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## IMPLEMENTATION POTENTIAL OF REAL AIKIDO TECHNIQUES ON BALANCE IMPROVEMENT AMONG THE RECREATIONAL POPULATION

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**Abstract:** A research was conducted on a sample of 36 participants from the recreational population, beginners in real aikido, aged 30 ( $\pm$  5years). The research aimed at determining the effects of a tri-monthly training of real aikido. The three-month period is the optimal time during which balance changes could occur. The research subject involves programmed training process, in which the “polygon” methodical-organizational form has a primary role in balance improvement among adult beginners who train real aikido. A balance was estimated by means of a test taken over from the Eurofit test battery for adults, involving standing on one leg with one’s eyes closed. Statistical data analysis showed the existence of a statistically significant difference between posttest ( $2.53 \pm 0.81$ ) and pretest results ( $2.94 \pm 1.09$ ), which proved that the polygon factor has a clear impact on the participants’ balance, and that it is undoubtedly possible to make use of the applied experimental factor in balance development among the recreational population.

**Key words:** *recreational population, balance, real aikido, polygon*

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## INTRODUCTION

Previous research of balance deserves special attention in terms of implementation of real aikido elements on recreational population. A number of techniques in real aikido enable the technique performer to unbalance their opponent, at the same time maintaining their own balance.

There are three primary factors of balance.

- The static body balance represents the capacity to keep a stationary body in balanced position for as long as possible;
- The dynamic body balance is the capacity to stay as long as possible in selected positions and their changes in sets of movements which place a vertical projection of the center of mass outside surface support;
- Balancing objects is defined as the capacity to maintain certain objects in equilibrium for as long as possible.

Some research studies also indicate the following balance factors:

- The balance factor with visual control and
- The balance factor without visual control.

The most significant among numerous factors that influence balance are: the current state of the balance system and vestibular apparatus, other motor capacities, age, the height of the body's center of mass, the range and level of motor habits, support surface, training level, concentration, emotional state of mind, genetic code, etc. (Trunić, Milosavljević and Matavulj, 2011).

A great number of research studies were dedicated to the balance area, but no one until now has ever researched this area within the recreational population who train real aikido as it is a relatively young martial art. Regarding balance, the first studies mention two functional mechanisms linked to different physiological foundations of balancing.

Bass pointed to the potential existence of two functional structures whose engagement depends on whether the eyes are open or closed (Bass, 1939). Research conducted within balance tests battery encompassed 350 female students and it isolated the following factors: general locomotor factor, general kinesthetic sensitivity, general ampullary sensitivity, the functioning of two perpendicular semicircular canals, and the tension factor which ensures a neurological intensification of the kinesthetic mechanisms. Somewhat later, research established the existence of static balance – determined by tasks in which static effort should be made to maintain the given position, and dynamic balance – determined by tasks in which the balance-obstructing force is overcome during movement. Dynamic balance is tightly linked to the action of external force which is in most cases identified as the force of gravitation, so in this sense, there seems to be no big difference between the static and dynamic balance in terms of force actions (Paspalj, 2008).

Fleishman and Hempel (1955) described the identical classification of balance factors, while Ismail and Gruber (1967) in addition isolated the general balance factor (Paspalj, 2008). A particularly interesting research was conducted by Tkalčić i Hošek (1973) who used eleven balance tests to determine the connection between balance and the engagement of a visual analyzer (Paspalj, 2008).

The relation between these research studies and the topic of this paper lies in the significance of the defined balance factors, as well as the information that there is no major difference between static and dynamic balance in terms of force actions. In relation to this paper, special attention should be dedicated to the last mentioned research which determines the relation between balance and engagement of visual analyzer, which is rather noticeable among recreational population when they perform real aikido techniques for opponent destabilization, above all in terms of balance.

Real aikido is a relatively young martial art founded by Ljubomir Vračarević. It is an authentic martial art derived from traditional aikido. The basic setting of real aikido implies an efficient overpowering of an attacker. It is a defensive, extremely flexible system of defense techniques, whose basic characteristics include: “fitting into” the opponent’s attack, the continuity of technique performance and the complete final control over the attacker. It needs to be underlined that, in real aikido, coherence and high degree of balance, speed, strength, stamina and flexibility make a very positive impact on the quality of application of real aikido techniques, i.e. its efficiency (Milosavljević and Vračarević, 2011).

Real aikido has found its place in the special training process of military and police members, bodyguards, as well as recreational population, regardless of their age. This martial art has found a great application among the recreational population and a significant number of recreational aikidists who suffer from weight issues use this type of recreation to fight against the problem. A combination of physical activity and diet is the simplest and safest way to reduce body weight. Apart from the simplicity and efficiency, this combination is also the healthiest way to lose weight. If body weight is reduced by means of physical activity, muscle mass will most certainly be preserved, which means that the change of body weight had occurred at the expense of adipose tissue (Milosavljević, 2008).

The subject of this research paper is a programmed training process in which the methodical-organizational form “polygon” holds a primary role in the improvement of two out of three balance factors among adult beginners who train real aikido.

The goal of this research is to determine the effects of trimonthly training of real aikido. The three-month period represents the optimal time during which balance changes could occur.

## **METHOD**

The experimental factor of this research is a specially programmed training process which puts a particular stress on the methodical-organizational form “polygon”, and uses it to give participants certain tasks during training.

### **Sample of participants**

The sample of participants in this research comes from the population of real aikidoists and involves males aged 30 ( $\pm$  5 years), who train three times a week. Apart from that, the participants do not belong to a single club, but various clubs, and come from different towns. Apart from their age and gender, one of the criteria during the selection of participants was how long they have been training real aikido. In that sense, it was decided that the participants should come from recreational population who have not been training real aikido for more than 30 days. So, it is an intentional sample. “We form an intentional sample using units of a set that we select according to our personal estimate as typical or representative of the given basic set” (Žižić et al. 1993, p. 142). At the beginning, a total of 45 male participants were tested, but due to the sample fluctuation, the plan for the final testing was to cover a sample of no less than 35 participants. All of the participants were in good health, had no injuries during testing and attended the training regularly.

### **Observed variable**

Balance, as the capacity to maintain body in a balanced condition, represents a variable which should be improved after trimonthly regular training of real aikido.

### **Testing procedure**

Having in mind that this paper estimates balance based on recreational population, we opted for the test that includes standing on one leg with one's eyes closed. The test was taken over from the Eurofit test battery for adults, which is often used in recreational population balance tests in more recent research studies. The standing on one leg with one's eyes closed test follows this procedure: the subject stands in one place on the bare foot of his/her preferred leg. He/she lifts the second leg laterally from the ground, finds his/her balance and shuts his/her eyes. Upper extremities are lifted. The subject's task is to keep the balance in this position for as long as possible (max. 30 sec). The mistakes the subject makes during the 30 seconds are counted, so

whenever they make a mistake, the timekeeper stops the timer, and starts timing again only when the subject reestablishes balance with his/her eyes closed.

The collected data was processed by means of the application program Statistica for Windows 8.0, and a Student's T-test was used to determine statistically significant differences of the pretest and posttest results.

### **Polygon**

Polygon is designed in a way that allows motor tasks characteristic of real aikido to be combined with exercises that can make a positive effect on the participants' balance. Most motor tasks comprised in polygon form are part of the activities included in most real aikido trainings. Several quite similarly structured polygons were used for balance impact, and the dominant tasks in them are almost identical. The basic difference among polygons was the order of the tasks that comprise a polygon, not their essential difference in terms of the type of motor task, the number of exercises, etc. Therefore, if we take into account such a great extent of their accordance, it can be concluded that identical results could be gained by implementing just one polygon.

### **Example of a polygon:**

Start from a lying position on the stomach, facing the opposite direction from movement.

1. Fall forth on the mat.
2. Cross a low beam by walking ahead. Make a 360-degree turn in the middle of the beam, after which the you can maintains balance on the left leg (the right one is in the air) for as long as possible, until losing balance. Then, a jump down follows.
3. Climb Swedish ladders to the final ladder on top, moving to the adjacent Swedish ladders, then step down without jumping, after which balance should be maintained on the right leg (with the left one in the air) for as long as possible, until losing balance.
4. Perform a movement technique characteristic of real aikido, titled "step-turn-small turn", after which balance is maintained on the left leg (while the right one is in the air) with eyes closed for as long as possible, until losing balance.
5. Fall backwards on the mat, after which you can get up and maintain balance on the right leg (with the left one in the air), with eyes closed for as long as possible, until losing balance.

## RESULTS

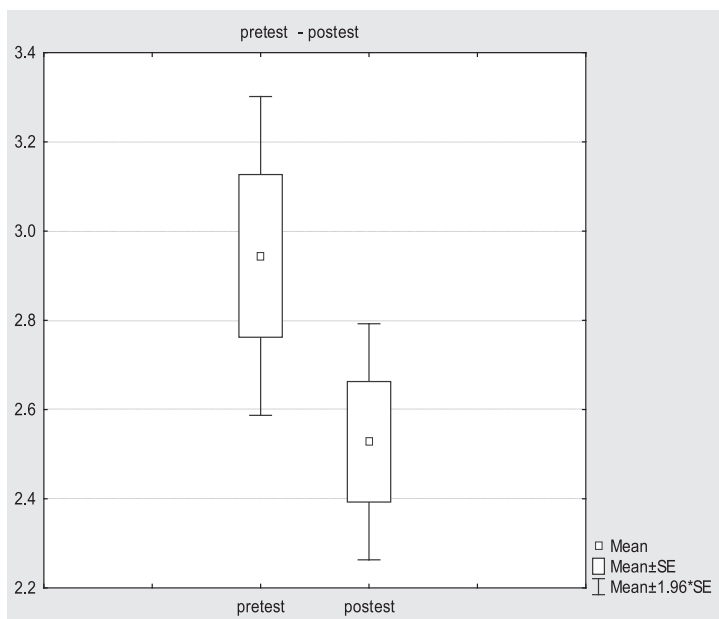
Statistical processing was based on the data obtained from testing 36 participants who took part in the research during pretest and posttest. The statistical analysis of the data showed a statistically significant difference ( $p < 0.05$ ) of the pretest and posttest results, as indicated in the Table 1. results. Namely, better results were obtained in posttest (the smaller value is a better result), which indicates that the effects of the experimental factor were significant.

Table 1. *Pretest and posttest results for the balance variable*

T-test for Dependent Samples Marked differences are significant at $p < .05000$	Age	Balance (the no. Of attempts in 30 sec)	Min	Max	T value	P value
Participants before (n=36)	30±5	2.94 ± 1.09	1	5	$t=2.97$	$p=0.005^*$
Participants after (n=36)	30±5	2.53 ± 0.81	1	4		

\* statistically significant difference

Graph 1: *The value of average and standard deviation for the balance variable, obtained during pretest and posttest*



The Graph 1. shows the average values and standard deviation for the observed variable. The research results showed a clear impact of the experimental factor of the “polygon” which leads to the conclusion that the real aikido training where such a polygon is used for three months makes a statistically significant impact on the participants’ balance.

## **DISCUSSION**

Until now, this topic was not the subject of a research. As the research results show, there is a statistically significant difference between the results of posttest ( $2.53 \pm 0.81$ ) and pretest ( $2.94 \pm 1.09$ ), which proves that the polygon factor has a clear impact on the participants’ balance. Research has shown that the applied experimental factor could certainly be implemented in the development of balance among the recreational population training real aikido.

The obtained results arguably prove that the implementation of the polygon in the main part of the training, for three months and three times a week, had a positive impact on the tested population’s balance. The stated positive changes can be explained as the product of a constant programmed influence on two out of three possible balance factors: static body balance and dynamic body balance. The third balance factor, balancing objects, is not relevant in real aikido, so the polygon did not include exercises that would affect it. Balance was improved through movement exercises with open eyes, such as the complex movement technique “step-turn-small turn”, as well as through exercises that included balance maintenance standing on one leg with eyes open.

Balance was positively affected by the exercise with closed eyes, in which participants were supposed to maintain balance while standing on one leg. Movement exercises with eyes closed were not included in the polygon motor tasks for security reasons, having in mind that the participants are beginners who are not skillful enough in performing polygon tasks, which could lead to their potential injuries.

## **CONCLUSION**

The subject of research in this work is a programmed training process in which the methodical-organizational form “polygon” plays a crucial role in the improvement of balance among adult beginners who train real aikido. The research aimed at determining the effects of a trimonthly training of real aikido, and the three-month period represents the optimal time for balance changes to occur.

The results obtained after the specially programmed training process which used the “polygon” – a methodical-organizational form that comprises

motor tasks characteristic for real aikido in combination with balance improving exercises as a method of assessment, undoubtedly show that the implementation of a thus designed polygon in the main part of the training during a three-month period and three times a week, made a positive impact on the tested population's balance.

The stated positive changes could be explained as a product of a constant programmed influence on two out of three possible balance factors: static body balance and dynamic body balance. Since balancing objects is not relevant in real aikido, the polygon did not include exercises that would improve this factor among the tested population. Balance was improved through movement exercises with open eyes, such as the complex movement technique "step-turn-small turn", as well as through exercises that included balance maintenance while standing on one leg with eyes open.

There is no doubt about the positive impact on balance realized through the exercise with eyes closed, which also involved balance maintenance while standing on one leg.

In the future, papers that cover this question could direct their research toward proving which balance factor is more affected by a regular attendance of real aikido training: the visual control factor, or the balance factor without visual control.

Further research should also focus on studying the impact of visual analyzers on the balance space, as well as the selective influence and the dynamics of balance development among the young and people of different genders.



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