it was the only true way to improve understanding and technique.

Her first session at the Kōdōkan was a great success. She practiced with a man of 6<sup>th</sup> dan who made her work really hard. Tired out she went to sit down and regain her composure, but almost immediately a man of 8<sup>th</sup> dan came to offer her a bout. She asked him if he would mind if she had a little rest first, however...

*„Afterwards Ichiro said that if I was asked to practice by any of these exalted ones, I mustn’t refuse -- but if the Prince of Wales had come up at that minute and asked me to dance I should have had to make some excuse!” (Mayer, 1934)*

## MIFUNE KYUZO

Mr Mifune, seemed old and frail to Sarah, with a tiny physique, but on the judo mat he was spectacularly fast and skillful. She managed to get a practice with him quite soon after her arrival in Tōkyō, and there was no sign of the gentle way most of the judo men started with her.

*„He was in a playful mood when I practiced with him. He just threw me round the room as if I were an India rubber ball, and when I tried any throw, he simply wasn’t there any longer.” (Mayer, 1934)*

Mr Mifune offered to teach her alone once a week, and he told her that she could follow him around to the many clubs he taught at on the other days. In the afternoons she went to Waseda University with Hatta to practice. The boys at the university took great delight in having a western woman in their midst, rushing to her side if she carried a bag, they would jostle for position and the winning boy would seize the bag and hold it aloft, with the other boys cheering, and if a boy were to hold a door open for her, they would all laugh.

## SAMURA KAICHIRO

In November 1934 the Kōdōkan had recently moved to a new site close to Suidobashi station, which had delayed the celebrations planned for 50<sup>th</sup> Anniversary. (Bennett, 2009) It was a national occasion and Emperor Hirohito sent a gift with the Imperial Prince Kan’in Kotohito. Mr Yamashita Yoshiaki, one of the Kōdōkan Shitennō (four heavenly gods), made one of the speeches. (Kōdōkan, 1935) Mr Yamashita had been in America for some time and taught judo to President Theodore Roosevelt. (Stevens, 2013) He was elderly and his voice wasn’t strong, so



Mr Munakata Ichiro read his words for him. (Kōdōkan, 1935) After some beautiful kata displays, it was Sarah's turn to demonstrate randori with Samura Kaichiro. (Kōdōkan, 1935; Mayer, 1934)

*„I was so frightened by the instructions I had been given (how to bow and which mat to stand on in a hall of 500 mats each indistinguishable from the next) that I was more inclined to collapse on his bosom than engage him in combat. However, despair gave me strength and I got through somehow although Ichiro said afterwards that I „made him some awful pants” by which he meant that he was as nervous as I was.” (Mayer, 1934)*

A couple of weeks before the celebrations, Sarah had dislocated her shoulder. She was attended to by the club's 'bonesetter' and after stopping her from practising until the anniversary he strapped her up ready for her big moment.

*„As I was about to enter the dojo he begged me to fight with might and main adding that if I put my shoulder out again he would soon mend it!” (Mayer, 1934)*

All went well and they had put on a good show, thankfully managing not to damage her shoulder again. Afterwards Professor Kano and Mr Yamashita came to congratulate her. When it was all over, her 'bonesetter' had another look at her injury and told her she must have another week away from practice to make sure it was fully strong.

## NAGAOKA HIDEICHI

One of the men who returned to Japan for the anniversary, was Mr Nagaoka. He had just been in London (Mayer, 1934) where he had spent some time with Mr Koizumi at the Budokwai. (Budokwai, 1932) He gave a talk about his travels at the Anniversary. (Kōdōkan, 1935) Once Sarah was fit enough to return to practice, Mr Nagaoka seemed to think that she needed looking after, perhaps Mr Koizumi had asked him to keep an eye on her.

*„He bestows the same care upon me as a hen with one chicken, and if he sees me alone in the Kōdōkan he calls loudly and demands to know the reason that I am being neglected. The other men who are quite accustomed to me look very surprised and rather at a loss.” (Mayer, 1934)*

Back in Tōkyō at the Kōdōkan, she told reporters that she was hoping to take her skill and knowledge back to the Budokwai in London, and help out with the teaching there, adding;

*„Judo is a more personal thing to me. It is a process of building up spiritual, mental, and physical health. It gives me a greater enjoyment of life.” (Anon, 1935)*

## ISOGAI HAJIME

Sarah visited Kyoto when Ichiro Hatta had sent her an introduction to Professor Isogai. She presented Ichiro's introduction but he showed great indifference. She was shown to the changing area, a room full of men in various states of undress.

A local headmaster had been called in to help her with translation and she was partnered with a „strapping young man of 5<sup>th</sup> dan”. He was initially very kind as they began to practice together, until a nod from Mr Isogai gave him permission to slam her around the mat with

*„that extra push when I was on my way down that makes the floor come up quicker than usual.” (Mayer, 1934)*

Sarah started to worry that she was going to get hurt, however,

*„when I considered the matter later, I found that I hadn't so much as a bruise or a scratch beyond the usual ones on my shins and my left collarbone which are no doing of mine. After I had a short rest, they told me to try again and this time the Professor stopped us every time I tried to do a throw and corrected me carefully. He taught me quite a lot in a very short time.” (Mayer, 1934)*

Sarah met Mr Isogai again at the Kōdōkan 50<sup>th</sup> Anniversary celebration. Afterwards she invited him to lunch at the Frank Lloyd Wright designed Imperial Hotel, along with Professor Iizuka. At the lunch Sarah saw a very different

man away from the dojo, Professor Isogai was relaxed and funny, and several cocktails later he offered her a fifth dan if she went back to Kyoto.

„He broke his leg a short while ago and arrived leaning heavily upon a stick, but he left the hotel waving it in the air. When I remember how terrified I was of him in Kyoto I can't help laughing. As for Prof. Iizuka - I've never been able to take him very seriously since I taught him the Charleston.” (Mayer, 1934)

In Kyoto, Professor Isogai was not so tightly tied to Professor Kano's standards on gradings. The Butoku Kai system had broken away from promotions through the Kōdōkan. (Hoare, 2009) Professor Kano had become disappointed with the way the standards were slipping for promotions and had disassociated himself with the Butoku Kai grades. In March 1935, Sarah took a trip back to Kyoto, and over four days she took part in a grading. (Anon, 1935)

„Her tests included 50 movements and holds. Twenty of the movements were in kime-no-kata, where her ability was tested for self-defence against such weapons as sticks, swords and daggers. Fifteen movements were in nage-no-kata, or various types of throwing the opponent. The last 15 movements were tests in katame-no-kata or floor work, which include strangle holds, arm and head lock, and pinning and holding opponents on the floor.” (Anon, 1935)

Mr Isogai stepped forward and smiled and Sarah's heart leapt as she was finally awarded her shōdan. The award ceremony took place immediately, and the certificate was presented by Prince Nashimoto. (Anon, 1935)

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## IS THERE A DIFFERENCE BETWEEN YOUNG JUDOKA AND KARATAS IN SOME DIMENSIONS OF SOCIAL SUPPORT

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### ABSTRACT

Since judo and karate as sports in the area of martial arts are quite similar in the field of functional and motor abilities, it will be interesting to see whether they are so similar in the area of social support.

The goal of this study was to examine is there a difference between young judoka and karate athletes in some dimensions of social support. 182 participants from Bosnia and Herzegovina, of which is 91 from judo and 91 from karate were subjects of this research. For the assessment of three dimensions of social support *scale of social orientation* Stuntz Weiss (2003)., is used. Although the judo and karate are two sports that have a different history, different requirements in combat and training social support, in this sample, was not significantly different in all three dimensions of social support.

**Key words:** judo, karate, social support

### INTRODUCTION

Sport is an organized, structured physical activity that offers youth participants many physical and psychosocial benefits. Physically active youth have opportunities to build social relationships, develop positive self-perceptions, and adopt self-determined forms of motivation (Weiss, Amorose & Wilko, 2009). Based on theoretical work Urdan and Maehr (1995), and empirical research by many other (Hayashi, 1996; Nicholls and Järvinen, 1996; Lewthwaite, 1990; Schilling and Hayashi, 2001; Whitehead, 1995) social orientation separated from the goal orientation and reflects the social relations that are established within parts of the social environment as well as in the work Stuntz and Weiss (2003). Our teammates, friends, parents, and coaches influence how we play and think about sports. Nonetheless, many people think of sport only as an arena to test athletic prowess and push the competitive spirit. However, this view ignores social affiliation and acceptance as consistent reasons behind sport participation (Stuntz and Weiss, 2003). Judo and karate belong to the group polystructural acyclic sports, with Judo belongs to acyclic activities wrestling character, a karate acyclic activities striking character (Segedi at all. 2011). Since judo and karate as sports in the area of martial arts are quite similar in the field of functional and motor abilities. It will be interesting to see whether they are so similar in the area of social support.

The goal of this study was to examine is there a difference between young judoka and karate in some dimensions of social support.

### METHODS

This study has 182 participants from Bosnia and Herzegovina, of which is 91 from judo and 91 from karate. They are all young men aged 13 to 15 years.

The *scale of social orientation* Stuntz Weiss (2003)., is used. Scale was modified and translated into croatian, (SO). The scale has 18 variables, which represent three dimensions of social support. The first dimension *coach praise* have 6 variables, and represents coach support. The second and third dimension represents *peers. Friendship* (6 variables) and *group acceptance* goal orientations also (6 variables). Confirmed the high level of reliability and

validity of the scale. Cronbach's alpha was 0.89 ( $\alpha = 0.89$ ). Factor analysis has showed three different factors (dimensions): *coaching praise*, *friendship* and *acceptance group*. The first dimension *coach praise*, is related to the approval of these coaching and support provided by the athlete, particles like. „My coach praising my performance” or „When I'm good at my coach told me that I did a good job. The second dimension *friendship*. Particles, „I have friends comrades who truly understand me” or „My friends encouraged me to strive together when I make a mistake,”. Third dimension under the *group acceptance*. „The children of my club carefully listen to what I say,” or „My comrades called me often to hang out with them,” the two particles from 6 to represent this dimension of peer support. Answers are on the fifth point Likert scale.

The data analysis was done by means of the statistical package *Statistica 12*. Upon confirming the significance, the pair-wise univariate analysis of variance (ANOVA) was used to compute the statistical differences between a group of young judoka and karate in some dimensions of social support.

## RESULTS AND DISCUSSION

For all three dimensions the basic descriptive parameters were computed: arithmetic mean (Mean) and standard deviation (SD). Normality of distribution of the variables was tested by means of KolmogorovSmirnov test at the error level of 0.05.

**Table 1.** Descriptive Statistics

Variables	N	Mean	max D	K-S p	Std.Dev.	Skewness	Kurtosis
CP	182	3,898	0,139	$p < ,05$	0,771	-0,995	1,178
FO	182	3,888	0,115	$p < ,05$	0,966	-1,060	0,716
GA	182	3,643	0,118	$p < ,05$	0,857	-0,863	0,649

Legend: CP-coaching praise FO- friendship GA- group acceptance N- number of respondents, AS- arithmetic mean, K-S – Kolmogorov–Smirnov test, SD- standard deviation, Skewnes- the degree of symmetry, Kurtosis – the degree of peakedness

The descriptive parameters obtained are presented in Table 1. Descriptive statistics shows that social support and in both martial arts (judo and karate) is high. The greatest support they have in the dimensions of the coaching praise. Peer support is also average high in both dimensions.

Across statistical analysis, ANOVA, we'll determine whether there are differences between social support young judoka and karate.

**Table 2.** Results of ANOVA

Effect	Value	F	Effect df	p	Partial eta-squared
Intercept	0,030	1949,925	3	0,000	0,970
Judo/Kara	0,969	1,897	3	0,132	0,031

Legend: df-degrees of freedom, Judo/Kara – significance differences between grups, F- Test, p- level of significance, partial eta-squared – measure of effect size

ANOVA (Table 2) helped to identify the differences between arithmetic means of two grups young judoka and karate in 18 variables, which represent three dimensions of social support (coach praise, friendship and group acceptance). The results of this research shows that statistically significantly difference between the young judoka and karate does not exist ( $p=0,132$ ). Since there were no statistically significant differences, then we did not do

further analysis. Judo and karate have a lot in common in the field of social support. According these dimensions of social support judo and karate are no different. Coaches and peers are an important part of social environment. In this particular age of 13-15 years, children usually leave the sport and social support is important to stay in the sport. Social support coaches and peers is extremely importantis one of the key factors to ensure young people remain in the sport, as the results show (Table 1). If coaches and peers create a good social environment, it is very likely that they will stay in the sport (Ullrich-French & Smith 2009).

## CONCLUSION

Although the judo and karate are two sports that have a different history, different requirements in combat and training social support, in this sample, was not significantly different in all three dimensions of social support. In future research one should include a larger sample, both sexes and more aspects of social support.

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## ANALYSIS OF WEBSITES: THE CASE OF NATIONAL JUDO FEDERATIONS IN EUROPE

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### ABSTRACT

The rapid development of technology along with the need to attract consumers as well as search for new distribution channels led to the development of the website as the integrated communication and sales platform. However, sport as a global socio-economic phenomenon with special features develop websites with a slightly different role and functions. Previous studies have indicated some important features that could serve in evaluation of the websites of sports organizations. They are adopted in the case of evaluation of websites of national sports federations in judo sport presented in this paper. A qualitative research was conducted using a sample of European national federations, members of the European Judo Union. Research has shown that the main target population of the national judo federations are their members. As expected, less attention is paid to information and promotion directed to media, sponsors and other potential users that is not completely in accordance with mission and tasks of national judo federations.

**Key words:** *website evaluation, national judo federations, sport management, European judo union*

### INTRODUCTION

In many countries, the number of Internet users is greatly increased so that, for example, in Europe, the penetration is, according to Internet World Stat, 73.5 per cent (2016). According to the same source around 40 per cent (3.4 million Internet users in 2015) of the world population has an Internet connections today. In comparison, in 1995 it was less than 1%. As the number of Internet users recorded rapid growth, business features and benefits offered by the Internet, such as the e-marketing, is becoming an indispensable medium for information, promotion and sales as well.

The rapid development of information and communication technology has completely changed the habits of collecting information in all aspects of life and also brought a number of changes in sports arena. New opportunities that arises from that development are available to provide information, promote and popularize different sports and thus attract new users. Therefore, carefully planned, designed and updated web pages that follow the world trends in technology can contribute to the success of individual sports.

Marketing of sport organizations is different from commercial firms and largely relates to informing the membership and other stakeholders as well as promoting the values and ethics of a particular sport. However, due to the fact that sport largely depend on a public sector, transparent performance becomes a condition for receiving financial support from umbrella organizations (European Commission, 2012). Given the lack of financial resources, attracting sponsors become important task of sports organizations, particularly national sports federations. In this context, the successful management is a prerequisite for obtaining financial support. The need to attract sponsors emphasizes the need for clear and detailed presentation of all the activities of a national federation. Potential sponsors are evaluating the efficiency of the national federations and therefore have to make decisions about financing individual projects. In this way the role and the importance of e-marketing and the use of websites for sports organizations become closer to those of a commercial nature. Due to a growing number of recognized Olympic sports as well as a large number of non-Olympic sports in the last decade, competitiveness

between sports is getting more fierce. Keeping this in mind, the principles of good governance are increasingly more important in sports movement (International Olympic Committee, 2012). Because of all this, the websites of sports organizations provide access to desirable target markets that justify establishing an online presence (Brown, 2003).

Internet as a medium is rapidly evolving and generally accepted rules for creating web pages do not exist, as is the case with printed publications. However, it is clear that great emphasis must be on the overall attractiveness, ease of use (finding information in a few clicks), timeliness and sufficiency of the information for different type of users.

The task of this paper is to analyze the basic elements of the websites of the national judo organizations, members of the European Judo Union, in order to gain insight into the current use of the Internet as a medium. The analysis should point out advantages and disadvantages of existing websites and therefore show opportunities for improvement.

## PREVIOUS RESEARCH

The link between sport and the Internet has lasted for more than twenty years, therefore many authors focused their academic papers on this topic from various perspectives (Brown, 2003; Kelly & Turley, 2001; Pederson, Miloch & Laucella, 2007; Wallace, Wilson & Miloch, 2011; Gonzales, M., E., Quesada, G., Davis, J. Mora-Monge, C., 2015). Using the advantages of the Internet for marketing sport, Brown (2003) conducted a study on a sample of 750 sports organizations. His research showed that the goal of most organizations is to provide information about them and to raise visibility, but a little was invested in interactive marketing and the advantages of this medium as an effective marketing tool was underused. Sports marketers must ensure that their online presence is an effective marketing tool in order to reach this potential market (Brown, 2003). Wallace, Wilson and Miloch (2011) dealt with the use of social media by sports organizations and pointed out the advantages of Facebook as a tool to develop long lasting relationships with customers and strengthen the brand through real-time online interaction.

When it comes to evaluating websites, the authors discuss the various elements, emphasizing the importance to be familiar with customers (internal or external public, business or private users, etc.). Pederson, Miloch and Laucella (2007) pointed out that scholars have identified six key criteria: business function, corporation credibility, content reliability, website attractiveness, systematic structure and navigation. All these elements should allow users to simply and easily, in just a few clicks, get to the desired information. Content is a key element to achieve this goal, but also a design that has its aesthetic role and a role in the functionality of the page. It is interesting to mention the atmosphere of the site; regarding this aspect Richard (2003) illustrated that the atmosphere has a major impact on the efficiency since heavily influence the decision how long to stay on certain sites. The role of websites in sport is extremely important for the strengthening of sports products. Pedersen, Miloch and Laucella (2007, pp. 230) pointed out that „sports Web sites should be designed to enhance consumer perceptions of the sport product, facilitate a great sense of product identification, add a greater dimension of service related to the varieties of product, and enhance consumer's experience with the sport product.”

## METHODS

Available websites of the national judo federations affiliated to the European Judo Union (EJU) were taken into the sample for this research. With regard to the 51 members of EJU the panel of experts (5) analyzed websites in English, French, Spanish, German, Croatian, Serbian, Slovenian and Russian and some other languages. In total, 44 websites of national judo federations were evaluated. Having in mind previous surveys on webpages

and mission and tasks of national sport federations, following basic website characteristics were analyzed: 1) the content in terms of its organization/detail and focus on different users (internal and external groups), 2) design with an aesthetic/atmospherics and functionality, 3) navigation (ease of reference and search), and 4) interactivity.

## RESULTS

The functions/tasks of the national sports federations most often include:

- Informing the members (clubs, competitors), umbrella organizations and all sports professionals and the media, potential sponsors and general public
- Promoting the characteristics and values of sport (popularization of sport)
- Creating a positive image and appropriate atmosphere according to sport characteristics.

Regarding above stated main functions of national sport federations we considered four basic elements of their websites: content, design, navigation and interactivity.

**Table 1.** Main results of the quality analysis of 44 websites of national judo federations in Europe

Elements	Evaluation
<b>Content</b>	<p>The analysis has shown the following:</p> <ul style="list-style-type: none"> <li>• Only 10 websites are available in English language</li> <li>• Only few federations has set up just a basic content with limited information (only three to four main menus - 6 websites)</li> <li>• About a third of the national federations has a well-established web architecture with a rich set of information</li> <li>• About 20% of the national federations on the web site addresses other users (media, potential new members, sponsors etc.)</li> </ul>
<b>Design</b>	<ul style="list-style-type: none"> <li>• When it comes to the aesthetic aspects and atmospherics, only about 20% of the national federations show visible concern about the attractiveness of the layout, for example, a good combination of colors, images, fonts, background and others.</li> <li>• A slightly higher number of national federations (25%) has a design in the function of transparency and ease of site search</li> </ul>
<b>Navigation</b>	<ul style="list-style-type: none"> <li>• Almost all the pages can be easily searched, while a smaller proportion (10%) are rather complicated when searching for specific information</li> </ul>
<b>Interactivity</b>	<ul style="list-style-type: none"> <li>• About 30% of websites use some elements of interactivity (video displays, search capabilities, image) that contribute to overall attractiveness of pages.</li> </ul>

## CONCLUSIONS

Considering the need for a transparent and successful work, the analysis revealed that only a small number of national judo federations pay attention to providing information to the general public, media and others and they are focused primarily to their members. For example, only a small number of national federations highlight the history and the ethics of judo, special projects such as Judo for all, Judo for children, etc., as part of the information available on websites. The design in majority of cases does not reflect the nature of judo as extremely dynamic and modern Olympic sport. Despite this results, some websites can be pointed out as extremely successful ones; according to the evaluated basic elements – content, design, navigation and interactivity particularly attractive

are the websites of national judo federations of Germany, Great Britain, France, Switzerland and Turkey. The website of national federation of Germany is outstanding regarding the overall quality of content; websites of Great Britain and France are evaluated as the best ones regarding comprehensiveness of information, webpage of Switzerland regarding web architecture and transparency, while Turkey is the only example of website that translated the content in several languages (English, French, German, Turkish, Japanese and Russian). It is interesting to note that about 40% all of the national judo federations on their website has links to social networks (mainly Facebook, Twitter and Instagram) that are important for communication between users.

As expected, the analysis showed that most national judo federations are active in promoting their sponsors, probably stressing the need to have not only sponsors as financial contributors but as federations' partners. However, the results have not shown the use of websites to inform about all the federations' activities and position themselves as sport leaders in various aspects (definition of strategy, mission and vision are not part of websites). Websites also do not allow communication between federations and exchange of information as only some of them are available in English or in other languages and this could be limiting factor for further development and popularization of judo within Europe. As this research has limitations this topic still needs further studies, adding more elements into analysis and investigating the needs of different segments of the users of websites of national judo federations in Europe.

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## ADAPTED UTILITARIAN JUDO (JUA): PROGRAM TO IMPROVE HEALTH AND QUALITY OF LIFE FOR OLDER ADULTS: JUDO BLACK BELT OF EXPERIENCE

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### ABSTRACT

Improving the health and quality of life of Older Adults in Europe is a demanded short term social objective. In this paper a pioneer innovation which aims to open Kodokan Judo to the aforementioned areas is presented. With this purpose, an adaptation of traditional Judo is carried out, Adapted Utilitarian Judo (JUA), with the aim of bringing this discipline closer to the need of the Older Adult of a utilitarian physical and mental holistic discipline (Judo for society). This program attempts to cover from the prevention and assistance in falls, to the integral development of the physical qualities and abilities, not forgetting the socializing aspects which are so important for this population. In the latter, the JUA opens the possibility of a transgenerational work (grandparents-parents-children) which is priceless for the Older Adult. The proposed intervention is aimed at a healthy or pre-frail sample of people aged 55 or more of either sex. As a main conclusion we can establish, for the implementation of JUA under the paradigm of health and quality of life, the need for the creation in Europe of the *EJU Dojo of the Experience*, space where the *Judo Black Belt of Experience* can be obtained, granting this way the achievement of the objectives established in this program.

**Key words:** judo, health, quality of life, falls, adapted-utilitarian-judo

### INTRODUCTION

The development of programs aimed at improving the health and quality of life of Older Adults is a demand from a Europe which ages at an accelerated pace. In this regard, the international scientific community is responding with programs of various approaches, such as fall prevention, improvement and maintenance of skills and physical qualities, among others (Granacher, Lacroix, Muehlbauer, Roettger, & Gollhofer, 2013; Borba-Pinheiro et al., 2013).

In this communication we will show a worldwide pioneer intervention proposal based on Kodokan Judo, framing it in one of the lines established as *innovation, longevity and quality of life for society*. Using the fundamentals and technical elements of traditional and professional Judo, adapted and contextualized to the needs of Older Adults, collaborative and cooperative methodologies are introduced, which aid by a system of assistance, make it a maintenance and functional improvement tool, and therefore useful and versatile for this population (Campos, DelCastillo-Andrés, Castañeda y Toronjo-Hornillo, 2016; Corral, Toronjo-Urquiza, Ruiz y Portillo, 2015). And it is in this construct of usefulness where we believe that the main importance of our contribution lies.

Under these premises, we define the concept of *Adapted Utilitarian Judo (JUA)*, as *the one which, under the foundations of Kodokan Judo, develops specific adapted motor skills with the scope of integrating standards and living habits to contribute to the welfare of the Older Adult, providing them with autonomy in personal, domestic and social contexts* (DelCastillo-Andrés; Toronjo-Hornillo; Corral, & Chacón-Borrego, 2016, p. 194).

Through this new approach, the JUA opens Judo to the field of health and quality, improving Older Adults lives (health judo, judo for society). It becomes thus an integral, formative and multifunctional physical activity which,



through adapted work of their technical elements and foundations, as well as the contents in the Katas, provides for the Older Adult, in addition to an overall improvement of their physical condition, a positive development of the process of socialization and personal acceptance, resulting in increased self-esteem and personal security.

In this sense, our program works on the individual in a holistic way and adds to numerous studies of national and international level, where it is stated the need to improve the health and quality of life of the population through basic and specific motor skills enhancement, as well as the amelioration of physical abilities such as balance, flexibility, strength, coordination, integration of proprioceptive and kinesthetic information, memorization work, etc., (Donath, Roth, Zahner, & Faude, 2015; Morat, & Mechling, 2014; King et al., 2000; Carbonell, Aparicio & Delgado, 2009). Regardless of the capabilities that the person has, the JUA has a vocation of maintaining and improving the functionality and autonomy of the Older Adult with respect to the performance of *Basic ADL (Activities of Daily Living)* and *Instrumental ADL*, which contributes to a healthy active aging.

Likewise, the implementation of the JUA program allows us to respond effectively to a priority demand of our society, as is intervention on falls. Not surprisingly, the World Health Organization (WHO, 2012) alerted about the incidence of falls as the second cause of deaths from accidental injuries, estimating the overall figure of 424,000 dead as a result of the 37 million three hundred thousand severe falls which require health care every year, being Older Adults over 60 years the main victims. We can say, as evidenced in several studies conducted by DelCastillo-Andrés et al. (2016) y DelCastillo-Andrés & Toronjo-Hornillo (in press) that the implementation of JUA in this population produces improvements in fundamental variables related to fall prevention, highlighting, among others, a decrease of Fear of Falling (FOF) as well as significant improvements in all items analyzed by the Falls Efficacy Scale-International (FES-I), both in its domestic and social dimension.

It can be inferred that JUA not only allows us to act on fall prevention in the Older Adult, boundary that no other international programs focused on this element have trespassed, but it also represents a pioneer innovation worldwide in the area concerning falls. Thus, JUA, based on the characteristics of the very Judo techniques and reduction of the magnitude of generated impacts on the body by applying these techniques (Montero & López, 2014; Pocecco et al. 2013), is of great social interest in order to reduce the risk of injury in the event of a fall, becoming a valuable tool to reduce the fragility of Older Adults.

To close the conceptual framework it is necessary to establish two new concepts closely linked to the JUA program. Namely: *EJU Dojo of the Experience and Judo Black Belt of Experience*. The first answers the question of where to locate the JUA. The second refers to the institutional recognition and confirmation of the program itself. Thus we define the *EJU Dojo of the Experience* as *the network of centers, that with the endorsement and support of the European Judo Union (EJU) and its National Federations, that have instructors with the professional expertise required and the necessary materials for the application of Judo Health as a tool to promote active aging of the elder population, through a program designed within the framework of innovation, longevity and quality of life, which uses the adaptation of the technical elements present in traditional Judo, adapted to the needs and characteristics of Older Adults, offering the program leading to the attainment of the Judo Black Belt of the Experience*. As a result of the involvement in the program, the older Adults could obtain the *Judo Black Belt of Experience*, this being the reflection of *the realization of the JUA, a significant comprehensive physical activity which leads participants to improve their physical condition, increases the balance capacity, the functional gait, coordination and memory; introducing elements of generational and intergenerational socialization, resulting all in the increase of self-esteem, security, personal autonomy and by extension in the quality of life of the participants*.

Finally, if we focus on this generated training process, the JUA allows us to carry out a transgenerational work (grandparents-parents-children), with adherence to Judo clubs of a population usually excluded from these sports centers. The adjustment made on the basics of Judo allows highly socializing work between, for example, the joint practice of grandparents and grandchildren.

In short, we can specify the priority objectives of this program of physical activity and health based on Adapted Utilitarian Judo in:

1. Create the EJU Dojo of the Experience.
2. Introduce the Judo Black Belt of Experience.
3. Promote the practice of Judo at a transgenerational level (grandparents-parents- children) as an element of socialization and quality of life for Older Adults.
4. Promote the practice of Judo as sport and physical activity as a healthy habit for the Older Adult.
5. Improve health conditions oriented to the Older Adult health, promoting an easy execution of everyday life tasks and reducing risk factors regarding falls.
6. Apply adapted Judo on Older Adults as an educational tool in teaching drop control to minimize the damage caused by the impact of the body against the ground in the event of a fall.
7. Teach the Older Adult to rise in case of fall and how to act correctly and calmly after it, minimizing the risk of further injury.
8. Maintain physical and mental balance, increasing well-being, emotional stability and self confidence.

## METHODS

### *Sample*

The proposed intervention is aimed at people aged 55 or more, of either sex, who have not been diagnosed with illnesses which could prevent them from performing the exercises or lose mobility in the body segments. The proposed intervention is aimed at a sample classified as healthy or pre-fragile (García-García et al., 2014).

### *Intervention*

Adapted Utilitarian Judo program. The courses are designed for implementation in two cycles of four and a half months, with 34 sessions each; being imparted on average two weekly sessions of 50 minutes. Usually they are organized following the traditional academic program, based on two semesters. Such timing is flexible, thanks to the broad range of contents. The aim is to respond to a practice that is meaningful and sufficient to achieve the objectives of improving Older Adults health and quality of life.

As progression sequence to obtaining the official degrees of the Judo Federations, the *Judo Brown Belt of Experience* can be obtained after the first cycle, and the *Judo Black Belt of Experience* after the second.

The intervention through the JUA program requires the following adaptations: the material and the sports facility does not require significant adjustments. The Judoki can be of a reduced weight, and the use of comfortable sports clothes under it is accepted, as well as the use of sporting white socks or shoes suitable for the tatami. As auxiliary material low density gym mats are required.

Significant adjustments are made in the technical and performance elements, the starting point are the contents of the Judo Black Belt program and Katas, which are tailored to the capabilities and functional needs of participants, completely avoiding any risk practice for the Older Adult population.

In the methodology and implementation special care has been taken in order to contemplate the special characteristics of the target population to facilitate progression, making it accessible to the largest possible number of recipients, saving individual limitations (inclusive Judo), and avoiding likewise any aspects unsuitable for the reference population or which diverge from the objectives of functionality, health and quality of life.

## CONCLUSIONS

- JUA implementation opens up a space in traditional Judo to contribute to the active aging of the population, improving their health and quality of life.
- JUA is a holistic activity, useful to prevent falls and to minimize the risk of injury on the event of a fall.
- The creation of the EJU Dojo of the Experience and thus, the Judo Black Belt of Experience, would allow social inclusion of the Older Adults population in a utilitarian physical activity supported by the Judo Federations.
- Utilitarian adaptation of Ukemis adds a unique and innovative element in the treatment strategy regarding falls of the Older Adult population.
- JUA improves the general physical conditions of Older Adults.

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# COMPARISON OF DIFFERENT GRIP CONFIGURATIONS DURING THE EXECUTION OF THROWING TECHNIQUES FOR FEMALE SENIORS AT NATIONAL CHAMPIONSHIP OF BOSNIA AND HERZEGOVINA IN JUDO

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## ABSTRACT

Grip (*Kumi kata*) is highly significant during judo match and its function is reflected both in the offensive and defensive segments of fight with the opponent. The goal of this research presents a comparison of different grip configurations during the execution of throwing techniques for female seniors at National championship of Bosnia and Herzegovina in judo, 2014. year. Based on video analysis 83 grip configurations and throwing techniques at National championship of Bosnia and Herzegovina in judo, for female seniors, two different types of guard configurations were watched over, the same grip (*Ai Yotsu*) and the opposite grip (*Kenka Yotsu*). The results showed that the female seniors prefer the technique of opposite grip (*Kenka Yotsu*), compared to the same grip (*Ai Yotsu*). The most dominant grip configuration is from the opposite Left vs. Right grip, in which the most used leg technique is Uchi Mata technique. Throwing techniques Harai Goshi and Ippon Seoi Nage were the most efficient ones from the Right vs. Right grip. This research may help coaches and competitors in order to cognize strong and weak sides of guards during the defensive and offensive activities during fight and the possibility to implement this informations in the training process of female seniors.

**Key words:** *competition, performance, contact, laterality*

## INTRODUCTION

Competition judo is very dynamic, intense and demanding physical activity, explosive character with highly developed aerobic and anaerobic energy systems (Pulkkinen, 2001). In such circumstances of judo fight, the primary role of grip is a control of the opponent and the space between them (Angus, 2006.) By establishing their grip, the opponents create a space for maneuver, opening the opponents defense space and realizing the attack through the use of certain throwing techniques (Adams, 1990). Several authors have defined the grip and its phases, as well as throwings and gripping time. So, Sacripanti (2010) defines Grip (*Kumi kata*) as period of the match in which the judoka disputes for the best grip, when there is contact with one or both hands, and Throws as period in which the judoka executes a technique or throw during standing combat (*Tachi-waza*). The *kumi-kata* phase included both lead grip and main grip and therefore started at *hajime* and ended on the first attack or *matte* (Challis et al., 2015). Calmet, Miarka & Franchini (2010) found that the expert groups spends less time between the grip and executing a technique of throwing in comparison to intermediate level judokas and beginners. The gripping time for the match is defined by the time between the accomplishment of the grip (*kumi-kata*) and the lack of contact on the opponent judogi, based on the protocol used in the analysis of combat time frame in Calmet et al. (2010). Earlier researchs showed that the gripping time differ by gender and age categories. Gripping time (Miarka et al., 2014) in senior female competitors (73 sec.) is higher than juniors (38 sec.), juvenile (45 sec.) and pre-juvenile (41 sec.), while gripping time in senior male (Miarka et al., 2012) competitors (89 sec.) is higher than juniors (59 sec.), juvenile (50 sec.) and pre-juvenile (75 sec.). The goal of this research presents a comparison of different grip configurations during the execution of throwing techniques for female seniors at National championship of Bosnia and Herzegovina in judo.

## METHODS

The sample of subjects include a video analysis of 83 grip configurations and a same number of executed throwing techniques at National championship of Bosnia and Herzegovina in judo for female seniors in 2014. year. The sample of variables consists two groups of variables. First group consists of different grip configurations (Yamashita, 1993) during executing throws: SAME GRIP (*Ai Yotsu*) – Right vs. Right and Left vs. Left grip during execution of throw; OPPOSITE GRIP (*Kenka Yotsu*) – Right vs. Left and Left vs. Right grip during the execution of throw.

Second group consists of all registered throwing techniques that female seniors performed effectively in the competition of different grip configurations (Daigo, 2005). The analysis was done based on notation analysis of videos where these grip and different throwing techniques were recorded. Two observers were asked to watch each guard and throwing technique for three times, so that the collected data could be valid. Frequencies and percentage values were calculated for each grip configuration and throwing technique. The total percentage value of each analyzed variable is calculated according to the formula: SITEF = Number of grip-throws / total number of grip-throws x 100.

## RESULTS

**Table 1.** Percentage values of realized throwing techniques from different grip configurations at National championship of Bosnia and Herzegovina for female seniors.

GRIP ( <i>Kumi Kata</i> )						
SAME GRIP ( <i>Ai Yotsu</i> )				OPPOSITE GRIP ( <i>Kenka Yotsu</i> )		
Right vs. Right		Left vs. Left		Right vs. Left		
				Left vs. Right		
Harai Goshi	7,2	Ippon Seoi Nage	2,4	O Soto Gari	4,8	
Uchi Mata	12,1	Tani Otoshi	10,8	Ippon Seoi Nage	10,8	
O Uchi Gari	6,1	O Uchi Gari	6,1	Tani Otoshi	6,1	
Uchi Mata	2,4	O Uchi Gari	3,6	O Soto Gari	3,6	
O Soto Gari	2,4	Uchi Mata	2,4	O Uchi Gari	2,4	
Tani Otoshi	1,2	Sasae CKA	1,2	Koshi Guruma	1,2	
Ko Uchi Gari	1,2	Seoi Nage	2,4	De Ashi Barai	1,2	
Koshi Guruma	1,2		Ippon Seoi Nage	1,2	Harai Goshi	1,2
De Ashi Barai	1,2		Soto Maki Komi	1,2		
Sasae Tsuriko. Ashi	1,2		Ko Uchi Gari	1,2		

Results of this research showed that female seniors dominate in throwing techniques from opposite grip (*Kenka Yotsu*) 62,7% compared to realized throws from the same grip (*Ai Yotsu*) 37,3% at National championship of Bosnia and Herzegovina. Percentage values of different grip configurations during the execution of throwing technique from the same grip are: Right vs. Right (27,7%), Left vs. Left (9,6%), and from opposite grip: Right vs. Left (24,1%), and Left vs. Right (38,6%). The results of realized throwing techniques from different grip configurations (Table 1) have shown differences in realization of individual throwing techniques, in which, from the same grip Harai Goshi and Ippon Seoi Nage are the most dominant from Right vs. Right grip, Ippon Seoi Nage from Left vs. Left grip. O Soto Gari is the most dominant throwing technique from Right vs. Left grip, while the Uchi Mata and Ippon Seoi Nage are the most dominant throwing techniques from Left vs. Right grip.

## DISCUSSION

The aim of this research represents a comparison of different grip configurations during the execution of throwing techniques at National championship of Bosnia and Herzegovina for female seniors, and the results showed that the competitors behave differently during the execution of throwing techniques from different grip. Winners of Olympic and World medals (Adams, 1990; Yamashita, 1993; Pedro, 2007) indicated that the grip is one of the most important and fundamental skills in judo sport, and that the performance of top athletes in judo, depend on good fight for a grip and on imposition of „your” grip during the fight, with which the opponent is controlled. Once a dominant grip is established, it creates a good basis for imbalance, contact and throw. A larger number of studies related to the grip are conducted by comparing men and women at different levels of competition, but under different grip rules of judo fight. Kajmović and Rađo (2014) report that female seniors behave differently from male seniors when it comes to the grip and throwing techniques. Female seniors are dominant in opposite grip throwing (63,9%), while male seniors dominate in same grip throwing (53,9%). The highest index of efficiency at female seniors throwing techniques from the same grip have Harai Goshi and Ippon Seoi Nage techniques, while the most successful techniques from the opposite grip are Uchi Mata and Ippon Seoi Nage. Courel et al. (2014) by exploring the side of grip and side of throwing on successfulness of an attack by both gender elite judokas, in final and semifinal matches at 12 IJF tournaments in all seven weight categories, have determined that the opposite grip (*Kenka Yotsu*) was most used grip by both genders and all weight categories. However, in terms of efficiency, throwing techniques from the same grip (*Ai Yotsu*) is the most effective grip grip. Dalponte, Pierantozzi & Lubisco (2011), in order to determine the difference between men and women at National team championship in Italy for juveniles in 2009. year, determined that the Right grip has a dominant role at this level of competition and that the majority of throwing techniques were conducted to the Right side. Differences in *kumite* tactics between men and women were identified in a study of 15 matches from the 60kg category and 15 matches from the 48 kg category in the 1997. World Judo Championship.

It was reported that female competitors use both hands significantly more when attacking than male competitors (Hirose et al. 2000). Murayama et al. (2005) conducted a case study on the women’s 57 kg category 2001. World Judo Championship and found that competitors who used both hands to grab their opponent’s sleeves scored significantly more points than those who didn’t. Different behaviors of female seniors during established grip and realization of throwing techniques could be explained by the fact that their lack of experience of training and competitions are not in their favor when they fight with competitors who have Left grip because they are not able to resolve that kind of situations, and that is why leg throwing technique Uchi Mata is commonly used in such situations effectively. It is necessary that female seniors, during their trainings and competitions develop their potentials of recognizing the established grip, fast transformation to the second grip or timely breaking of the grip, in order to avoid effective attacks of the opponent.

## CONCLUSION

The results of this research should have a positive effect on the training process with female competitors, so that judo experts and coaches can design new learning programs and perfect fight for a grip. Also, there is a need that researchers in judo sports, treat grip in more studious manner and present the results of that studies to the coaches and competitors.

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## DISCRIMINANT VALIDITY OF JUDO-SPECIFIC TESTS IN MALE JUDOKAS

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### ABSTRACT

The main objective of this study was to determine the discriminant validity of three judo-specific tests in a sample of male judokas of cadet age group. Fourteen Croatian cadet male judokas ( $15.8 \pm 1.6$  years) took part in the study. They were divided into two groups – seven successful judokas with body mass  $72.0 \pm 10.8$  kg, and seven less successful ones with body mass  $70.1 \pm 9.5$  kg. The following judo-specific tests were investigated: the Special Judo Fitness Test (SJFT), the Uchi Komi Fitness Test (UFT), and the Ten-Station Judo Ability Test (SJA). The Student's t-test for independent samples indicated statistically significant difference ( $p < 0.05$ ) between the successful and less successful judokas in UFT. The magnitude of the differences between the two groups were large when the performance in the SJFT and the UFT is considered, and small when SJA is analyzed. The SJFT and the UFT discriminated the successful and less successful male judokas and, therefore, are suitable for the evaluation and monitoring of the training status of successful and less successful male judokas.

**Key words:** *combat sport, motor-functional abilities, metric characteristics, young judokas*

### INTRODUCTION

To evaluate the state of preparedness of top athletes, specific tests are often used, the structure of which is similar to the one of the analyzed sport. Judo is an acyclic sport the performance of which is difficult to explain, because it may be determined by a combination of different physical abilities, as well as technical, tactical and psychological aspects (Detanico et al. 2012.). Several studies (Hernandez-Garcia et al. 2009, Franchini et al. 2009, Bonitch-Domínguez et al. 2010) have shown that lactic anaerobic metabolism is highly demanded during fight simulations, as evidenced by high concentrations of blood lactate (between 8 and 14 mmol/l) after fights. On the other hand, the aerobic capacity is also important because it is related to a higher rate of blood lactate removal after a fight (Franchini et al. 2003). Garriod et al. (1995) verified that judokas who are better trained aerobically had higher phosphocreatinine resynthesis, which could generate higher recovery in the intervals during the fight. However, in addition to the above-stated aerobic and anaerobic capacity, judokas need to have a high level of muscular strength and endurance during the fight (especially in grip fighting and ground grappling), as well as power during the performance of throwing techniques (Krstulović et al. 2006).

Therefore it can be concluded that the energy and neuromuscular requirements of the fight are extremely large and complex, which significantly complicates the process of determining the specific training condition of a judokas. An overview of previous research shows that various authors have constructed a number of specific judo tests (Sterkowicz, 1995, Almansba et al. 2007, Santos et al. 2010, Lidor et al. 2005) that are structurally similar to the physiologic and neuromuscular demands of judo training and fights. However there is an evident lack of research that compares the results of specific tests in male or female judokas in terms of the quality of the subjects (discriminant validity). Therefore, the main objective of this study is to determine the discriminant validity of three specific judo tests in a sample of successful and less successful male judokas.



## METHODS

### *The Subject Sample*

The study was conducted with 14 male Croatian judokas cadet age group ( $15.8 \pm 1.6$  years). All athletes gave verbal and written consent, while the parents of athletes under 18 years of age also gave written informed consent. All the subjects were active contestants in weight categories ranging from under -55 kg to -90 kg. To determine the discriminant validity of the tests applied, the participants were divided into two groups based on their competitive success. The first group consisted of seven successful male judokas (judo practice  $8.3 \pm 3.0$  years) who participated in the Croatian Cadet National Championship in 2015, in which they achieved first to third places, and second group consisted of seven less-successful male competitors (judo practice  $6.4 \pm 1.7$  years) who participated in the Croatian Cadet National Championship in 2015, in which they achieved fifth to ninth places.

### *The sample of variables*

The sample of variables consisted of three judo-specific tests: 1) **The Special Judo Fitness Test** (SJFT) (index) proposed by Sterkowicz, 1995. and described by Franchini et al. (1998). 2) **The Uchi-komi Fitness Test** (UFT) (number of total uchikomi) developed by Almansba et al. (2007). 3) **The Ten-station Judo Ability Test** (SJA) (s) developed by Lidor et al. (2005). In terms of structure, to a greater or lesser extent, the tests simulated the energy and neuromuscular demands of judo training and/or fights.

### *Experimental design*

Testing was done for two days in the competition period of the semi-annual training cycle. All the subjects were healthy and without injuries. During the 24 hours before the measurement, they did not carry out any activities demanding physical effort (except during the actual test) and kept their usual eating habits. The order of the tests were SJFT, UFT and SJA. The break between tests lasted for a minimum of 8 hours, which was estimated to be sufficient for full recovery. The testing was preceded by a 15-minute warm up (5 minutes of easy pace running in circles, 5 minutes of stretching exercises, and 5 minutes of moderate-intensity *uchi komi*).

### *Statistics*

The basic descriptive parameters (mean and standard deviation) were calculated for all analyzed variables. By using Kolmogorov Smirnov test with Lilliefors correction, all variables are found to be normally distributed ( $p > 0.05$ ). To determine the discriminant validity of the tests under analysis Student's t-test for independent was applied to calculate the difference between the successful and less successful male judokas. 95% confidence interval for mean differences between groups were also presented. To evaluate the magnitude of differences the Cohen's effect size was calculated. Threshold values to effect size were 0.2 – 0.5 (small), 0.5 – 0.8 (medium), 0.8 – 1.3 (large),  $> 1.3$  (very large) (Sullivan & Feinn, 2012). All data were analyzed with the software package STATISTICA version 10.0 (Statsoft, USA).

## RESULTS

As shown in Table 1, a statistically significant difference between the successful and less successful male judokas was found only in UFT. However, large effect size can be observed in the SJFT, which implies the conclusion that the mentioned test also differs successful and less successful judokas. Probably due to small sample of subjects, differences between two groups are not statistically significant.

**Table 1.** Performance in judo-specific tests for successful and less successful judo athletes

variables	M±SD		t	ES	95% CI
	1	2			
SJFT <sup>#</sup> (index)	12.5±1.3	13.9±1.5	-1.9	1.0 (large)	-3.1 to 0.2
SJFT (reps)	26.9±2.2	25.6±2.3	1.1	0.6 (medium)	- 1.3 to 3.9
SJFT (after)(beats/min)	182.9±13.0	190.3±3.9	-1.4	0.8 (large)	-18.6 to 3.8
SJFT (1 min)(beats/min)	150.3±18.9	159.0±11.3	-1.0	0.6 (medium)	-22.6 to 9.4
UFT (reps)	47.4±3.6	43.1±3.7	2.2 <sup>a</sup>	1.2 (large)	0.0 to 8.5
SJA <sup>#</sup> (s)	128.4±9.6	133.1±13.8	-0.7	0.4 (small)	-18.5 to 9.1

Legend: SJFT = Special Judo Fitness Test; UFT = Uchi-komi Fitness Test; SJA = The Ten-station Judo Ability Test; values are mean and standard deviation, 1 –successful male judokas, 2 – less successful male judokas, t - Student's test of differences, 95% CI - confidence interval of 95% for mean differences between groups, ES – effect size, <sup>a</sup>p<0.05; <sup>#</sup>reversely scaled variable

## DISCUSSION

The main findings of the present study were that: (a) SJFT and UFT discriminated the successful and less successful male judo athletes; (b) the SJFT and UFT have acceptable discriminant validity and therefore are suitable for the evaluation and monitoring of the training status of successful judo athletes; (c) the magnitude of the differences between the two groups were large when the performance in the SJFT and UFT is considered, and small when SJA is analyzed.

The findings that the SJFT and the UFT tests better discriminated the successful and judo athletes from the less successful group and presented acceptable discriminant validity can be explained by the fact that both tests rely heavily on anaerobic processes to meet the physiological demand, but also present a high aerobic demand (Almansba et al. 2007; Almansba et al. 2013; Franchini et al. 2011), which has been considered to be a characteristic of judo matches (Franchini et al. 2013).

Previous studies have also shown that the SJFT (Franchini et al. 2005; Drid et al. 2009; Katralli et al. 2012) and UFT (Almansba et al. 2007) successfully discriminated judokas of different qualities. However, it is important to emphasize that based on the previous research (Tavra et al. 2016), all applied tests seem to measure a similar physical ability or combination of physical abilities, probably due to their maximal effort nature. Thus, coaches and sports scientists are recommended to use preferably the SJFT and the UFT, but they can also consider to use the SJA when the use of the SJFT or UFT could not be conducted for some reason. Additionally, using different judo-specific tests complementarily to each other can result in more accuracy on the physical and technical level of the evaluated athlete.

The most commonly applied specific judo test is the SJFT. A comparison of the obtained SJFT test index values of the successful male judokas with those reported in previous studies shows, similar results compared with male judokas of senior age (SJFT index values ranging from 11.8 to 12.5 (Franchini et al. 2007; Detanico et al. 2012) and better results compared with young male judokas (SJFT index value of 12.7) in Boguszewska et al. (2010). When considering the index obtained in the SJFT by the judo athletes of our study according to the classificatory table proposed by Franchini et al. (2009) for male judo athletes, the successful judokas are classified as good, while the less successful group are classified as average.

The successful male judokas had slightly worse results in the UFT compared with the results obtained by Almansba et al. (2012) (47.4 versus 51.5 respectively) and significantly poorer (53.3) results compared with the judokas in the study of Almansba et al. (2013).

In the present study, the male judokas in both groups achieved significantly better results in the SJA compared with boys aged 12 to 15 years in the study of Lidor et al. (2006) (128.4 s for successful and 133.1 s for less successful judokas versus 173.5 s for the boys).

Although all the applied tests contain specific judo elements that are commonly used in judo training and/or combat, the SJA also includes basic training facilities (shuttle run, push-ups, sit-ups, and side-to-side jumps) that are not judo-specific. Therefore, this test could be characterized as a combined basic-specific test. This is probably the reason why statistically significant differences between the successful and less successful judokas were not obtained in this study.

## CONCLUSION

According to the results presented and discussed, the following conclusions can be made:

- The SJFT and the UFT discriminated the successful and less successful male judokas.
- The magnitude of the differences between the two groups were large when the performance in the SJFT and UFT is considered, and small when SJA is analyzed.
- Using different judo-specific tests can result in more accuracy on the physical and technical level of the evaluated athlete

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## ANALYSIS OF RATE FORCE DEVELOPMENT, POWER AND RESISTANCE EXPLOSIVE STRENGTH INDICATORS IN TOP ELITE vs. ELITE MALE JUDOKAS

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### ABSTRACT

This work aims: To identify physiological variables (eg. lactate and heart rate) and the variables that characterize the different forms of strength manifestation that distinguish judo athletes from different levels of experience. The study involved 63 male judokas, who were divided into two working groups: (1) Top Elite ( $n = 30$ , age  $23.50 \pm 3.24$  years) and (2) Elite ( $n = 33$ , age  $22.64 \pm 2.91$  years). All participants made six tests in the laboratory and one specific judo test.

**Key words:** judo, heart rate, lactate, maximum strength, explosive strength, power, rate force development, explosive resistance strength

### INTRODUCTION

Judo is a sport characterized by having many moments of high intensity over a bout that require a high neuromuscular performance. These repeated high intensity match after match cause major episodes of fatigue in the judoka, to be treated during the rest time between them. There is a gap in studies concerning the maintenance of intra-fighting strength and its relationship with other variables specifically required in a judo contest.

This work aims: To identify physiological variables (eg. lactate and heart rate) and the variables that characterize the different forms of strength manifestation that distinguish judo athletes from different levels of experience.

To this end, six specific objectives were defined: (1) Profile judokas, in relation to the indicators of the different forms of strength manifestation in upper and lower limb; (2) identify and analyze the variables that differentiate the male judokas performance levels; (3) analyze the balance of agonists vs. antagonists upper limb in each of the groups studied; (4) analyze the descent of different indicators of strength manifestation (speed, strength, power and rate force development) intra-fighting, as well as the behavior of judokas in physiological terms; (5) analyze the differences between the variables of strength, resulting from the execution of exercises Squat Jump (SJ) and Countermovement Jump (CMJ) in groups of referrals and finally (6) review most significant changes in the main variables that characterize an optimal biomechanical performance of Repeated jump.

### METHODS

The study involved 63 male judokas, who were divided into two working groups: (1) Top Elite ( $n = 30$ , age  $23.50 \pm 3.24$  years) and (2) Elite ( $n = 33$ , age  $22.64 \pm 2.91$  years). All participants making six tests in the laboratory: (1) Test Bench Press (BP) and Rowing (RP), with progressive loads up to 1RM, (2) test in Resistance Explosive Strength Bench Press with the burden of power until exhaustion, and (3) test of jumps, Squat Jump (SJ), Countermovement Jump (CMJ) and Repeated Jump 30'' ( $RJ_{30}$ ). Participants performed the field test, COPTTEST, (Garcia, 1996) test of five minutes long, consisting in the execution of 9x Komi Nage, 9x Uchi-Komi, 9x Juji-gatame and four repetitions of Bench Press, with the load where the athlete showed his full power, at every minute. The values  $p < .001$  on the

following variables were recorded: (1) strength; (2) power; (3) speed; (4) rate force development (RFD); (5) blood lactate and (6) heart rate.

A classification-discriminant analysis is performed using the CART Classification and Regression Trees algorithm [Breiman, Friedman, Olshen and Stone 1984] in order to differentiate between Top Elite and Elite classes of judokas. CART uses a binary recursive partitioning of the base data to build a tree from a dataset gathered in the root tree node. Each node is split into two 74 descending nodes using one of the predictor variables to establish the branching. The selection of the splitting variable searches for the decreasing of the within-nodes diversity (referred to the target classes) and for the increasing of between nodes diversity, each partition obtained producing a tree with less diversity than the immediately preceding tree. The predictions are assessed in each terminal node of the tree using the corresponding modal classes. The proposed approach differentiates the athletes and ranks their discriminant characteristics.

## RESULTS

In the BP and RP test it was possible to verify the existence of significant differences in almost all variables ( $p < .001$ ), particularly in the maximum load (1RM), in the load where the maximum power is manifested, in all parameters of strength, power, rate force development, and maximum speed ( $p < .01$ ). In the variable in BP, there was a real difference in amount of strength (N) that athletes perform up to 350 ms, where Top Elite judokas manifested significantly stronger than the Elite judokas ( $p < .001$ ).

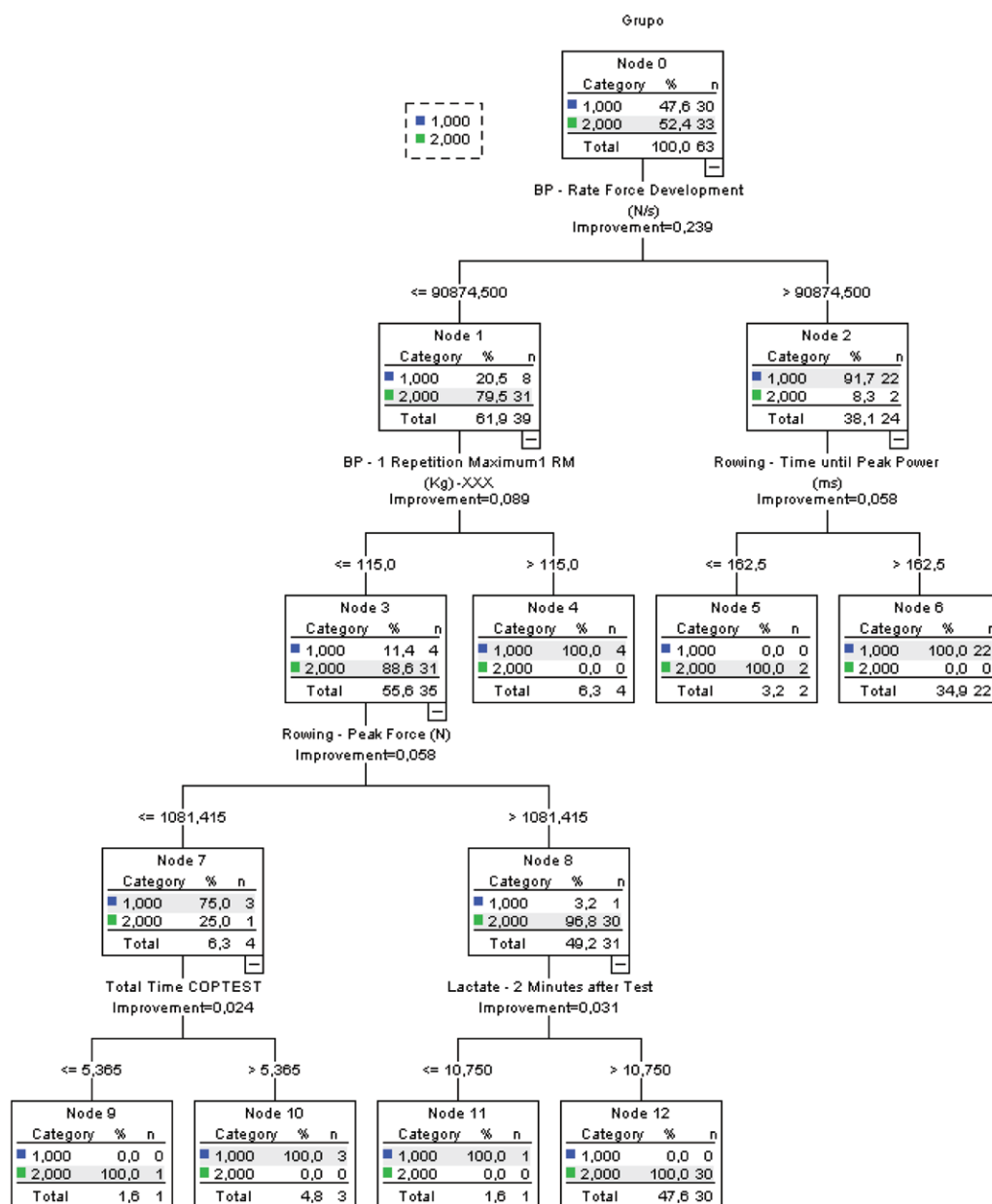
In the actions of pull / push the outcomes between Top Elite and Elite group in the different variables of the ratio RP / BP strength were significantly different: (1) at maximum load (1RM); (2) to the power load, (3) maximum strength, (4) in the average strength until peak power and (5) the average strength. There was also a greater muscle balance between agonists / antagonists in these actions in the Top Elite group.

In the Rate Force Development (RFD) variable at SJ exercise, Top Elite group showed significantly higher values than ( $p < .001$ ), Elite group.

In  $RJ_{30}$  test, statistically significant differences were observed between the group of Top Elite and Elite, regarding power, with a more pronounced decrease in the Elite group (15'', -143.90 W, 30'' -226.6 W). Relatively, the evolution of  $RJ_{30}$  jump height, magnitude differences show high and statistically significant between 3 phases. In fact, the results suggest that the effect of exercise on jump height and power depends on the group of athletes (Top Elite vs. Elite).

In COPTTEST significant differences were observed in the power ( $p < .001$ ), strength ( $p < .001$ ) and RFD ( $p < .001$ ): (1) the two groups of judokas, Top Elite athletes were more powerful, stronger and have more explosive strength of arms and (2) intra combat. Although, the effect of different forms of expression of the strength (eg, strength, speed, power and RFD) on fatigue is independent of performance group.

The factors affecting Top Elite and Elite men success at international level are different. The analysis performed with CART identified the following discriminant factors between Top Elite and Elite male judokas: The first discriminant variable is BP – Rate Force Development. Should the tree be pruned at this stage, BP – Rate Force Development would correctly classify as either Top Elite or Elite 30 out of 33 male athletes.



practice on improving power may be misplaced: strength qualities such as impulse, RFD or explosive strength may better predict athletic performance and hence it is the development of these qualities that research and strength training should focus on.

## CONCLUSION

We conclude that: (1) Top Elite judokas are able to achieve maximum explosive strength values, above 90000 N·s<sup>-1</sup> in the arms. (2) the differences between Top Elite athletes and Elite suggest that to compete at the top level are indispensable a series of conditional parameters, giving special attention to the strength, the power, the amount of strength to 350ms and the RFD, (3) the differences in the variables of maximum explosive strength and maximal strength, power and power load, suggest that these variables are a good argument when defining the Top Elite judokas; (4) maximizing the capacity of power development and RFD should be a key component of judo training programs.

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## THE TRANSITION TO NEWAZA IN A SAMPLE OF HIGH LEVEL JUDO COMPETITION

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### ABSTRACT

Despite the importance of the transition situation there are very few studies that examined the transition (Roux 1990; Weers 1996). To better understand this key moment in high-level judo fights we had analyzed the medal fights of Paris and Baku Gran Slam 2016 (n. 77 final matches). As trainers we have to increase the number and the various of training situations to improve judokas behaviors concerning transition situations to *ne-waza phases*, especially with transition situations starting Tori standing up, *uke* 4 supports or prone.

**Key words:** judo bout tactic, training improvement, transition

### INTRODUCTION

Transition in judo fight is the situation when, at least, one of the two fighters touch the ground (*tatami*) or with the central area of the body (trunk, hip) or the extremities (hand, elbow, knee) longer enough to go to fight in *ne-waza*.

For the International Judo Federation referee's rules, the contestants shall be able change from *tachi-waza* (standing fight) to *ne-waza* (ground fight) as far as it is done by one of the cases referred (IJF 2014):

- a) When a contestant, after obtaining some result by a throwing technique changes without interruption into *ne-waza* and takes the offensive.
- b) When one of the contestants falls to the ground, following the unsuccessful application of a throwing technique the other may take advantage of his opponent's position to take him/her to the ground.
- c) When one contestant obtains some considerable effect by applying a *Shime-waza* (choking techniques) or *Kansetsu-waza* (arm-locking techniques) in the standing position and then changes without interruption to *ne-waza*.
- d) When one contestant takes his/her opponent down into *ne-waza* by the particularly skillful application of a movement which does not qualify as a throwing technique.
- e) In any other case where one contestant falls down or is about to fall down, not covered by the preceding sub-sections of this article, the other contestant may take advantage of his/her opponent's unbalanced position to go into *ne-waza*.

However, if the technique used is not continuous, the Referee shall announce *Matte* and order both contestants to resume the fight from the standing position.

In the judo match an athlete can win in different ways. In standing fight he/she can win throwing the opponent by score, in ground fight choking, or locking, or holding down the opponent. Another way is when the other contestant receives penalty(ies). Coach has to teach and train the techniques more effective for the athlete style and needs, to try to achieve the victory during the fight in standing situation and in ground situation. Some

researches analyzed the technical actions performed by judoka in *tachi-waza* situation and in *ne-waza* situation to understand if there are any differences between the successful judoka and less successful judoka (Sterkowicz & Franchini 2000; Calmet et al. 2006; Franchini et al. 2008). In these studies are usually considered and analyzed only the classified technical actions as choking, arm-lock and holding.

There is always a series of events that lead to the execution of these techniques. Professor Kano recognized a progression of event in standing fight, unfortunately he died before analyzing deeply the ground situation (Weers 1996).

Because ground fight starts from standing fight, we think the control of the transition situation (the connection between the two situations) is an important key factor to lead to the success the fight in *ne-waza*. In general, we think that the effective training of the transition situation can reinforce the system of attack of the athlete significantly, because some studies showed that many opportunities during transition are lost by two fighters (Roux, 1990; Weers 1996).

Despite the importance of the transition situation there are very few studies that examined the transition (Roux 1990; Weers 1996).

To better understand this key moment in high-level judo fights we had analyzed the fights of two important competitions in the world trying to answer these main questions:

- How many times during the fight judoka have a transition opportunity?
- How many times they use transition to *ne-waza* fight?
- How many *ne-waza* sequences finish with a score?
- Are there any connection between who control the transition situation and who scores in *ne-waza*?
- Who more frequently dominate the transition to *ne-waza* from the standing situation: the attacker, the defender or the counter-attacker?
- Are there any differences between winner and loser in transition?
- Are there any differences between male and female in transition?

## METHODS

We analyzed the medal fights of Paris and Baku Gran Slam 2016 (n. 77 final matches).

**Table 1.**

Tot Fights		Weight Category (kg)															
		60	66	73	81	90	100	p100	Tot M	48	52	57	63	70	78	p78	Tot F
GSParis	40	3	3	3	3	3	3	3	21	3	3	3	3	2	3	2	19
GSBaku	37	3	3	3	3	3	3	2	20	2	3	3	2	3	2	2	17
Tot Fights	77	41								36							

- N. 156 athletes (77 Man, 79 women), age  $25.9 \pm 3.4$  (M  $24.9 \pm 3.3$ ; F  $26,6 \pm 3,4$ ) from 43 different nationalities.
- To understand this phase we have chosen some transition variables (Roux 1990; Gibert & Flamand 1993; Weers 1996; Sacripanti 2010; Pierantozzi et al. 2015) and we have analyzed these during each fight. The main criteria to collect data were our questions just above.
- Data seem consistent and comparable 41 combats for Men, 36 combats for Women

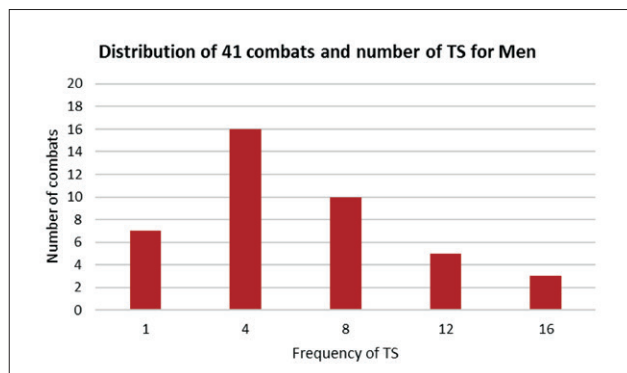


Figure 1.

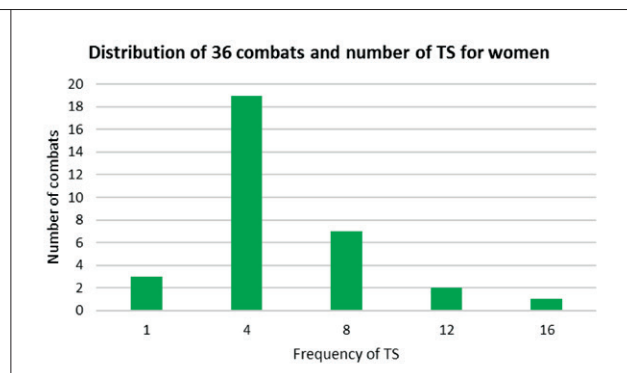
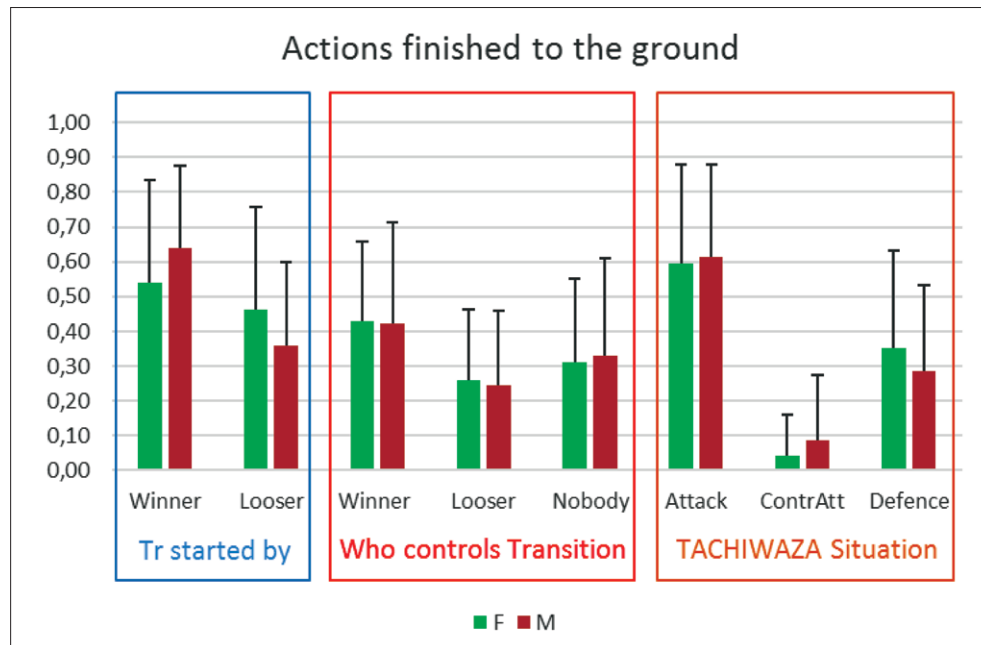


Figure 2.

## RESULTS

- We found 610 transition situations occurs during the 77 final matches: 7.9 transition situations per fight.
- Transition situations were started by:
  - Winner: 57%
  - Defeated athlete: 43%
- Transition situations were:
  - Controlled by winner: 35%
  - Controlled by defeated athlete: 27%
  - No one controlled transition situations: 39% (in fact „matte” occurred every time in this situation)
- *Ne-waza* fight WAS NOT continued after transition situations: 73%
  - Referee announced matte, no continuation in *ne-waza*: 29%
  - Tori dominant in the transition situation „walked away” uke: 23%
  - Immediate standing: 9%
  - Out of contest area: 7%
  - Maximum score reached (ippon or 2 wazari): 5%
  - End of time: 1%
- *Ne-waza* fight WAS continued after transition situations: 27%
  - 3% of this 27% finished by score (13 ippon, 1 wazari, 3 yuko:12 Osae komi, 3 Shime waza, 2 Kansetsu waza)
  - Scores in *ne-waza* were obtained by who controlled the transition. In the most of the case the transition was initiated by the winner (13 attack situations, three defenses, one other).
  - The most common position of Tori during transition to *ne-waza* was standing (41%) which was also the most effective to gain a *ne-waza* score (6 times). Other effective was the direct *ne-waza* techniques after *tachi-waza* (5 times).
  - The most common position of Uke during transition to *ne-waza* was 4 supports and prone (36% and 33%) and only few time, comparing the frequency that this situation occurred, Tori got the score.

Data let us see that Men and Women are playing the same judo.



## CONCLUSION

We have to moderate our conclusions because of the number of combats analyzed, and the level of these combats was „medals” combats in Gran Slam. Nevertheless, some results concern us:

- 8 transition situations per fight: one transition situation each 35s
  - 73% transition situations without continuation in *ne-waza*: in a combat 6 transition situations are not continued
  - 23% of opportunities to continue in *ne-waza* were not „grasped” by Tori: „Tori walked away”.
  - 3% of transition situations continued in *ne-waza* were scored.

To score in *ne-waza* seems difficult and judokas can think that *ne-waza* is not profitable. May be this is a consequence of the new rules not allowing to grasp the legs with the hands.

Judokas have to consider that 8 opportunities per combat to continue in *ne-waza* represent one opportunity each 35s during the combat. At that time, only two opportunities (transition situations) per combat lead a *ne-waza* phase.

As trainers we have to increase the number and the various of training situations to improve judokas behaviors concerning transition situations to *ne-waza phases*, especially with transition situations starting Tori standing up, *uke* 4 supports or prone.

We will continue this survey with new combats. Two axis seem important:

- Analyzing scores obtained in *ne-waza*
- Detailing learning situations to improve transition situations.

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## BALANCE DIFFERENCE BETWEEN JUDOKAS OF DIFFERENT QUALITY LEVEL

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### ABSTRACT

Correlation between static and dynamic balance and the situational efficiency in judo represents a very important research area. Also, the balance can be highlighted as one of the most important abilities for the effective execution of techniques in judo fight. The main objective of this study was to investigate whether there are differences in tests of balance with judoka of different qualitative level, and whether there are differences between the non-dominant and dominant foot in these tests. For this purpose 13 judoka (14-17 years old) have been tested. The balance was assessed with one simple test (carried out in two modes): maintaining balance on one leg with his hands behind his back with open and closed eyes. Results were collected by device „GYKO - MICROGATE”. Although not statistically significant, differences between groups of respondents identified a trend in which higher quality judoka achieved much better results when they perform more complex test (balance test with their eyes closed). One can conclude that the quality of judoka will come to the fore when the situation become more complex.

**Key words:** *static balance, dynamic balance, centre of gravity of the body, motor ability*

### INTRODUCTION

Balance play a fundamental role in many athletic activities as well as sport specific postural control and may contribute to an efficient performance (Hryssomalis , 2011). In the case of judo one can say that this part of the motor space is even more pronounced. The balance has a very big role in tachi waza and ne waza fight. The ability to maintain dynamic balance will enable more efficient performance of throwing techniques but also the combining the techniques of throws and defence against the opponent's attack. There are many factors that allow effective maintenance of balance during the technique execution and vision is one of them. Information acquired via vision is important for maintaining balance (Berthoz et al., 2001).

The aim of this paper is to examine whether there is a difference in the ability to maintain a balance between more and less quality judoka, in terms of the test with open and closed eyes. Also, as a partial goal of this paper, one will examine whether there is a difference in this ability between the dominant and non-dominant leg of judoka.

### METHODS

The sample of subjects consisted of 13 judoka between 14 and 17 years of age. All are members of one of Croatian judo club and have been practicing judo for at least three years. All respondents are active competitors and compete at the national level.

Assessment of balance was performed by using the device „GYKO MICROGATE” that registers changes in the movement of centre of gravity of the body (COG). All subjects performed a test in which they should, as steady as possible, stand on one leg with their hands behind their back. The test is performed on the left and on the right foot, and with opened and closed eyes. Results are represented in variables: EA - ellipse area (total area of movement of the COG); MD -mean distance (average distance of the COG from the initial position); AP MD – antero-posterior mean distance (mean anterior-posterior distance of COG from the starting position during

the duration of the tests); ML MD – medio-lateral mean distance (mean medio-lateral distance of COG from the starting position during the duration of the tests). L – represents left foot; D – represents right foot; Z – represents test performed with closed eyes.

The data were processed in the software package STATISTICA for Windows 12.0, using Student's t test for dependent samples and Multivariate analysis of variance (ANOVA).

## RESULTS AND DISCUSSION

**Table 1.** Balance differences between the left and right foot with right-handed subjects

	Mean	Std.Dv.	t	p
EA RAV L	245,990	149,999		
EA RAV D	223,581	149,568	0,5489	0,598076
EA RAV ZL	3191,504	4735,066		
EA RAV ZD	593,994	668,084	1,7221	0,123356
D MD RAV L	2,040	0,752		
D MD RAV D	2,110	0,698	-0,3138	0,761712
D MD RAV ZL	7,980	9,229		
D MD RAV ZD	3,506	1,449	1,5017	0,171565
ML MD RAV L	3,550	1,398		
ML MD RAV D	3,272	1,349	0,9326	0,378327
ML MD RAV ZL	11,59333	11,75391		
ML MD RAV ZD	7,00556	3,45401	1,354726	0,212520
AP MD RAV L	2,558	1,414		
AP MD RAV D	2,572	0,819	-0,0265	0,979529
AP MD RAV ZL	6,448	8,069		
AP MD RAV ZD	3,338	2,585	1,0971	0,304501

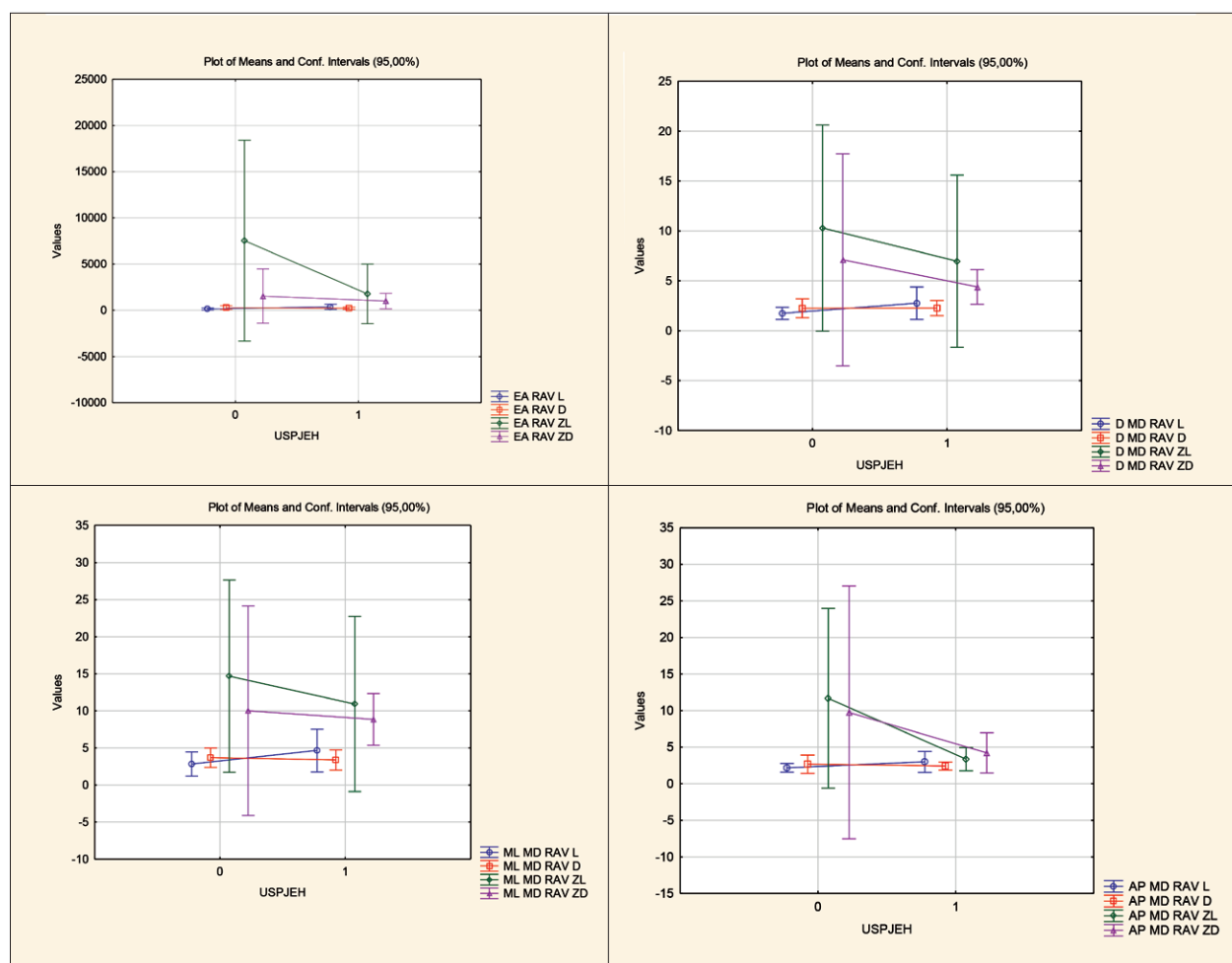
**Table 2.** Balance differences between the left and right foot with left-handed subjects

	Mean	Std.Dv.	t	p
EA RAV L	331,6675	448,2500		
EA RAV D	305,8325	200,0159	0,137358	0,899449
EA RAV ZL	9610,870	14550,27		
EA RAV ZD	3124,000	2260,26	0,907805	0,459804
D MD RAV L	2,850000	2,405203		
D MD RAV D	2,592500	1,094147	0,273804	0,802005
D MD RAV ZL	12,46667	11,38218		
D MD RAV ZD	11,59000	9,26306	0,481360	0,677781
ML MD RAV L	4,402500	4,587231		



ML MD RAV D	4,100000	1,211088	0,141018	0,896792
ML MD RAV ZL	19,05333	15,09363		
ML MD RAV ZD	16,32333	12,56838	0,627089	0,594644
AP MD RAV L	2,735000	0,803223		
AP MD RAV D	2,452500	1,132648	0,723710	0,521571
AP MD RAV ZL	11,09667	12,88582		
AP MD RAV ZD	16,09000	15,75723	-2,93539	0,099104

If the efficacy between the dominant and non-dominant legs is observed (Table 1 and Table 2) it can be concluded that there is no statistically significant difference in maintaining the balance regardless the supporting foot in any of the variables of balance tests. It can be concluded that the dominant leg is not significantly expressed/trained at judoka of this age category. Considering the characteristics of judo, in which the situation determines which leg should perform any action, it is important to have both legs equally effective. Moreover, these results represent one of the most important positive characteristics of judo sport - and that is that judo almost equally develops on both sides of the body.



**Graph 1.** Differences in variables performed by judokas of different quality level

Graph 1 shows the differences in the observed variables between the two groups that differ in their quality. For this purpose, the subjects were divided into two groups. First group was consisted of judoka of higher quality level (medallists from the national championship) and in second group judoka who has not win medals at the national championships. Although ANOVA indicates that there is no statistically significant difference between these two groups in the observed variables, graphical representation is indicating a very interesting trend. Although not statistically significant, better judoka achieved numerically much better results when the test is performed in the more complex conditions (closed eyes). When the subjects performed the test with open eyes, results in both groups were equal, but when they performed the test with eyes closed differences between groups of subjects become very visible (graph 1.). Similar results were obtained in the study Witkowski, Olivet, Remiarz, 2014, in which are not provided statistically significant differences in the simple static balance tests between trained judoka and untrained subjects. From these results one can conclude several things; First, if one wants to clearly distinguish the better from the worse judoka one should apply the tests of greater complexity. This information can be extremely useful in the selection of judoka. Also, one can conclude that better judoka have greater activation of their skills in complex combat situations in which is important to connect more elements to achieve a positive score. Better combination efficiency, which probably means a higher motor ability level, definitely predisposes to better results in the judo bout.

## CONCLUSION

Correlations between static and dynamic balance and the situational efficiency in judo represents a very important research area. The conclusions of this study may help to increase the efficiency of the training process. Although a small sample of subjects was fairly aggravating circumstance in this paper, the results still suggest an important link between the judoka quality level and the level of manifestation of their complex motor skills, and in this case balance.

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# SOMATOTYPING AND SUBCUTANEOUS ADIPOSE TISSUE PATTERNING USING THE NOVEL ULTRASOUND MEASUREMENT TECHNIQUE IN MALE AND FEMALE ELITE JUDOKAS

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## ABSTRACT

A novel and recently published ultrasound (US) method for measuring subcutaneous adipose tissue (SAT) has been used in judo athletes of different weight classes. Male: N=29, age [years]: 23.5 ( $\pm 5.87$ ); stature [m] 1.772 ( $\pm 0.077$ ), body mass [kg], 86.3 ( $\pm 19.79$ ),

BMI [ $\text{kg}/\text{m}^2$ ]: 27.2 ( $\pm 4.4$ ),  $MI_1$  [ $\text{kg}/\text{m}^2$ ] 27.2 ( $\pm 4.42$ ). Female: N=22, age [years]: 19.5 ( $\pm 4.21$ ) stature[m] 1.683 ( $\pm 0.055$ ), body mass [kg] 64.3 ( $\pm 7.52$ ), BMI [ $\text{kg}/\text{m}^2$ ] 22.7 ( $\pm 1.78$ ),  $MI_1$  [ $\text{kg}/\text{m}^2$ ] 22.5 ( $\pm 1.85$ ). Sums of SAT thicknesses from eight sites  $D_{\text{INCL}}$  [mm] in males: 36.09 ( $\pm 32.6$ ) (5.07, 127.03) and female: 70.62 ( $\pm 19.9$ ) (29.6, 118.98). This new measurement technique enables SAT patterning measurements in athletes in different weight classes and shows in several cases that skinfold methods for determining endomorphy in the somatochart can fail to detect body fat accurately.

**Key words:** somatotyping, subcutaneous adipose tissue, ultrasound measurement technique, somatotype rating

## INTRODUCTION

Body composition is an important factor for both, performance and health. The Ad Hoc Research Working Group on Body Composition, Health and Performance under the auspices of the IOC medical commission draws attention that weight class sports such as judo, might be risky for extreme dieting on rapid weight changes with related health consequences.[1] A variety of measurement methods is being used to assess body composition of athletes. The most common methods have recently been reviewed by Timothy R. Ackland, 2012.[2]

Skinfold measurement, the most commonly used body composition method [3] and somatotyping [4] is widely applied in sport anthropometry. Somatotyping means describing and appraising the status of the human body based on three-numeral ratings: „mesomorphy“, „endomorphy“ and „ectomorphy“.

Endomorphy characterises the relative degree of adiposity or fatness. Mesomorphy describes the relative musculoskeletal development of the individual.

Ectomorphy characterize the relative slenderness of human shape. It also describes relative linearity of the body or fragility of limbs. Detailed description what is meant by these somatotype components can be found in: Body composition in sport, exercise and health by Arthur D Steward: 2012.[4,5]

There are many methods in use to determine the degree of adiposity and body fat content, among them are several multi component models. Methods in use include: Dual Energy X-Ray Absorptiometry (DXA), Densitometry, Computer Tomography (MRI and CT) and commonly used field methods such as skinfold measurement and bioelectrical impedance analysis (BIA). Most recently a novel ultrasound (US) method for measuring subcutaneous adipose tissue has been established.[2,3,4,5,6]

This standardized US method for measuring subcutaneous adipose tissue is capable of detecting SAT thicknesses with high accuracy and reliability. This new method enables cross-sectional and longitudinal studies of SAT with

a sensitivity not reached before. It is important to apply the US technique in standardised way, when highly accurate and reliable results are desired.[6,7]

This US technique does not compress the tissue. A semi- automatic image evaluation procedure is used for multiple thickness measurements of SAT layers.

The purpose of this study is to determine somatotype profiles of elite female and male judokas and to evaluate the SAT thicknesses patterning using this US method. It has been shown that skinfold values and accurately measured thickness of SAT correlate poorly because skinfolds measure skin and fat in a compressed state.

## METHODS

### *Anthropometry and Somatotyping:*

Body height was measured with an anthropometer (GPM). Body weight was measured with a calibrated scale (Seca Model 799), skinfold thicknesses were measured with a Harpenden skinfold caliper (Baty international; spring pressure of 10g/mm<sup>2</sup> throughout its entire range). Skinfold thicknesses were measured at triceps brachii, subscapula, biceps brachii, iliac crest, supraspinale, abdominal, thigh and medial calf. Anthropometric metallic tape (CESCORF) was used to measure arm girth in flexed and tensed position and maximal calf girth. Width measurements were obtained with a sliding caliper (Campbell caliper 10- Rosscraft). Skinfold sites were marked with a water soluble eyebrows pen.

Data collection included body mass (m), body height (h), and sitting height (s). The body mass index (BMI in kgm<sup>-2</sup>) and the mass index  $MI_1 = 0.53m/(hs)$  in kgm<sup>-2</sup> were calculated. The mass index considers the sitting height (and thus also the individual's leg length). [8-10] Anthropometric data were collected by ISAK (International Society for the Advancement of Kinanthropometry) guidelines.[11]

The following measurements were used for calculating the somatotype ratings: Circumference of upper arm flexed and tensed and calf, breaths of biepicondylar humerus and biepicondylar femur, skinfold thicknesses at triceps, subscapular, supraspinale and medial calf.

The equations below were used for calculation of somatotype:[12]

$$\text{endomorph} = -0.7182 + 0.1451 (X) - 0.00068 (X^2) + 0.0000014 (X^3)$$

X= (sum of triceps, subscapular and supraspinale skinfold thicknesses) multiplied by (170.18/height in cm).

$$\text{mesomorph} = (0.858 \cdot \text{humerus breath} + 0.601 \cdot \text{femur breath} + 0.188 \cdot \text{corrected arm girth} + 0.161 \cdot \text{corrected calf girth}) - (0.131 \cdot \text{height}) + 4.5$$

**ectomorph** = calculated dependent on the height-weight ratio (HWR):

$$\text{If HWR} \geq 40.75: \quad \text{ectomorph} = 0.732 \cdot \text{HWR} - 28.58$$

$$\text{If } 40.75 < \text{HWR} < 38.25: \quad \text{ectomorph} = 0.463 \cdot \text{HWR} - 17.63$$

$$\text{HWR} \leq 38.25: \quad \text{ectomorph} = 0.1 \text{ (or recorded as } \frac{1}{2} \text{)}$$

### *US sites for measurement of SAT patterning:*

The conventional eight sites were marked in standing or sitting position, the US imaging process were done in lying position. The SAT recording were in supine, prone or in rotated position. The detailed description of correct SAT patterning were published by Wolfram Müller et al.: 2016.[6] The new method includes the following eight sites for SAT patterning: UA (upper abdomen), LA (lower abdomen), ES (erector spinae), DT (distal triceps), BR (brachioradialis), LT (lateral thigh), FT (front thigh) and MC (medial calf). The originally applied ISAK skinfold sites

are not applicable for US thickness patterning because at several sites US images are difficult to interpret and the marking procedure needs specific knowledge of ISAK and a complex anthropometry training.[6,13]

*B-mode ultrasound imaging of subcutaneous adipose tissue (SAT):*

For US determining a Phillips LX50 (linear probe L12-3) and a GE logiq-e (linear probes L8-18i-RS, operated at 9 to 18 MHz) were used. Diagnostic US systems conventionally use  $c=1540$  m/s for counting the distance from the surface of the probe to the boundary between two tissues. The speed of sound is lower in adipose tissue than in other body contents (1450m/s) and this sound speed was used in this study. The measurements were carried out according to the standards of International Society of Sciences in Medicine and Sports (IASMS). The standardised eight sites were used. [6,7]

*Semi-automatic thickness measurement:*

The SAT thicknesses were calculated using the FAT software ([www.rotosport.com](http://www.rotosport.com)) which is produced for multiple semi-automatic evaluations of SAT layers. The software enables the user to calculate US thicknesses included ( $d_{INCL}$ ) or excluded ( $d_{EXCL}$ ), and of embedded fibrous structures. In this study,  $d_{INCL}$  - values were used primarily ( $D_{INCL}$  = sum of eight sites).

*Participants and observers:*

The study includes 49 international and two national fighting female and male judo athletes from 11 countries. The anthropometric investigation was authorized by the Ethics Committee of the Medical University of Graz (20-295ex08/09). Written consents were obtained from the participants in advance of the examination. All measurements were carried out by the same observers on three days during an international training camp in Mittersill, Austria. Two observer are ISAK (International Society for the Advancement of Kinanthropometry) certified anthropometrist, and both of them had attended the two- day advanced level training course on ultrasound fat measurement (IASMS); they had measured more than 40 persons with this US method before. The third observer was a medical- technical assistant and supported the examination, while measuring.

## RESULTS

The following data were obtained from the athletes: male: age [years]: 23.5 ( $\pm 5.87$ ), stature [m]: 1.772 ( $\pm 0.077$ ), body mass [kg]: 86.3 ( $\pm 19.79$ ) in different weight classes, BMI [ $\text{kg}/\text{m}^2$ ]: 27.2 ( $\pm 4.4$ ),  $MI_1$  [ $\text{kg}/\text{m}^2$ ]: 27.2 ( $\pm 4.42$ ). Female: age [years]: 19.5 ( $\pm 4.21$ ) stature[m]: 1.683 ( $\pm 0.055$ ), body mass [kg]: 64.3 ( $\pm 7.52$ ), BMI [ $\text{kg}/\text{m}^2$ ]: 22.7 ( $\pm 1.78$ ),  $MI_1$  [ $\text{kg}/\text{m}^2$ ]: 22.5 ( $\pm 1.85$ ).

**Table 1.** Average values for body proportion in athletes (SD) (range)

variable	unit	male (n=29)	female (n=22)
Age	y	23.5 ( $\pm 5.87$ ) (15, 39)	19.5 ( $\pm 4.21$ ) (15, 32)
Stature [h]	m	1.772 ( $\pm 0.077$ ) (1.65 , 1.95)	1.683 ( $\pm 0.055$ ) (1.54, 1.78)
Body mass [m]	kg	86.3 ( $\pm 19.79$ ) (62.0, 133.2)	64.3 ( $\pm 7.52$ ) (50.8, 81.2)
Sitting height [s]	m	0.940 ( $\pm 0.04$ ) (0.87, 1.04)	0.898 ( $\pm 0.03$ ) (0.86, 0.95)
BMI	$\text{kg}/\text{m}^2$	27.2 ( $\pm 4.4$ ) (21.15, 39.47)	22.7 ( $\pm 1.78$ ) (20.49, 27.15)
Mass index 1 ( $MI_1$ )	$\text{kg}/\text{m}^2$	27.2 ( $\pm 4.42$ ) (21.23, 39.17)	22.5 ( $\pm 1.85$ ) (20.20, 26.32)

**Table 2.** Average values for US-SAT [mm] (SD) (range)

variable	unit	male (n=28)	female (n=22)
D <sub>INCL</sub>	mm	36.09 (±32.6) (5.07, 127.03)	70.62 (±19.9) (29.6, 118.98)
D <sub>EXCL</sub>	mm	30.96 (±32.0) (3.76, 119.28)	64.8 (±19.405) (24.67, 110.16)

**Table 3.** Somatotype-ratings (SD)(range)

variable		male (n=29)	female (n=22)
Endo		2,5 (±1.3) (1.32, 6.01)	3.1 (±0.81) (1.73, 5.13)
Meso		7,3 (±1.3) (4.9, 10.99)	4.8 (±0.77) (3.85, 6.66)
Ekto		1.4 (±1.25) (-1.87, 3.43)	2.6 (±0.74) (0.9, 3.65)

**Table 4.** Preliminary valuation of SAT sums for competitive athletes (adults)

D [mm]	Valuation	Comment
<b>Females:</b>		
below 25	extremely low	medical surveillance necessary
25 to 35	very low	medical surveillance recommended
35 to 50	low	desirable range
50 to 70		noticeable ballast weight
above 70		
<b>Males:</b>		
below 12	considerable ballast weight	medical surveillance necessary
12 to 20	extremely low	medical surveillance recommended
20 to 30	very low	desirable range
30 to 50	low	noticeable ballast weight
above 50		considerable ballast weight

**Table 5:** Somatotype-ratings; D<sub>INCL</sub> [mm] (Examples male: Endo rating >3.3)

ID	Endo/Meso/Ecto	D [mm]
A	5.19/10.99/-1.87	127.03
B	3.53/8.18/0.35	58.30
C	4.17/7.48/0.22	82.28
D	6.01/8.36/-0.19	108.91
E	3.76/9.05/-0.57	15.61
F	3.42/6.65/1.47	51.48
G	5.67/10.22/-1.23	111.47

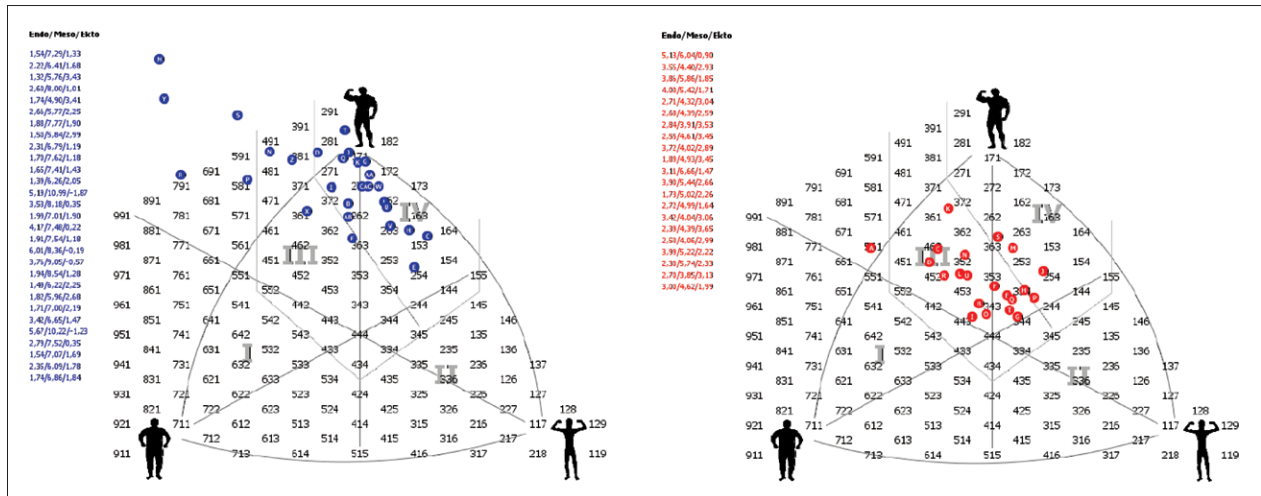


Figure 1. Somatochart group/male and female judokas

## CONCLUSION

The somatotype and dominate mesomorph ratings of judokas was similar to those observed in previous studies [17,18,19]. Some athletes showed higher ratings in the endomorphic component. However, in one athlete this degree of body fat content with skinfold was not observed using the US for SAT patterning. The results of several athletes would occur in a misinterpretation of body fat content, especially one athlete with an endomorph rating 3.76 (Sum of three skinfolds for endomorphic rating = 35.5 mm;  $D_{INCL} = 15.61$  mm- preliminary valuation of SAT SUMS reads: „very low“, medical surveillance recommended). The endomorphy ratings measured with a Harpenden caliper can fail to detect low body fat content accurately. Calipers measure a double-layer of compressed skin and SAT and therefore correlations with the uncompressed SAT thicknesses measured by the highly accurate standardised US method are poor [13]. It is suggested to use US whenever accurate and reliable fat patterning measurements are desired, particularly in sensitive weight class sport like judo.

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## TECHNICAL ANALYSIS OF CROATIAN NATIONAL CHAMPINSHIP FOR SENIORS

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### ABSTRACT

In order to be successful in judo bout it is necessary to achieve high fitness level and very high level of technical and tactical skills. It is important, therefore, that training is efficient in terms of technical and tactical preparation. Therefore, the main objective of this paper is to analyse technical and tactical elements of judo bout on Croatian national championship for seniors, in order to help coaches and athletes to prepare themselves better and raise their level of performance.

The paper analyses the 143 bouts in men and 30 in women part of competition. The bouts were part of the Croatian national championship for seniors in Rijeka in 2015.

Numerically higher number of bouts ended with positive point. A very important part of the bout are throwing techniques. Differences in throwing techniques usage were detected comparing men and women part of competition.

Judoka maintain a high level of activity throughout the fight using the techniques of throws in all directions. Furthermore there is a major difference in the use of throwing techniques between men and women. That may be a good indicator for trainers in which way to organize training process to meet very high technical and tactical requirements of the judo bouts.

**Key words:** *throwing technique, training process, technical efficiency*

### INTRODUCTION

Competitive judo, by changing of certain rules, has changed quite a few. New rules led to much higher activity of competitors in the bout (Boguszewski, Jagiello 2012) in order to prevent getting a penalty, as also to force opponents to obtain the same. The activity in the bout forces the competitors to use a higher number of attacking techniques to overcome an opponent. This causes that the judoka must be at extremely high technically and tactically level. This is why training must be designed to meet all the requirements and problems they may meet in the bout. In order to maximize the efficiency of the training process the main goal of this paper was to determine which techniques are most commonly and most successfully applied in bouts on Croatian national championship for seniors in Rijeka in 2015.

### METHODS

This paper analyses judo bouts at the senior judo championship in Croatia (143 in men and 30 in women's competition). Bouts were recorded by „care” system and analysed by judo experts with at least 20 years experience in judo competitions and minimal black belt 3rd DAN. The paper analyses the technical and tactical elements of judo bouts, differences between men and women part of competition, direction of attacks, frequency and efficiency of throwing techniques.

### RESULTS AND DISCUSSION

Considering the fact that the most of the bout takes place in the standing position and thus a larger number of attempted attacks in judo bout are throwing techniques, this paper will analyse only tachi waza part of the bout.

**Table 1.** The way of winning in the bout

	REGULAR TIME OF BOUT						GOLDEN SCORE	
	IPPON	OTHER SCORE (YUSEI GACHI)	HANSOKU GACHI	SOGO GACHI	KIKEN GACHI	FUSEN GACHI	SCORE	PENALTY
<b>WOMEN</b>	16	7	1	6	0	0	0	0
<b>MEN</b>	91	23	4	21	2	1	1	0

According to the results of the analysed bouts it is obvious that a significant majority of bouts end with the positive score and a very small number with penalties. It should be added that a large percentage of the bouts (63.6% in men and 53.3% in women) end with ippon before the expiration of regular time. This suggests that the activity of the bout is high and that judoka do not allow that the bouts go over to „golden score“. Small number of bouts ends by a penalty or disqualification from which one can conclude that the intensity during the whole bout retains at high level. This means that competitors, beside high technical-tactical preparedness, must have extremely high fitness level to meet the energy demands of the bout.

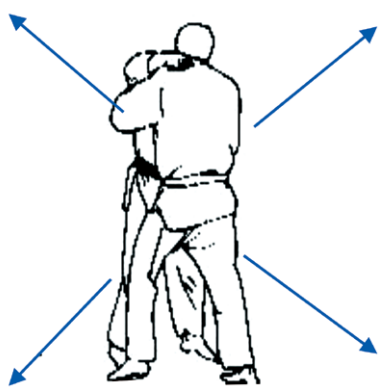
**Table 2.** Number of attacks and their efficiency

	DIRECT ATTACK	ATTACK WITH COMBINATION OF TECHNIQUES	EFFICIENCY
<b>MEN</b>	467	25	30.5%
<b>WOMEN</b>	101	18	19.7%

Significantly higher number of attacks in the standing position occurs from a direct attack and not from combination of attacks by performing two or more related techniques. The ratio is 18:1 in men and 5:1 in women competition. It can be concluded that there is a space for improvement of technical knowledge with a goal to use a combination of two or more throwing technique more frequent. The combination of techniques is one of the most important ways to unbalance the opponent and place him in correct tsukuri for scoring technique.

Men and women more commonly use throwing techniques when uke is moving forward right and forward left. One can see that women more often use techniques when uke moving backwards. Results indicate that a judoka has to be ready to respond to the opponent's attacks from the left and right guard with the same quality.

**Table 3.** Direction of attack (from the position of uke)

Backward right			Backward left	
Men	Women		Men	Women
9,3%	14,6%		10,8%	18,2%
Forward right			Forward left	
Men	Women		Men	Women
41,7%	41,6%		38,3%	25,5%

**Table 4.** Nage waza attempts

	TE WAZA	KOSHI WAZA	ASHI WAZA	SUTEMI WAZA	KAESHI WAZA	SPECIAL TECHNIQUES
<b>MEN</b>	<b>169</b>	<b>65</b>	<b>149</b>	<b>104</b>	<b>29</b>	<b>12</b>
<b>WOMEN</b>	<b>27</b>	<b>14</b>	<b>58</b>	<b>32</b>	<b>4</b>	<b>2</b>

One can notice the difference in the use of certain throwing techniques of throwing. Men most commonly use te waza and woman ashi waza. Judoka rarely have used kaeshi waza. On the contrary, it is necessary to develop and insist on the use of kaeshi waza because they proved to be very effective during situations in which the opponent turns his back to the competitor. This can be one of things where the coaches can improve the bout efficiency of their judoka, off course taking into account the equal applications of attacks from the right and left guard.

**Table5.** 10 most used and 10 most efficient throwing techniques in men's part of competition

	NATT	I	W	Y	Σ		NATT	I	W	Y	E
IPPON SEOI	93	8	4	12	117	SUKASHI UCHI MATA	0	0	3	2	100,0
UCHI MATA	45	7	5	1	58	KOSOTO GARI	0	1	1	2	100,0
SOTO MAKIKOMI	32	2	7	3	44	TANI OTOSHI	4	0	6	7	76,5
OUCHI GARI	19	3	4	2	28	URA NAGE	1	1	1	1	75,0
HARAI GOSHI	17	7	3	0	27	YOKO GURUMA	1	2	0	0	66,7
KOSHI GURUMA	17	4	3	2	26	SODE TSURIKOMI GOSHI	3	1	3	0	57,1
MOROTE SEOI	20	3	1	1	25	DE ASHI HARAI	7	3	3	1	50,0
TOMOE NAGE	22	1	0	0	23	OSOTO GARI	7	2	2	3	50,0
KOUCHI GARI	14	1	2	5	22	HARAI GOSHI	17	7	3	0	37,0
TAI OTOSHI	14	0	2	2	18	KOUCHI GARI	14	1	2	5	36,4

(NATT- NON SCORING ATTEMPT, I – IPPON, W – WAZA ARI, Y – YUKO, Σ – OWEALL, E - EFFICIENCY)

Most used techniques of throws in men's part of competition are ippon seoinage and uchimata. These two throws are also techniques with which judoka achieve most scores. But, if one talks about the most efficient throws it is clearly shown that the techniques with the best efficiency (ratio between number of attempts and scores achieved) are sutemi waza and ashi waza.

**Table6.** 10 most used and 10 most efficient throwing techniques in women's part of competition

TEHNIKA	NATT	I	W	Y	Σ	TEHNIKA	NATT	I	W	Y	E
OUCHI GARI	20	1	1	0	22	KOUCHI GARI	3	0	3	0	50,0
UCHI MATA	18	0	1	1	20	TAI OTOSHI	1	0	1	0	50,0
SOTO MAKIKOMI	15	2	1	1	19	ERI SEIINAGE	2	1	0	0	33,3
IPPON SEOI	13	3	1	1	18	MOROTE SEIINAGE	2	1	0	0	33,3
HARAI GOSHI	9	2	1	0	12	KOSHI GURUMA	2	0	1	0	33,3

SUMI GAESHI	7	0	1	0	8	KOSOTO GARI	2	0	1	0	33,3
KOUCHI GARI	3	0	3	0	6	IPPON SEOI	13	3	1	1	27,8
OSOTO GARI	4	0	0	1	5	HARAI GOSHI	9	2	1	0	25,0
TANI OTOSHI	3	1	0	0	4	TANI OTOSHI	3	1	0	0	25,0
ERI SEOINAGE	2	1	0	0	3	SOTO MAKIKOMI	15	2	1	1	21,1

(NATT- NON SCORING ATTEMPT, I – IPPON, W – WAZA ARI, Y – YUKO, Σ – OWERALL, E - EFFICIENCY)

Most used techniques of throws in men's part of competition are ouchi gari and uchi mata, while the techniques with which the most scores are achieved are ippon seoinage and sotomakikomi. If one talks about the most efficient throws, it is clearly shown that the techniques with the best efficiency are kouchi gari and tai otoshi.

## CONCLUSION

This paper has analysed technical features and differences between men and women judoka in judo bouts of the Croatian national championship for seniors 2015. Both, men and women, maintain a high level of intensity of fighting and apply a large number of different techniques in all directions attack. One can conclude that judokas can improve the attack efficiency by use of sutemi and ashi waza, especially as kaeshi waza. Coaches and their judoka should also remember that higher number of combinations and avoidance of the direct attack will also improve judo bout efficiency.

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## RELATION BETWEEN MOTORIC AND PSYCHOLOGICAL CHARACTERISTICS OF YOUNG JUDOKAS

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### ABSTRACT

This study examined the contribution of different motor and psychological variables in school achievement and psychological well-being in young judokas. Data were collected from 110 participants of the program „Judo in schools” from Zagreb and Rijeka. There were 79 boys and 31 girls with mean age of 12.82 years (SD 1.42). Two separate dimensions on motor skills for judo was obtained from several assessment of motoric skills. Psychological functioning was measured with self-assessment questionnaires for emotional competence, emotional intelligence, self-control, emotional and behavioral problems and general satisfaction as a measure of well-being.

According to the results better motor skills were related with emotional competence and higher school achievement. Self-control, younger age, lower BMI and better judo rank were statistical predictors of global satisfaction. The only significant predictor of internalizing and externalizing problems was self-control. The results confirm the role of motoric skills and self-control in school achievement and psychological well-being.

**Key words:** young judokas, emotional competence, self-control, general satisfaction, behavioral and emotional problems

### INTRODUCTION

During time, judo was profiled in a sport that contributes to the proper anthropological development of young people and also transmit positive values and patterns of behavior. The project „Judo in schools”, which is carried out in Croatia for several years, tries to contribute to the development of positive qualities and characteristics of our students and prevent risk behaviors.

As various studies found increased levels of sports participation had a positive relationship with aspects of emotional and behavioral well-being, particularly self-concepts (Donaldson and Ronan, 2006). Children with increased perceptions of sport-related competencies reported significantly fewer emotional and behavioral problems. Many researches connect judo with development of self – confidence and self-control (Reynes and Lóránt 2002; Imada and Matsumoto, 2004), and as an activity that gain positive experiences that contribute to the proper anthropological development of young people. According to results of Matsumoto and Konno (2005) participation in judo was positive correlated with life satisfaction.

The relation between martial arts and externalizing behavior in young athlete is still unclear. Results of meta-analysis show that type of martial arts moderated the relation with externalizing behavior (Gubbels et al., 2016). According to some studies development of motor skills in young judokas is related with decreasing of aggression (Lamarre and Nosanchuk, 1999).

The research of project „Judo in schools” until now has shown that the students who train judo for minimum two years, differ in behavior and motor-functional components from the students who recently started training (Takšić et al, 2015, Đonlić et al, 2015.)

One of the possible effect of participation in judo could be better self-control why in this study we were interested whether students with different level of participation in judo differ in self-control. As studies confirm the relation of self-control and adjustment, higher grades, better relationships and interpersonal skills, and more optimal emotional responses (Tangney et al., 2004), participation in judo and consequently better self-control may result with better adjustment. Accordingly, the goal of our study was to analyze the contribution of motor and psychological variables in school achievement, psychological well-being and emotional and behavioral problems with control of age and anthropometric characteristics of the respondents on new sample of young judokas.

## METHODS

### Participants

The study included 110 participants of the „Judo in schools” from Zagreb and Rijeka, 79 boys and 31 girls, with mean age of 12.82 years (SD 1.42). Students were ranked in regard to belt color considering years of coaching. Distribution of participant was presented in Table 1. Majority judokas in this sample had yellow-orange belt.

**Table 1.** Percent of children in regard to belt color

Belt colors	Years of coaching	% of children
White-Yellow	0-2	17.3
Yellow	2-3	16.4
Yellow-Orange	3-4	24.5
Orange	4-5	18.2
Orange-Green	5-6	12.7
Green	6-7	10.9

### The sample of variables

#### Motor variables

A sample of motoric variables in this study consists of several assessment of motoric skills: long jump from place (MOT1) - explosive power (Neljak et al., 2012 p. 74); endurance in the resistance front (MOT2) - static force (Metikoš et al., 1989 p. 85); raising the hull (MOT3) - repetitive strength (Neljak et al., 2012 p. 81); rolling ball by non-dominant hand (MOT4) - coordination (Neljak et al., 2012 p. 52); conveying run across (MOT5) - speed (Neljak et al., 2012 p. 62); bend in a narrow side –straddle hop (MOT6) – flexibility (Neljak et al., 2012 p. 66); standing on the toes of one foot (MOT7) - the equilibrium position (Metikoš et al., 1989 p. 32).

In order to accurately estimate the obtained data anthropometric variables (height, weight and body mass index, BMI) were also collected.

#### Psychological variables

Several questionnaires assessed emotional competence, emotional intelligence, self-control, emotional and behavioral problems and general satisfaction as a measure of well-being.

**The Questionnaire of emotional competence** ESCQ-45 (Takšić et al. 2010) consists of 45 items divided into three subscales – perceiving and understanding emotion (PU), expressing and labelling emotion (EL), and managing and regulating emotion (MR). The students on a five point scale assess how much each statement applies to them.



The **Test of emotional intelligence** (ATTEI, Božac, 2005) measures emotional intelligence according to Mayer-Salovey model of emotional intelligence. Students have to find solution to various everyday problems related to emotional functioning.

**The Brief Self-control scale** (Tangney et al., 2004) measures ability to control impulses, interrupting undesired behavioral tendencies and refrain from acting on them. In our study, we used a short version of the original scale with 10 items. Answers were on a 5-point scale, ranging from 1 (not at all like me) to 5 (very much like me). Higher result means lower control.

The **Youth Self-Report** (YSR; Achenbach, 2001) is used to assess factors related to the behavioral and emotional problems of youth. Participants evaluate their behavior and experiences on 112 items that constitute eight subscale and two syndrome scale: internalizing and externalizing behavior. The items were rated on a 3-point scale, ranging from 0 (does not apply to me at all) to 2 (often applies to me). Higher result means more behavioral and emotional problems.

For assessment of well-being satisfaction with peers, parents, school and sport success and life in general was measured. The answer were on the 5-point scale ranging from I'm not satisfied at all to I'm completely satisfied. Composite variable of general satisfaction have satisfactory reliability score (Alpha 0.80).

School achievement was compute as average grade from student's data on their grades in Croatian, Foreign language and Mathematics.

### Methods of data processing

For statistical analysis of data was used computer program SPSS 20 (Statistical Package for Social Sciences).

## RESULTS AND DISCUSSION

### Results of tests of motor skills of young judoka

Component factor analysis with oblique rotation established two separate factors that are correlated  $r = 0.25$ ,  $p < 0.05$ . A significant association was found between variables MOT1, MOT2, MOT3, MOT4 and MOT5. Other isolated factors are interrelated motor variables MOT6 and MOT7. The first factor involved separate explosive, static and repetitive strength, coordination and speed, while second extracted factor is related with the flexibility and the equilibrium position skills.

First factor (strength, coordination and speed) correlated with the test of emotional intelligence (0.32), while second factor related to flexibility and equilibrium was negatively correlated with the managing and regulating emotions (-0.21). It is interesting to notice that factor related to strength, coordination and speed was correlated with grades in foreign language (0.36), physical education (0.28), and with Croatian language (0.22). Second factor on motor skills was correlated with age and gender: older students and girls showed better results in flexibility and equilibrium position.

For the purpose of analyzing the differences between groups in regard to belt, two groups were formed: first (white-yellow, yellow, and yellow-orange) and second (orange, orange-green, and green). Besides differences in age (more years in coaching had older children), the only significant difference between these two groups is in secondary factor of motoric skills: judokas with higher rank in judo have better flexibility and equilibrium position ( $t = 2.961$ ,  $df = 1, 108$ ,  $p < 0.01$ ). According to results of our study participant in program „Judo in school” after longer coaching period progress in coordination and flexibility.

It was not achieved significant association of motoric variables with self-control. The average result in self-control of those who are in higher rank of judo was 26.13 (SD 7.02) and those who are still beginners was 24.75 (SD 7.06) but the difference in self-control between two groups is not statistically significant ( $t = 0.981$ ,  $df = (1, 108)$ ,  $p > 0.10$ ).

Our results show that young participants in program „Judo in school” were successful and satisfied students. Average general satisfaction was 4.29 (SD=0.66), while satisfaction with sports achievement was 4.30. Students participant in judo had good average grades (M= 4.34, SD= 0.78). The results on scale of externalizing and internalizing problems are in range of results obtained from other studies (Macuka, et al, 2012), with slightly lower results of externalizing problems in our participants.

We analyzed the contribution of motoric and psychological variables to several criteria variables: general satisfaction and satisfaction with sport achievement, internalizing and externalizing problems as well as total problems and school achievement. In Table 2 are correlations between all analyzed variables.

**Table 2.** Correlations between all variables

	Satisf. sport	YSR_ internal.	YSR_ extern.	mot_skills_1	mot_skills_2	ESCQ_PU	ESCQ_EL	ESCQ_MR
Belt color	,082	-,010	-,010	,057	,211*	-,022	-,125	-,094
Satisfaction_ sport	1	-,294**	-,215*	,148	-,005	,079	,109	,216*
YSR_internal.		1	,569**	,015	,149	,074	-,299**	-,267**
YSR_external.			1	,076	,040	,040	-,163	-,293**
mot_skills_1				1	,250**	-,037	,032	-,043
mot_skills_2					1	-,158	-,083	-,214*
ESCQ_PU						1	,484**	,488**
ESCQ_EL							1	,590**
ESCQ_MR								1

	ESCQ_45	ATTEI	Self-control <sup>a</sup>	YSR_total	General_ satisf.	Grades (language, mathem.)	Age
Belt color	-,096	-,055	,038	,006	,131	,085	,297**
Satisfaction_ sport	,160	-,038	-,245*	-,312**	,778**	,306**	-,260**
YSR_internal.	-,193*	-,182	,389**	,918**	-,562**	-,104	,084
YSR_external.	-,160	-,157	,602**	,805**	-,441**	-,098	,162
mot_skills_1	-,018	,284**	,025	,023	,057	,299**	,029
mot_skills_2	-,180	,004	,052	,118	-,038	,180	,190*
ESCQ_PU	,810**	,098	-,151	,066	,133	,261**	-,219*
ESCQ_EL	,843**	,229*	-,224*	-,262**	,266**	,108	-,139
ESCQ_MR	,821**	,241*	-,375**	-,295**	,388**	,002	-,084
ESCQ_45	1	,226*	-,299**	-,191	,313**	,160	-,183
ATTEI		1	-,222*	-,165	-,175	,114	-,096

Self-control <sup>a</sup>			1	,523**	-,445**	-,146	,150
YSR_total				1	-,607**	-,114	,135
General satisfaction					1	,374**	-,250*
Grades						1	-,223*

\*Correlation is significant at the 0.05 level (2-tailed); \*\*Correlation is significant at the 0.01 level (2-tailed)

<sup>a</sup> higher score- lower self-control

ESCQ- questionnaire of emotional competence ATTEI- test of emotional intelligence; mot\_skills\_1 - explosive, static and repetitive strength, coordination and speed; mot\_skills\_2- flexibility and the equilibrium position skills)

Hierarchical regression analysis was used, in first step demographic variable (gender, age, BMI) were controlled, in second step entered motoric variable (primary and secondary motoric skills and belt color) and in third step emotional competence and intelligence and self-control. The results of hierarchical regression analysis are in Table 3.

Taking into consideration **satisfaction with sport success** significant predictors was gender, age and body mass index (BMI). These predictors explained 29% of variance of satisfaction ( $F=4,271$ ,  $p<0,001$ ). Younger boys with lower BMI were more satisfied with sport success. Judo rank (belt color) was significant only in second step ( $\beta=.20$ ,  $p<0.05$ ).

Self-control, younger age, lower BMI and better judo rank were statistical predictors that explained 32% variance of **general satisfaction** ( $F= 4,741$ ,  $p<0,001$ ).

Significant predictors of **school achievement** were age and primary motor ability that explained 23% of variance of criteria ( $F= 3,013$ ,  $p<0,01$ ). This result, as well as correlations between motoric skills and grades in some school subjects, could be an example of integration of cognitive and motor skills. The contribution of motor aspects to school success in a main subject (without grade in physical education) could be interpreted as a connection between the motivation to learn and achieve greater results in all school activities.

Analyzed variables explained 31% variance of total score on YSR scale ( $F=4,54$ ,  $p<0,001$ ), 23% variance of internalized problems ( $F=3,057$ ,  $p<0,01$ ) and 37% variance of externalized problems ( $F=6,039$ ,  $p<0,001$ ). The only significant predictors for these three criteria was self-control. Low levels of self-control were associated with more emotional and behavioral problems among young participant in judo.

**Table 3.** Results of hierarchical regression analyses in predicting satisfaction (general and with sport success), general problem behavior, and school achievement (\*  $p<0.05$ ; \*\*  $p<0.01$ )

	CRITERIA	<i>Satisfaction with sport success</i>			<i>General satisfaction</i>			<i>YSR-total score</i>			<i>School achievement</i>		
		$\beta$	$\Delta R^2$	$R^2$	$\beta$	$\Delta R^2$	$R^2$	$\beta$	$\Delta R^2$	$R^2$	$\beta$	$\Delta R^2$	$R^2$
1 <sup>st</sup> step	Gender	-.24*		.16*	-.18		.15*	.17		.08*	.03		.09*
	Age	.32*			-.27*			.14			-.22*		
	BMI	-.20*			-.25*			.12			-.12		
2 <sup>nd</sup> step	Mot_skill_1	.13	.06	.22*	.07	.07*	.22*	.04	.01	.09	.26*	.10*	.19*
	Mot_skill_2	.13			.17			.00			.16		
	Belt color	.18			.20*			-.07			.05		
3 <sup>rd</sup> step	ESCQ_45	.11	.07*	.29*	.17	.10*	.32*	-.03	.22**	.31**	.15	.03	.23*
	ATTEI	.15			-.01			-.08			-.08		
	Self-control	-.22*			-.24*			.44**			-.02		

## CONCLUSION

Our results confirmed the role of self-control on internalizing and externalizing problems and general satisfaction as well as the relation of motor skills in judo with emotional competence and school achievement. Students with different level of participation in judo didn't differ in self-control, emotional intelligence, satisfaction, emotional and behavioral problems and school achievement. The only difference between participants with different rank in judo was in motor skills related to the flexibility and the equilibrium position skills while there was no differences in motor skills related to strength, coordination and speed. This results suggest that program „Judo in school” have to be more directed toward conditioning training program.

The present study provided some evidence to support the value of participation in judo for young adolescents. In drawing conclusions it is important to consider the limitation related to correlational study design why we cannot have any conclusion of causal relationships and we could not be sure what was the real determinant of the relatively good emotional adjustment and school achievement of participant in our study. In future studies we plan to compare young judokas and participants in other sports for analyze possible effect of judo. Besides this comparison, a longitudinal design and assessment of students before and during the engagement in judo would be the best way to find out the possible positive effects of program „Judo in schools”.

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## UNDER 73 KG CATEGORY ISOKINETIC QUADRICEPS AND HAMSTRING STRENGTH PROFILE OF YOUTH JUDOKAS

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### ABSTRACT

The aim of this study was to perform an isokinetic testing of youth judokas competing in the under 73 kg category. 5 Slovenian youth judokas were tested that are competing on national and international level with mean age of 14.7 ( $\pm 1.90$ ) years, weight of 66.3 ( $\pm 4.01$ ) kg and with mean height of 172.2 ( $\pm 4.46$ ) cm. All of the subjects were right hand dominant. Isokinetic testing was performed on iMOMENT, SMM isokinetic machine (SMM, Maribor, Slovenia). Aims of this study were: (1) to establish the concentric and eccentric strength profile of and hamstring (H) and concentric profile of quadriceps (Q) muscles in healthy male under 73 kg category youth judokas; (2) to evaluate the differences in concentric and eccentric peak torques, various strength ratios and bilateral leg strength asymmetries; and (3) to assess bilateral concentric and eccentric strength asymmetry of hamstrings and bilateral concentric strength asymmetry of quadriceps. Paired t-test was used to determine the difference between paired variables. The level of significance was set at  $p \leq 0.05$ . Paired t-test showed statistical differences in left and right peak eccentric hamstring torque  $t(4) = -8.77$ ,  $p = 0.001$  and in left and right dynamic control ratio-DCR  $t(4) = -3.85$ ,  $p = 0.018$ . Our results suggest that the high focus should be on the eccentric hamstring strength of the supporting leg to prevent possible injuries when attacked by e.g. uchi-mata and to lower the bilateral strength asymmetry which was in our case  $18.85 \pm 6.24$  % for the eccentric hamstring contraction,  $11.99 \pm 6.08$  % for hamstring concentric contraction and  $6.87 \pm 4.47$  % for quadriceps concentric contraction.

**Key words:** judo, isokinetic, strength, strength ratios, youth, bilateral asymmetry

### INTRODUCTION

Judo represents a high intensity, dynamic intermittent sport that requires complex skills and tactical excellence for success (Callister et al., 1991; Franchini et al., 2011; Ghrairi et al., 2014). Numerous studies in different sports demonstrated that an adequate level of muscle strength is required for an effective technical action (Lech et al., 2015). Therefore, the maximal muscular strength is of high importance in achieving the superior physical fitness and technical supremacy in a judo bout (Drid et al., 2010; Ghrairi et al., 2014). Maximal strength can be measured with many devices but one of the most reliable methods is the computerized isokinetic dynamometry (Ghrairi et al., 2014; Drid et al., 2010; Detanico et al., 2012; Andrade et al., 2012; Hadžić et al. 2010). Isokinetic diagnostic devices are used for evaluating the current condition of the locomotor apparatus so that the strength of certain muscle groups is tested). In testing the extremities, lower angular velocities are most often used for measuring maximum strength and higher angular velocities (with a higher number of repetitions) for determining the stamina (Drid et al., 2010). Aside from its high reproducibility (Kannus, 1994), isokinetic strength testing has several other important advantages including (1) quantification of muscle function in different contraction regimes and at different contraction velocities, (2) comparison of agonists and antagonists muscle function through various strength ratios, and (3) bilateral strength comparisons between the limbs (i.e., assessment of bilateral strength asymmetry) (Hadžić et al., 2010). The aims of this study were therefore (1) to establish the concentric and eccentric strength profile of hamstring (H) and concentric profile of quadriceps (Q) muscles in

healthy male under 73 kg category youth judokas; (2) to evaluate the differences in concentric and eccentric peak torques, various strength ratios and bilateral leg strength asymmetries; and (3) to assess bilateral concentric and eccentric strength asymmetry of hamstrings and bilateral concentric strength asymmetry of quadriceps.

## METHODS

In the study we tested 5 Slovenian youth judokas, that are competing in the under 73 kg weight category on national and international level with mean age of 14.7 ( $\pm 1.90$ ) years, mean weight of 66.3 ( $\pm 4.01$ ) kg and with mean height of 172.2 ( $\pm 4.46$ ) cm. All of the subjects were right hand dominant.

Testing was performed by the same experienced examiner in the Laboratory for isokinetic testing at the Faculty of Sport in Ljubljana, Slovenia. Laboratory was air-conditioned and room temperature was held between 22–24°C. Testing was performed between 10 AM and 4 PM over a period of one week. Each testing session started with a warm up consisting of cycling for 6 minutes at moderate pace (50 – 100 W), followed by a 15 second stretch of Q and H. All participants were given a detailed explanation about the testing procedure.

Testing was performed for quadriceps and hamstrings in concentric and also for hamstring in eccentric mode using iMoment, SMM isokinetic dynamometer (SMM, Maribor, Slovenia). This isokinetic dynamometer was already used in literature by Hadžić et.al., (2015). Judokas were tested in sitting position. Forward sliding on the seat was prevented with the use of proper 4 point belts that were pushing pelvis downward and back ward, but were not uncomfortable for the participants and were also controlling the trunk movement. The thigh of the tested leg was secured using a special additional belt. The subjects were instructed to hold the side handles of the chair during testing. The axis of rotation of knee joint was identified through the lateral femoral condyle and aligned with the motor axis. A range of motion of 60° was set from 90° to 30° knee flexion (full flexion considered 0). Testing was performed at 60°/s for both H and Q in concentric mode and in H eccentric contraction mode. Gravity error torque was recorded for every subject. Prior to testing each participant performed a series of 20 submaximal repetitions at a given velocity in a continuous passive mode (CPM). After the initial CPM set each participant performed 5 maximal contractions in the following order: (1) five consecutive concentric Q and H contractions followed by a 60 s pause, (2) five eccentric H contractions. When testing of one side was completed, a 3 minutes' break followed during which the machine setting was changed to accommodate for the opposite leg. The first tested leg was assigned randomly for each subject. There was no verbal coaching during testing repetitions.

Data were processed and presented using the SPSS for Windows 22.0 statistical package. The main outcome measure was peak torque (PT) which was later normalized for body weight (BW) and expressed as PT/BW as suggested by Jaric et al., (2005). Following strength ratios were also calculated: the concentric H/Q ratio (HQR), Hecc/Qconc ratio – the dynamic control ratio – DCR (Dvir et al., 1989), and Hecc/Hconc ratio (HEC). Finally, we calculated the relative strength difference between left and right leg for all testing conditions – a neuromuscular measure known in literature as the bilateral strength asymmetry (Barber et al., 1990) using the following formula:  $[1 - (PT \text{ left} / PT \text{ right})] \times 100$ . The bilateral strength asymmetry expressed in percentages was used regardless of which leg was stronger. For determination of differences in paired variables we used paired T-test and statistical significance was set at  $p \leq 0.05$ .

## RESULTS

**Table 1.** Mean ( $\pm$  SD) values for left and right quadriceps (Q) and hamstring (H) concentric and hamstring eccentric (PTHecc) peak torques (PT), peak torques per kg of weight (PT/BW) and strength ratios (HQR, DCR and HEC) at 60°/s with paired t-test.

	Group								
	LEFT side		RIGHT Side		95% CI				
Variables	Mean	SD	Mean	SD	Lower	Upper	df	t	p
PTQ (Nm)	261.41	42.22	252.30	38.07	-19.53	37.75	4	.883	.427
PTH (Nm)	136.97	10.38	142.29	21.84	-28.03	17.40	4	-.650	.551
PTHecc (Nm)	139.34	21.81	164.94	22.15	-33.70	-17.50	4	-8.771	.001
HQR	0.53	0.09	0.57	0.07	-0.15	0.08	4	-.816	.460
DCR	0.54	0.10	0.66	0.10	-0.21	-0.03	4	-3.853	.018
HEC	1.01	0.11	1.17	0.12	-0.37	0.06	4	-1.992	.117
PTQ/BW	3.56	0.41	3.44	0.37	-0.26	0.51	4	.893	.422
PTH/BW	1.88	0.14	1.94	0.22	-0.38	0.26	4	-.535	.621

$p \leq 0.05$ ; **LEGEND:** PT-peak torque, Q-quadriceps muscles, H-hamstring muscles, Hecc-hamstring eccentric mode data, HQR-hamstring/quadriceps ratio, DCR-dynamic control ratio, HEC-H eccentric contraction divided by H concentric contraction, PTQ/BW- peak quadriceps torque divided by body weight, PTH/BW (Nm/kg) - peak hamstring torque divided by body weight.

**Table 2.** Bilateral strength asymmetry (%) of quadriceps (Q) and hamstring (H) muscles in youth under 73kg judokas

VARIABLES	Mean (%)	SD
Q in concentric mode	6.87%	4.47
H in concentric mode	11.99%	6.08
H in eccentric mode	18.85%	6.24

Table 1 shows that youth judokas in category under 73kg statistically differ in left and right peak eccentric torque (PTHecc)  $t(4)=-8.77$ ,  $p = 0.001$  and in left and right dynamic control ratio-DCR  $t(4)=-3.85$ ,  $p = 0.018$ . Other variables did not statistically differ. From Table 2. We can see that the bilateral strength asymmetries in Q concentric mode were 6.87% in H concentric mode were 11.99% and in H eccentric mode were 18.85% between left and right leg.

## DISCUSSION

Our data shows that our youth judokas achieved PT values of  $261.41 \pm 42.22$  Nm on the left and  $252.3 \pm 38.07$  Nm on the right Q and  $136.97 \pm 10.38$  Nm on the left and  $142.29 \pm 21.84$  Nm on the right H. Compared to Drid et al., (2010) senior Serbian judokas achieved values of 270.87 Nm on the right Q and 270.47 Nm on the left Q, and the 109,2 Nm on the right H and 110,07 Nm on the left H, which shows a high maximum strength level of our youth judokas with average age of  $14.9 \pm 1.90$  years when compared to Serbian judokas with  $23.77 \pm 8.93$  years. High hamstring strength is important in youth judokas as according to Lech et al., (2015) maximum relative torques in knee flexors highly correlate with the judo activity index ( $r=0.76$ , respectively).



Relative maximal torques (Nm/kg) are in comparison to a study done by Lech et al., (2015) with extensors arithmetic means of the right and left joints  $3.44 \pm 0.59$  Nm/kg similar in comparison to our findings. Higher differences occur when we are comparing flexors data with  $1.77 \pm 0.58$  Nm/kg to our  $1.88 \pm 0.14$  Nm/kg on the left and  $1.94 \pm 0.22$  Nm/kg on the right side. Biggest differences in left to right leg ratios are shown in eccentric hamstring PT with statistically lower values on the left leg. Same statistical difference is also shown in the dynamic control ratio-DCR on the left leg which according to Dervišević and Hadžić, (2012) presents a larger possibility of accuracy of injuries in left hamstring muscle. This could be explained with all judokas being right hand dominant judokas which usually reflects in the judo bout to also be right stance dominant. In this position usually the right stance dominant judokas operate on the left leg as a supporting leg and the right leg is used as the "execution" or attacking leg. Therefore, the execution leg is getting much more concentric and eccentric work than the supporting leg which could lead to imbalances between muscle groups. Especially if the judokas training is mostly unilateral and they are performing their throwing techniques only to their dominant side (Šimenko, 2012). This circumstances almost always occur when youth judokas are training their Tokui waza – special technique. Standing leg hamstring is therefore in higher risk of being injured especially when judoka is attacked with the uchi-mata technique, which is one of the most used techniques and the standing leg hamstring gets stretched to the limits. In this position the eccentric hamstring power of the standing leg plays a vital role in preventing hamstring injuries. Unilateral training can lead to imbalances between muscle strength which increases the occurrence of injuries. According to Dervišević and Hadžić, (2012) bilateral asymmetries that exceed 15 % represents a higher possibility of occurrence of injuries. Our data in Table 2 show that youth judokas have small bilateral strength asymmetry in Q concentric contraction with  $6.87 \pm 4.47$  % asymmetry, which are well below the recommend 15 %. Also below the recommended 15 % of bilateral strength asymmetries are values for the concentric H contraction with  $11.99 \pm 6.08$  %. As we could assume from the lower DCR strength ratio the difference in H eccentric bilateral asymmetries exceed the recommended 15% of asymmetries with  $18.85 \pm 6.24$  %.

## CONCLUSION

This current study represents the isokinetic strength values of youth judokas in under 73 kg category. Based on this research, the importance of eccentric knee flexor strength in youth judokas is highlighted if we want to reduce the occurrence of injuries. Therefore, special attention should be put on the supporting leg and its eccentric hamstring training. Additionally, we would also recommend for future research to focus on the relationship between injuries and judokas' hamstring eccentric strength in different fighting stances. It is also important to execute the Tokui waza and the rest of techniques in all movement directions to ensure the adequate development of musculoskeletal system of youth judokas.

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## JUDO: A PEDAGOGICAL TOOL FOR STUDENTS WITH NON-VISIBLE DISABILITIES

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### ABSTRACT

Judo is not only a physical education, but can also be a tool to strengthen academic achievements for children and youth. Here we present a method where judo training is used as a mean to improve the school performance of students with so-called non-visible disabilities. Kano and the Norwegian school have the same learning goals, but use different pedagogic means to reach them. For students that face challenges in following traditional western classroom education, judo training founded on the basics of Kano's philosophy may help strengthening their academic skills. We present an analysis of judo principles and its implementation at a high school in eastern Norway. The subjects in the study have non-visible disabilities. These include different and complex diagnoses within ADHD, F 70 retardation (9-12 years category 1), the autism spectrum, and other mental or psychological-social challenges. Preliminary results show that students respond positively to judo training both with respect to social interactions and in theoretical subjects. Thus, by getting judo included in the school plan on a permanent basis, the moving of the educational arena from the classroom to the dojo may improve academic achievement for many students with learning difficulties.

This article is based on Birgitte Ursin's thesis *Judomåten* (The Judo Way) presented for her Bachelor Degree and its practical implementation with high school students.

**Key words:** *pedagogy, disability, alternative learning, judo in school, Kano's philosophy*

### INTRODUCTION

The school's mission is to teach children and youth to cope with life and challenges, and to be able to contribute to society in general. Research shows that students with so-called non-visible disabilities learn significantly less on academic arenas compared to other students. It is therefore of interest to examine how judo can be used to increase school performance in these children and youth. Non-visible disabilities in this study include different and complex diagnoses within ADHD, F 70 retardation (9-12 years category 1), the autism spectrum, and other mental or psychological-social challenges.

We hypothesized that by learning basic judo, children and youth will be able to develop skills that can have an effect on social interactions and academic achievements. Texts by Jigoro Kano in the biography *The Way of Judo* by John Stevens were chosen as background literature, where Kano describes key aspects of the educational philosophy of judo.

Kano believed education was important, which is reflected in the principles he prepared: You should not let anything affect your confidence and you must not forget that the spirit of education should be interpreted a broad sense. You should use the abilities you learned in school not only for the profession you trained for, but also use your talents and abilities in other aspects of your life.

Through Steven's interpretation, we see that Kano believed that schools focused too much on theoretical teaching, and too little on physical activity. With this in mind, the author of this paper developed a method for using judo as a tool for students in so-called risk groups, focusing on non-visible disabilities. Preliminary results show that students respond positively to judo training, improving academic achievement and ability of social interactions.

## METHODS

### Text analysis

The philosophy that underlies the practice and teaching of judo is central, thus, a qualitative text analysis of the biography of Kano by John Stevens was chosen. Stevens grew up in the western world, but has lived in Japan for thirty-four years and has a Ph.D. in Buddhism and aikido from the University Tohoku Fukushi in Sendai. Japanese and western culture are far from each other in terms of both language and culture, but Stevens' background enables him to make Kano's philosophy understandable to us.

The data chosen and emphasized are those Stevens has presented as direct quotes from Kano. I further emphasize points that Kano, through Stevens, presents regarding the purpose of training judo. The texts contain Kano's basic principles introduced to his students, principles that aim not just at training and competitions, but also for life in general.

### Judo training at school

The analysis of the biography of Kano was used as a foundation in the judo session. The students in this pilot program have different and complex diagnoses within ADHD, F 70 retardation (9-12 years category 1), the autism spectrum and various mental or psychosocial difficulties. They train judo at school three times a week, where the training is customized and adapted; meaning that the progressive learning has a much slower pace than „regular” trainings. The program is equivalent to a beginner course in judo for children under 9 years. The focus is on routines, dojo rules, Japanese expressions and structure. For the approach to competition and competition-like situations, newaza randori is used. Teachers were present at all time during judo training. The assistants participated on the tatami with the students.

### Analysis of Kano's philosophy-Basic principles

Kano focused on norms of social behavior. With these in mind, he developed basic principles of how his students should relate to school, the gymnasium, judo and life in general. Students who practice judo must aim to develop both the body and the mind so that they can contribute and become a resource for the community. Thus, the intention of judo is, according to Kano, educating and developing good citizens.

Self-regulation, or discipline, was a key element Kano's students had to be aware of, meaning that they should stop an activity when it came out of control. This principle is still valid today and applies to all activities on the tatami. Children with difficulties related to impulse control and hyperactivity often have challenges related to discipline. Judo may therefore be an alternative venue to develop awareness of knowing when an action is destructive, and when to stop potential harmful acts.

### *Seiryoku zenyo*; Development of self-control and social behavior

Kano underlines *Seiryoku Zenyo*; minimum effort and maximum effect. As we see described in the text, one of the main goals of judo is developing self-control and social skills. This is realized through *Seiryoku Zenyo*, but also related to *Jita Kyoei*, mutual welfare and benefit. Reaching self-control and discipline have effect in a positive feedback manner, and encourages the desire to continue to maintain positive behavior in daily life.

### To develop the holistic person

Judo consists of skills such as persistence, self-control, good manners and respect for others. The aim is to bring out the best in individuals, which enables us to live a satisfying and meaningful life. Furthermore, judo is linked to the concept of social competence: To cultivate the mastering of how to interact with others. This has clear parallels to western learning goals such as empathy, cooperation, independence, self-control and accountability.

### **Competition as a mean/method and not a goal**

Kano sees a competition as a learning process. You should acquire skills such as learning to win without gloating, and lose without letting the disappointment break you down. In this way, the competitions can become an arena where good social skills are exercised. When people experience mastering competition situations, the probability is high that they will use the same strategies when challenges arise in other situations.

### **To learn through adversity**

Kano taught his students that when challenges arise, no matter how hopeless the situation seems, they should not let this break them down. By using judo skills and values, the challenges will be manageable. He taught his students to see opportunities during a crisis, and to seek out positivity in every situation.

If we look at the perspective of Kano and focus on developing life skills, there are important parallels to draw; Prepare today's children and young people to build up persistence and make the best of the situation. Kano's philosophy is about transferring acquired judo skill to situations outside the tatami - life in general – to overcome challenges.

### **Practical implementation of the Kano philosophy in school**

The results show that students are making great progress in terms of breaking barriers. This is particularly evident when in physical contact with others, which is a big challenge for many individuals in this group. Judo training makes difficult situations harmless, and promotes cooperation with other, which results in experiencing mastery. Furthermore, judo exercises and expressions have shown to be useful when transferred to other classes.

Students find that they suddenly manage „spectacular“ exercises with ease. The teaching environment has been improved in general, and students who previously did not get along, now work together on assignments in other situations. Students dare more, participate more, both orally and written. By being challenged in the dojo to go outside their comfort zone, they are able to do the same in class. The assistants participating had no previous experience of judo. Most have worked with this group of students for many years, and are now overwhelmed by what happens due to judo practice. Teachers and supervisors rapport a change in the students, after judo was introduced to the student's schedule.

Further investigations are required to document the lasting effect of judo in school, but the preliminary results show that judo has an overall positive effect.

## **DISCUSSION**

Through practicing judo, students experience mastering exercises that previously were unachievable. The experience of control gives them confidence to actively influence the events they are exposed to in life. This is tremendously valuable for these students, who have previously had difficulties performing tasks, which to most people are manageable.

The pedagogy and customized education are used to create motivation and coping challenges for each individual student. When students experience obstacles at school, we see that there are differences in how they cope with this. Either they withdraw and/or show maladaptive behavior, or they are being able to stand in and look ahead.

We can see that Kano developed methods to how students should deal with adversity. This is implemented in judo as a tool to develop life skills so that one can cope with challenges, even though things look bleak. Kano's philosophy says; Lean on judo properties and values, and the challenges will be manageable.

In order to document the effect of judo as a functional pedagogical tool, we need to develop methods to measure both quantitative and qualitative results on short and long-term basis. Further studies are needed to investigate

the effect of judo in school. Documented effect of judo will be of importance for our main goal: That the Ministry of Education puts judo on the curriculum in Norwegian schools on a nation-wide basis.

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## AN ESTIMATION OF EFFORTS' INTENSITY DURING THE COMPETITION AND TRAINING IN FEMALE JUDO ON THE BASIS OF DETERMINING A CONCENTRATION OF LACTIC ACID IN BLOOD

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### ABSTRACT

#### Background:

One of the most topical problems of theory and practice of sport is a perfecting training process, its rationalization. Unification and objectification the process of getting information on the condition of athlete's training skills, become a necessity in modern sport. Sport practice enriches itself by the results of researches in various sciences all the time and only this information alongside with the experience promotes principally increasing efficiency of training process.

During the realization of training process the condition of athlete's organism changes. An estimation of these changes, which appear because of various factors (in particular because of fulfilled physical work), must be the basis for managing training process at the separate stages of various duration training (microcycle, mesocycle, macrocycle) and also during the separate trainings.

A check-up of the realization covers the all elements of burden, which the exercises (means) affecting the organism also belong to, which training units, organized into cycles, consist of.

But then a check-up of the effects is connected with research on the condition of organism, which determines motion effects and, in result, sport successes.

Considering that large quantity of various exercises and training facilities are used in judo, a development of more efficient set of means, which are used in this sport seems to be necessary. Such a development will allow to carry out a registration of the used training burdens, which will simultaneously inform on influence these burdens upon energy and coordination mechanisms.

Using the determination of lactic acid concentration in the blood in sport practice. Concentration of lactic acid was thoroughly researched especially in kinds of combat sports (wrestling, judo, boxing). These are such sports, in which the starting efforts cause a significant protoxide of muscles and blood (Callister and others, 1991; Han, 1996; Hubner-Wozniak and others 1999; Hubner-Wozniak and others, 1997; Lerczak and others, 1995; Little, 1991). Competitions in kinds of wrestling are connected with the most extremal conditions and cause most sharp reactions on the part of organism.

Efforts of judo athletes during the competitions have a character of repeated work (operation) with different statistic and dynamic efforts. An effort is characterized by alternating intensity and alternating participation of aerobic and anaerobic processes in energy supply for muscles' operation with acyclic course of motions and active wrestling of an opponent.

The purpose of present study is to define metabolic characteristic of female judo, on the basis of the results of lactic acid concentration's determination in blood after efforts.

### Methods:

The researches covered 30 polish female athletes, included in national combined judo team during 2010-2014. female athletes represented 7 weight categories. Average indicators of the ages, height and mass of the body of the researched females were correspondingly equal to  $19.8 \pm 2,6$  years,  $165,9 \pm 6,8$ cm and  $64,1 \pm 15,3$ kg. The all female athletes agreed to take part in the researches. The researches were held during 2010-2014 at the gatherings of national combined female judo team and at the national competitions. Intensity of efforts on the basis of lactic acid concentration in the blood of the female athletes after efforts was estimated at the researches held during competitions and training. The blood for the research was taken from ear-lap before and in 3 minutes after finishing the estimated physical effort. Concentration of lactic acid in blood was determined with the help of photometer and the ready set Dr Lange (Germany).

The researched training means were characterized by way of representing a method of fulfilling them and determining average duration of the operation. The received outcomes were represented in the form of mean values and standard deviation ( $x \pm SO$ ). A statistical analysis was held with the help of t-student test for dependant and independent variables and also by way of calculating correlation coefficient of straight line by Pearson. The level  $p < 0.05$  is taken as statistically substantial (significant).

### Results:

Concentration of lactic acid in blood after wrestling at a competition and after training wrestling of the female judo athletes was compared in the researches. Characteristic of training means are adduced below meaning a practical use of the data, represented in the table. Concentration of lactic acid in blood after wrestling at a competition and after training wrestling.

**Table 1.**

№	Kind of efforts	Concentration (LA) mml/1	
		$x \pm SD$	diapason
1	Polish Cup 2010	$12,4 \pm 3,3$	$6,8 \pm 16,9$
2	Polish Cup 2011	$10,3 \pm 2,4$	$6,2 \pm 16,4$
3	Polish Cup 2012	$8,9 \pm 2,2$	$2,8 \pm 13,3$
4	<b>Refereed randori</b>	$11,4 \pm 1,6$	$9,3 \pm 14,7$
5	Tachiwaza randori	$6,6 \pm 1,7^*$	$3,8 \pm 10,3$
6	Newaza randori	$2,8 \pm 0,8$	$1,9 \pm 3,9$
7	Tachiwaza randori <b>with partner changing (motodachi randori)</b>	$10,4 \pm 2,9$	$7,4 \pm 17,3$

\* statistically significant difference ( $p < 0,01$ ) in comparison with randori newaza

**Key words:** training load, lactic acid, performance, elite judo players



## RELATIONSHIPS BETWEEN SPECIAL JUDO FITNESS TEST (SJFT), FLEXIBILITY AND SOME VARIABLES OF LOWER-UPPER BODY ON YOUNG JUDOKAS

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### ABSTRACT

Judo is a balance control based sport as destabilizing opponent's stability. However, during the fight judokas spend a considerable amount of time grasping the judogi of the adversary by using the kumi-kata (Ache Dias et al, 2011). Grip strength takes extremely important place in judo training due to the fact that there are intense exercises and challenges associated with keeping the judogi (Karakoç, 2016). The purpose of the present study was to investigate the relationships between special judo fitness test (SJFT), flexibility and some variables of lower-upper body in judokas. 12 male judokas (Age:  $12,33 \pm 1,17$  years, height:  $147,16 \pm 9,17$  cm, body mass:  $41,28 \pm 9,01$  kg, body fat percentage:  $17,76 \pm 5,94\%$ , judo experience:  $3,5 \pm 0,52$  years) voluntarily participated in this study. In the study, isometric dynamometer was used for the determination of right pinch (RPS), left pinch (LPS), knee (KS), back (BS) and right grip (RGS) and left grip strength (LGS). BIA was used for determination of body fat percentage (BF), right leg muscle (RLM), left leg muscle (LLM), right arm muscle (RAM) and left arm muscle (LAM). Sit and reach test (SAR) was used for determination of flexibility. Judokas were submitted to the specific test (SJFT) proposed by Sterkowicz (Sterkowicz et al, 1999).

The test consists of three phases, A, B and C. According to the results of Multiple Linear Regression Analyses, A were significantly correlated with RPS, LPS, KS, BS, RGS, LGS, BF, RLM, LLM, RAM, LAM and SAR ( $R=0.84$ ,  $p=.005$ ). RPS, LPS, KS, BS, RGS, LGS, BF, RLM, LLM, RAM, LAM and SAR predicted %71,5 of the A. B were significantly correlated with RPS, LPS, KS, BS, RGS, LGS, BF, RLM, LLM, RAM, LAM and SAR ( $R=0.77$ ,  $p=.005$ ). RPS, LPS, KS, BS, RGS, LGS, BF, RLM, LLM, RAM, LAM and SAR predicted %60,6 of the B. C were significantly correlated with RPS, LPS, KS, BS, RGS, LGS, BF, RLM, LLM, RAM, LAM and SAR ( $R=0.85$ ,  $p=.005$ ). RPS, LPS, KS, BS, RGS, LGS, BF, RLM, LLM, RAM, LAM and SAR predicted %73,6 of the C. However, T (A+B+C) were significantly correlated with RPS, LPS, KS, BS, RGS, LGS, BF, RLM, LLM, RAM, LAM and SAR ( $R=0.84$ ,  $p=.005$ ). RPS, LPS, KS, BS, RGS, LGS, BF, RLM, LLM, RAM, LAM and SAR predicted %71 of the T. And also immediately heart rate after test (HR) were significantly correlated with RPS, LPS, KS, BS, RGS, LGS, BF, RLM, LLM, RAM, LAM and SAR ( $R=0.85$ ,  $p=.005$ ). RPS, LPS, KS, BS, RGS, LGS, BF, RLM, LLM, RAM, LAM and SAR predicted %73,6 of the HR. Heart rate 1 minute after test (HR1) were significantly correlated with RPS, LPS, KS, BS, RGS, LGS, BF, RLM, LLM, RAM, LAM and SAR ( $R=0.80$ ,  $p=.005$ ). RPS, LPS, KS, BS, RGS, LGS, BF, RLM, LLM, RAM, LAM and SAR predicted %64,1 of the HR1.

Index were significantly correlated with RPS, LPS, KS, BS, RGS, LGS, BF, RLM, LLM, RAM, LAM and SAR ( $R=0.86$ ,  $p=.005$ ). RPS, LPS, KS, BS, RGS, LGS, BF, RLM, LLM, RAM, LAM and SAR predicted %75,5 of the Index. As a conclusion, the findings of the present study indicated that RPS, LPS, KS, BS, RGS, LGS, BF, RLM, LLM, RAM, LAM and SAR play a determinant role in A, B, C, T, HR, Index and HR1. It is concluded that SJFT scores are related to motor skills in young male judokas.

**Key Words:** *special judo fitness test, flexibility, lower-upper body, judokas*

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