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**Research article**

# THE PROGRESS ACHIEVED BY JUDOKAS AFTER STRENGTH TRAINING WITH A JUDO-SPECIFIC MACHINE

**Laurent Blais ✉ and Francis Trilles**

Université de Poitiers, Équipe mécanique du geste sportif, Laboratoire de Mécanique des Solides, Nice, France

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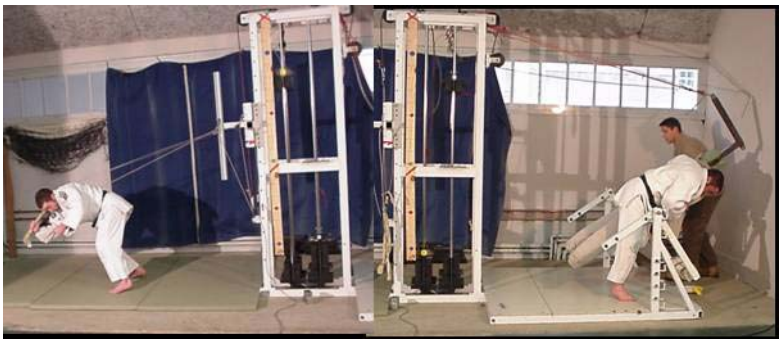
**ABSTRACT**
For judo players, as in many sports activities, strength development has become an important element of performance. However, this should not be done separately from the development of technique. Specific strength training is thus used for the controlled strengthening of specific muscles or muscle groups, corresponding to the movement in a competitive situation. In line with this, the use of a judo specific apparatus is proposed. The aim of this study is to analyze the progress of a group of judokas after a training program with the apparatus. The results have shown that, using the apparatus, the heaviest weight achieved using the throwing technique is greater. In addition, the judokas' technique improves as a consequence of this training program. This judo specific apparatus could therefore be used to complement traditional judo training.

**KEY WORDS**: Strength training, machine specific to judo progress.

## INTRODUCTION

For the judo participants, as in many sport activities, strength development has become an important element. Lack of strength delays the correct execution of the various judo throwing techniques, accelerates the onset of tiredness, and harms the precision of the movement (Manno, 1992). Another author adds that the strength level immediately influences the effectiveness of the training process (Weineck, 1983). Because judo is characterized by the control of complex motor skills, strength development should not be addressed separately from the development of technique. Strength training can be divided into general and specific strength training. The former is used in the comprehensive strengthening of many muscle groups in leisure sport, in performance sport and in rehabilitation. The strength exercises involved usually employ dumbbells, barbells, strength apparatus (leg press machines, isokinetic apparatus, hand grips and pulleys), sand bags, inclined boards and benches, weighted shoes, etc. Several authors have shown the importance of specific strength training during the overall process of training and suggested that general strength training should not be the only one used (Egger, 1992; Matveiev, 1983; Platonov, 1988). Specific strength training is usually used for the controlled strengthening of specific muscles or muscle groups. To improve sporting performance this type of training is undertaken in such a way that the amplitude and direction of a movement, the dynamics of the strength release and the contraction of the muscles correspond to the movement in a competitive situation. These specific exercises have to correspond to the competitive movement, both in relation to structure and time sequence, and may be executed through overload



**a -** *Morote Seoï Nage* **b -** *O Soto Gari*

**Figure 1.** The machine specific to judo.

(e.g. rowing against mechanical resistance). To respect these important elements, a judo-specific apparatus can be envisaged. In previous studies we have validated a specific machine for judoka strength training (Blais, 2004). This apparatus makes it possible to execute a judo throwing technique while pulling weights (see Figure 1). We showed the kinematic correspondences for the judo throwing techniques *Morote Seoï Nage* and *Osoto Gari*, utilizing this apparatus and performing with a human partner. This investigation aimed to complete the validation, analyzing the progress of judokas training with this apparatus. Accordingly, the following were measured :

- the maximum weight able to be mobilized before and after the training program,
- the quality of the judo throwing techniques, *Morote Seoï Nage* and *Osoto Gari*, before and after the training program.

It was supposed that the training program with the judo specific machine could improve the maximum weight able to be mobilized, at the same time improving technique.

## METHODS

### *Approach to the problem*

To develop judo specific strength, some authors have proposed alternating general strength training exercises with technical sequences (Bouchet and Cometti, 1996). Some trainers of the French judo team were also interested in the development of specific strength and proposed a training program involving sprint and technical skills. These exercises were interesting, but did not correspond to specific strength training. To do so, these exercises must correspond to the production of the movement in a competitive context. Thus, it is necessary to use a judo-specific machine to develop judo-specific strength. Consequently, the subjects were judokas who practiced with this apparatus over a ten-week period. The study entailed a quantitative validation (maximum weight moved) and a qualitative validation (judo throwing technique evaluation).

### *Subjects*

20 male subjects were randomly assigned to one of the two groups. The experimental condition consisted of 10 subjects (22 ± 3.6 years old); the other 10 were the controls were (23 ± 2.4 years old). They were all studying to become judo teachers and their skill level, according to the Japanese grading system, was at least second dan black belt.

Anthropometric data of the two athletes' groups:

Tested group: stature (1.73 ± 0.07 m) and mass (69 ± 6.3 kg).

Control group: stature (1.75 ± 0.05 m) and mass (72 ± 4.8 kg).

The subjects were fully informed of the nature and the goals of the experiment and gave their written consent.

### *Procedures*

The tested subjects went through a 10-week training program, with two sessions per week. In each session, they carried out 5 series of 10 repeated exercises with the judo machine alternating with 5 series of ten *Nage Komi* (a judo throwing exercise) with a partner. This procedure was carried out for the two judo throwing techniques: *Morote Seoï nage* (MSN) and *Osoto Gari* (OSG). It should be noted that these two techniques were imposed on the athletes, which may explain the different levels achieved. It also should be noted that a member of the research team supervised each training session in order to control the quality of both the judo machine and *Nage Komi* exercises.

The control subjects did not undertake the training program.

A 25 Hz video camera was used to film the judo throwing techniques involving a partner, for the two groups before (pre test) and after (post test) the 10 week training cycle. The video film was presented to a group of 23 technical experts of the

French Federation. They evaluated the performance of each judoka scoring on a scale of 0 to 20.

### *Statistical analysis*

Statistical treatments were applied to the data using a Wilcoxon test. All results are expressed as means and standard deviations (mean ± SD) computed for each of the repeated measurements (before and after the training program). The difference is significant at the $p < 0.05$ level. The maximum weight and the technical quality notation represent the measured dependent variables. The difference in the evaluation before and after the training program represents the independent variable.

## RESULTS

The quantitative results corresponding to the maximum weights mobilized with the judo machine, as well as the qualitative results corresponding to the technical quality score, are analyzed before and after the training program for the two groups (tested and control).

### *Maximum weights mobilized with the judo machine*

It is reiterated that only the test condition subjects worked with the judo machine.

The statistical analysis shows a significant difference ($p < 0.05$) for MSN and OSG between the performances of the subjects at the time of the pre-test and the post-test. They work at a larger weight with the judo-specific apparatus after the training program for OSG (31.1 ± 7.0 kg after, against 25.0 ± 6.1 kg before), and for MSN (27.8 ± 7.9 kg after, against 13.1 ± 2.4 kg before.

### *Technical quality scoring (see Figure 2)*

The statistical analysis shows a significant difference for OSG and MSN ($p < 0.05$) between the performances of the tested group under the two test conditions, before and after the training program.

They obtain a better score after the training program for OSG (9.4 ± 2.4 /20 after, against 6.43 ± 2.5 /20 before), and for MSN (9.6 ± 2.6 /20 after, against 8.2 ± 2.7 /20 before). There is no significant difference for OSG and MSN ($p > 0.05$) between the performances of the control group under the corresponding two test conditions.

## DISCUSSION

The objective of this study was to validate the qualitative and the quantitative progress achieved by judokas undertaking a training program with a judo-specific machine. Leplanquais et al. (1994) had measured the quantitative progress made by 2 athletes (maximum weight mobilized) after a training program (8 weeks) with this apparatus. The effect of such a training program on the performance of group of athletes has been statistically validated by the present investigation. The statistical data confirmed that the athletes using the apparatus improved their performances on the two judo-throwing techniques (*Morote Seoï Nage* and *Osoto Gari*).

It is logical to suppose that the capacity to execute a judo throwing technique with the judo-specific apparatus, involving the mobilizing of a larger weight, should facilitate the execution of this same movement with a partner and should allow the athlete to gain in effectiveness. The technical quality scoring by the experts confirmed this. Moreover, the technical quality scoring for the control subjects has showed that the traditional practice (i.e. without work with the judo-specific machine) failed to improve the quality of practice for the reference period.

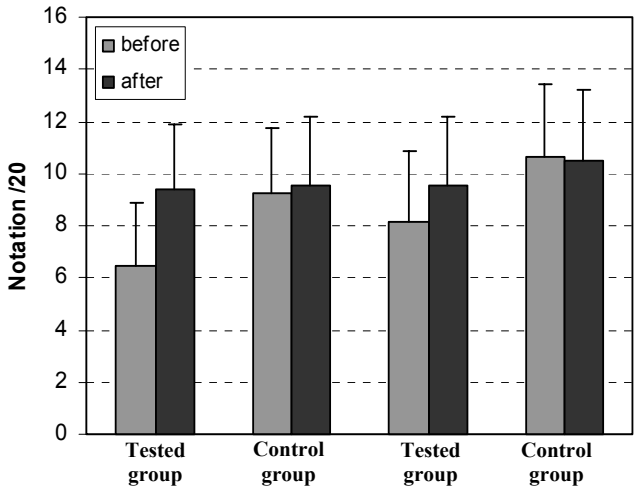



**Figure 2.** technical quality notation of the tested and the control groups before and after the training program, for the two judo throwing techniques.

## CONCLUSION

Subjects working with the judo-specific machine show improvement, not only at the quantitative level but also at the qualitative level. This apparatus can thus be used for both strength training and technique training. There appears to be a positive transfer of skill between work with the judo machine and the traditional work with a partner. This apparatus could be used also to compare different athletes or different athlete groups. Its use could be extended to a larger group of people and used to complement traditional judo practice, which remains irreplaceable.

It should also be noted that repeated exercises for developing throwing technique (*Nage Komi*) can be difficult for the partner because of the large number of times he must fall during each training session. Some substitution of this apparatus for the partner would ameliorate this situation.

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### KEY POINTS

- Judo, strength training, machine, technical progress.

## AUTHORS BIOGRAPHY

**Laurent BLAIS**
**Employment**
Doctor in Sport Sciences from the University of Poitiers, France.
**Degree**
PhD
**Research interests**
Biomechanical knowledge to a better understanding of the judo throwing techniques.
**E-mail:** blaislaurent@hotmail.com

**Francis TRILLES**
**Employment**
Doctor in Sport Sciences from the University of Poitiers, France.
**Degree**
PhD
**Research interests**
Judo analysis. Mechanical motor skills analysis.
**E-mail:**
francis.trilles@univ-poitiers.fr

✉ **Laurent Blais**
46 boulevard Napoléon III, Domaine des Fleurs, Edelweiss 2, 06200 Nice, France