Elaboration and evaluation of judo training means

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C Statistical Analysis
D Manuscript Preparation
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Abstract

Background & Study Aim: At the moment to select training means for composing the training program, many coaches are guided by the empirical evidence of training means specificity. A practical and scientific instrument containing relevant judo training means may contribute to coaches to achieve better results. The purpose of this study was to elaborate a catalogue of judo training means and classify it according to specificity: general, special or specific.

Material and Methods: Five Brazilian judo coaches answered what exercises are used for training the judo demand. The exercises were combined to a physical training method generating training means and they were submitted to 9 experts who evaluated the practical relevance and the specificity of each training mean to form the catalogue. The Coefficient of Validity Content and the Coefficient of Kappa were used as a statistical tool to measure the practical relevance of the catalogue and the classification of specificity, respectively.

Results: Seventy six exercises were listed and suitable to training means. Coefficient of Kappa value was = 0.533. Twenty two training means were classified as general, sixteen as special and thirty eight as specific of judo. The Coefficient of Validity Content for the catalogue was = 0.821. Analyzing this coefficient by specificity, the group of specific training means achieved the higher rate and the general group had the lower rate.

Conclusion: A catalogue of training means for judo were elaborated and classified by specificity. The high rate found for practical relevance confirm the representatively of this catalogue.

Key words: general exercise · physical training method · principle of specificity · special exercise · specific exercise

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Introduction

The judo training is highly complex once it requires from the athletes high levels of physical, coordinative, technical and psychological preparation [1-3]. Coaches need to plain training programs capable to promote improvements in the performance of the athletes [4]. The exercises contained in the training program might be vary, although some coaches support the idea to train only with specific exercises based in the principle of specificity [5]. If this principle was followed to the extreme, all training would simply mimic competition demands [6]. Although such an approach may be expected to yield a good transfer to performance in the short term and in experienced athletes, it may also be expected to produce negative outcomes such as overtraining, muscle imbalances, increased injury risk, and boredom in the long term [6]. Due this fact, different types of exercises which aim different goals and yet develop different capacities and abilities are recommended to make part of the routine of training [7]. These exercises might be classified into three groups, classified as general, special and specific exercises of the modality [8].

Approximately 70 years ago, coaches knowledge over the role for general or nonspecific exercises was to provide a "foundation of fitness" [9]. More recently,

Physical training method – represent the organization of the load components, intensity and duration considering the metabolic pathway prioritized [11]

Training Mean – combination of exercise to a physical training method [11]

Planning, Registration and Analysis of Sports Training Load (PRACTE) – theoretical model that interprets and organizes the sports training in an integrated system [11]

general exercises became important because it allows the development of a balanced neuromuscular system as a base from which to train more specifically at later stages [10]. From a theoretical sports training model [11], known as Planning, Registration and Analyses of Sports Training (PRACTE), the general exercises need to combine LOAD in a physical training method to generate training means (TM). According to PRACTE, the general TM aim the development of the general capacities not strictly related to the sports performance. These general TM represent a support for a harmonic development of the specifics adaptations required by the modality [11].

The special exercises are represented by exercises who aim the development of the physical capacities of the modality in question [8]. Its function is to convert the adaptations provided by the general exercises and to direct it to the specific exercises [10]. According to the PRACTE, the specials TM (special exercise combined in a physical training method) aim the development of the physical capacities necessary to train the specific actions required by the modality during the competition. Yet by PRACTE, these special TM promote adaptations directed for the predominant energy system of the modality and they also can be considered a bridge between the general and specific exercises [11].

The specific exercises provide a training stimulus similarly to competition [8]. Adding this information, was mentioned in PRACTE that specific TM (specific exercises combined into a physical training method) contribute strictly for the improvement of the specific actions from the modality once it demand the same internal structure (energetic and pattern of recruiting of motors unit) and external (range of motion and speed of execution) required during the competition.

Training schedules tend to start with general training means that become progressively more complex and increasingly reflecting the characteristics of the sport in question [10]. During the periodization planning is important to set general, special and specific stimuli of the modality regarding that general training means should be largely during the beginning of the periodization and largely special and specific according to approach of competitions [10]. Thus, is quite important to discriminate the nature of the training means regarding the selection of the stimuli that shall be distributed along the training season.

As judo is a sport which requires during the training season the insertion of different stimuli [12, 13] what represent the practice of many types of TM, was not found any study which highlighted what are the TM considered general, special or specific of judo. Therefore, this study proposed to: 1) elaborate judo TM who attempt different levels of athletes, since initiation until high level; 2) classify these TM as general, special or specific; 3) evaluate the practical relevance of each TM; 4) elaborate a catalogue with those TM divided by specificity.

Material and Methods

Elaborating the TM

For developing the physical and technical characteristic necessaries to achieve high levels of performance, the judo training planning might contain exercises that objective the improvement of some variables, such as flexibility [14], strength [15], balance [16], general motor coordination [17] specific motor coordination [18], aerobic and anaerobic power [19] and recovery [20].

Five experienced Brazilians judo coaches responded, in an individual semi structured interview, what exercises are used during a training season that aim the development of the variables previous cited. Table 1 shows the questions that guided the interviewer during the interview process. All interviews were video and audio recorded and all the coaches signed an agreement term, approved by the Ethic Committee of the Federal University of Minas Gerais, Brazil. As inclusion criteria, coaches must have won at least once a relevant international judo tournament and have been coaching for 10 years continuously. Table 2 shows the coaches profile and the main titles won by each of them.

Each video and audio record was watched and listened by the main researcher of this study and the exercises and it respective goal cited by the coach were transcribed in a file and sent individually for each interviewed coach for concordance and proof of authenticity. After the coach's agreement, the exercises from the five files were grouped in a single file and the repeated ones were disposable. Thus, three researchers of this study gathered to analyse and combine the exercise into a training method (Figure 1), generating TM as proposed in PRACTE, without impair the objective whereby the exercise was made for. Hence, the TM were randomly organized in a single file and all TM received a code that corresponded to the number of the physical training means (Figure 1) and then was generate a second code (Table 3) correspondent the goal which for the TM were elaborated and then the file was ready for analyses as showed in Table 4.

Classification

Nine experts (Judges) in sports science and also judo analysed the TM and evaluated the practical relevance and the specificity of each training mean.

The practical relevance indicates whether the TM is in fact important or not during the judo training and in what level. The specificity is represented by one of the 3 possibilities that TM could being: general, special and specific for judo.

To evaluate the practical relevance, the Judges used a Likert Scale [21], with 1-5 points to rate on the following manner: 1 = not important for judo

Table 1. Questions responded by the coaches

Nº	Question
1	What exercises do you plain for training the anaerobic capacity?
2	What are the recreational exercises which aim the development of any characteristic required by judo do you plain?
3	What exercises do you plain to improve flexibility?
4	What exercises do you plain aiming hypertrophy and maximal force?
5	What exercises do you plain for training the muscle power?
6	What exercises do you plain for warming up?
7	What exercises do you plain for strength endurance training?
8	What exercises do you plain for proprioception training?
9	What exercises do you plain for improvement of the motor skills?
10	What exercises do you plain for improvement of judo technique?
11	What exercises do you plain for training the aerobic capacity?
12	What exercise do you plain for improvement of any specific force manifestation utilized in any judo technique?
13	What exercises do you plain for recovery training?

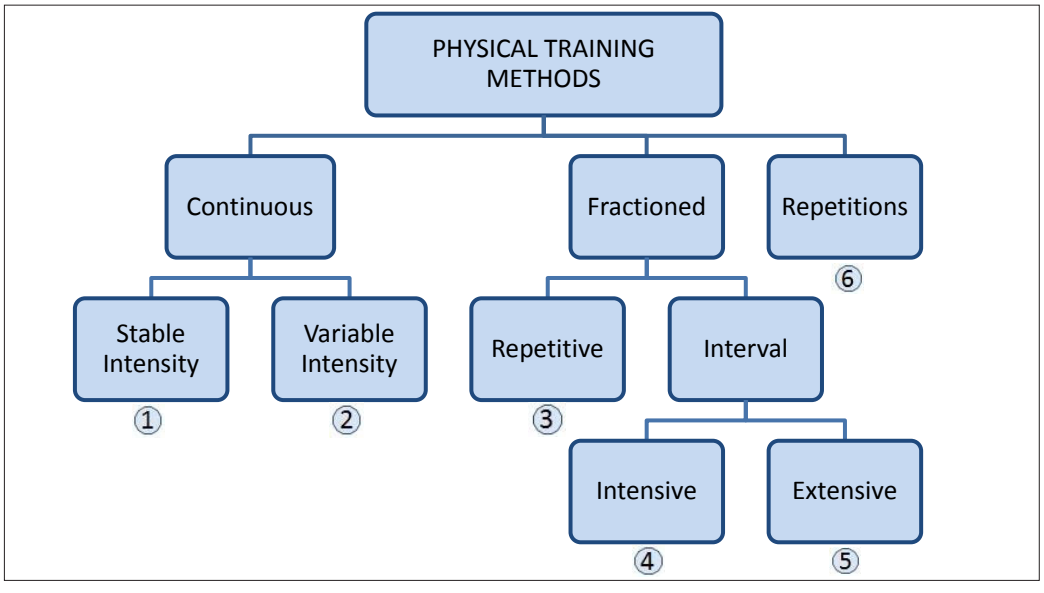

Figure 1. Physical Training Methods adopted in PRACTE

1: Used for aerobic training. The intensity of exercise remains constant. There is no break for recovery. 2: Used for aerobic and anaerobic training. The intensity of exercise alters along time. There is no break for recovery. 3: Used in exercises performed in high intensity with long break for full recovery. 4: Used in intense exercise with short break for incomplete recovery. 5: Used in intense exercise with break for incomplete recovery. 6: Used in quite low intensity exercise performed without provoke important changes in the energetic system.

Table 2. Coaches profile

Nº	Age Yrs.	Judo rank	College Graduation Degree	Yrs. of coaching	Coaching for category	Titles as coach
1	39	Black Belt Yo-Dan	PE	12	Advanced	- Panamerican Champion - Brazilian Champion
2	58	Black Belt Sichi-Dan	PE	30	Initianing Advanced	- Bronze medal in Olympic Games. - World Champion - World Army Tournament Champion - Brazilian Champion
3	40	Black Belt San-Dan	PE	11	Advanced High Level	- Sulamerican Champion - Brazilian Champion
4	60	Black Belt Sichi-Dan	PE	30	Advanced High Level	- 4 Bronze Medal in Olympic Games - World Champion (5x) - Sulamerican Champion - Panamerican Champion
5	47	Black Belt Yo-dan	PE	29	Initiating Advanced High Level	- Brazilian League Champion - World League Champion - Panamerican League Champion

Initiation: From white until orange belt - Advanced: From green until black belt. High Level: Professional athletes. PE: Physical Education.

Table 3. Training means goals

Code	Goals
1	Warm up
2	Improvement of judo skills by playing recreational activities or other sports
3	Improvement of flexibility
4	Increase of maximal strength or hypertrophy
5	Increase of muscle power
6	Increase of strength endurance
7	Increase specific strength for a specific technique
8	Improvement of the proprioception
9	Improvement of the coordinative capacities
10	Improvement of a specific action
11	Improvement of the aerobic capacity
12	Recovery
13	Improvement of the anaerobic capacity

Table 4. Part from the file evaluated by the Judges

Nº	Exercise	PTMº	Goal
1	Classics work out exercises. e.g. Bench press, squat and rows. Practical Relevance: 1 2 3 4 5 — Specificity: G* S** SP*** Observations:	3,4,5	4
2	Aerobic running to improve aerobic capacity. Practical Relevance: 1 2 3 4 5 — Specificity: G S SP Observations:	1,2,3	11

PTMº = Physical Training Method. G* = General TM; S** = Special TM; SP*** = Specific TM. Judges marked an "X" on the practical relevance according to the Likert Scale 1-5points and on the specificity.

Table 5. Judges expertise

Judge	Age Yrs.	Expertise in Sports Training or related areas	Expertise in Judo
1	32	PhD Post PhD student 4 years as a University Professor	Black Belt – Sho-Dan 28 years of judo practice 7 years as judo coach
2	34	PhD student	Black Belt – Ni-Dan 26 years of judo practice 7 years as judo coaching State Referee
3	64	Master Degree 35 years as a University Professor	Black Belt – Sichi-Dan 54 years of judo practice 20 years as a high level coach International Referee
4	30	PhD 7 years as University Professor	Black Belt – Sho-Dan 12 years of judo practice State referee for 3 years
5	52	PhD 19 years as a University Professor	Black Belt – Poku-Dan 20 years as a high level coach 40 years of judo practice
6	37	PhD student	Orange belt 15 years as judo physical trainer Physical Trainer of the Brazilian Selection at Olympic Games
7	56	PhD 26 years as University Professor	Black Belt – Poku-Dan 50 years practicing judo National referee for 5 years
8	72	PhD 28 years as University Professor	Black Belt – Yo-Dan 47 years of judo practice 8 years as judo coach
9	39	Master degree	Black Belt – Go-Dan 33 years of judo practice National referee for 20 years Golden Medal in Paralympic Games as judo coach Silver medal in Paralympic Games as judo coach

training; 2 = somewhat important for judo training; 3 = reasonably important for judo training; 4 = important for judo training; 5 = very important for judo training.

To classify the TM according to its specificity, the Judges based on their own expertise [22, 23] and the current theory of general, special and specific exercise and marked an "X" in the chosen specificity. All Judges received a mini manual contending the decoding for training methods, goals and all instructions about how to judge. The Judges also signed an agreement term previous approved by the Ethic Committee of the Federal University of Minas Gerais. The Judges expertise is presented Table 5.

Statistics Analysis

To verify statistically the level of practical pertinence, the Coefficient of Validity Content (CVC) was adopted as recommended by Hernandez-Nieto [24]. To calculate the CVC was necessary to know the rated mean of all Judges using the following equation for each TM:

$$A = \frac{\Sigma J}{J}$$

Where A represents the rated mean of all Judges, ΣJ is the amount of Judges rates and J is the number of Judges. From the A result, was calculated the CVC for each TM (CVC_i), based on the following equation:

$$CVC_i = \frac{A}{MaxR}$$

Where MaxR represent the maximum rate (5 points) that a TM can receive from a Judge. From CVC_i rate, was calculated the CVC for each specificity (CVC_s), previously stablished by the Judges, and finally the CVC for the entire catalogue (CVC_c) using the equations below:

$$CVC_s = \frac{\Sigma CVC_i}{Ni} \Longrightarrow \quad CVC_c = \frac{\Sigma CVC_s}{3}$$

Where, ΣCVC_i represents the amount of the CVC_i rates of one respective specificity and Ni represents the number of TM belonged to that specificity. The ΣCVC_s represents the amount of CVC_s from all specificity.

According to Hernandez-Nieto [25], rates of CVC_i, CVC_s or CVC_c, equal or higher than 0.80 represent high practical relevance.

To calculate the level of concordance between the Judges about the specificity chosen, the Kappa Coefficient (*k*) was used [25, 26]. The Statistical Package for the Social Sciences (SPSS 20.0) was adopted as tool to calculate *k*.

According to Fleiss [27], the intensity of the concordance by the use of *k* can be classified on the following classification:

poor ≤ .40
good ≥ .40 to ≤ .75
excellent ≥ .75

Results

Seventy six exercises were transcribed from the semi structured interview and converted as TM (Table 6) The Judges evaluated the TM as to practical relevance and chosen the specificity of each TM.

Twenty two TM were considered as general TM, sixteen were considered as special TM and thirty eight were considered as specific TM. For the practical relevance was found a CVC_c = 0.821. For the general TM means was found a CVC_s = 0.753, for the special TM was found a CVC_s = 0.828 and for the specific TM was found a CVC_s = 0.911.

The *k* results was = 0.533. The Table 6 shows the catalogue organized by specificity with rates of CVC_i, CVC_s (for each specificity), CVC_c and *k*.

Discussion

The objectives of this study were to elaborate judo TM who attempt different levels of athletes since initiation until high level; to classify the TM as general, special or specific; to evaluate the practical relevance of each TM; to organize a catalogue with the TM divided by specificity. To achieve a wide variety of TM capable to attempt since beginners until high level athletes in judo, experienced Brazilian judo coaches from different categories expressed the exercises used to develop the main variables trained in judo. Although some articles presented exercises practiced by judoist [13, 15, 28], as far as we search, only one study analysed the level of practical relevance of judo exercises [28], but in this case, the researches concerned to analyse the practical relevance of the general and specific exercises performed by Olympic athletes during their routine before start the Olympic Games. Thus, is quite difficult to discuss the results from this study once any other article was found concerning the evaluation of the practical relevance and the specificity of judo exercises in the same context showed in this study. Therefore, seventy six exercises were elaborate and combined into a training method according to PRACTE model and evaluated by Judges who were PhD, PhD student or Master in Sports Training or related areas and black belt graduated, except one, but this one is an experienced judo physical trainer as much familiarized as the others to the judo training routine.

The result of CVC_c indicates high practical relevance for the entire catalogue, what means that the TM elaborated in this study are in fact very important for the judo training and it might be a great reference for others coaches at the moment to select exercises to compose the training program. However, when the catalogue is discriminate by specificity was noticed that the general TM group had the lowest rate (CVC_s = 0.753) and the specific TM had the highest rate (CVC_s = 0.911). This is might be pointing that, most likely, the specific judo TM presented in this study when analysed as a group were considered more important than the others two groups. Specific exercises are designed to reproduce the physical, technical and psychological characteristics of the sport [11, 29].

Authors suggest that training should be specific in terms of movement pattern, contraction velocity, contraction type, and contraction force [3, 30], what might generate a positive transfer in a determined skill. A positive transfer occurs once specifics TM optimize the muscle-activation patterns that are required at the execution of the sports skills [11]. A basic principle of training is that adaptation becomes increasingly specific to the sport demands imposed on the athletes [8]. In this study the specific TM group had the highest rate indicating a higher importance level for the judo training in comparison

Table 6. Catalogue of Judo TM

Nº	GENERAL TRAINING MEANS	PTM*	G**	CVCi
1	Aerobic exercises in pool. e.g. free style swimming	1-4	11	0.6
2	Proprioception exercises. e.g. balance board	1-6	8	0.622
3	Cycling aerobic exercises. e.g. street biking	1,2,3	11	0.644
4	Basic coordinative exercises. e.g. jump on trampoline or run across a coordinative ladder	1-6	9	0.644
5	Recovery exercises. e.g. hydrogimnastic	1,2	12	0.644
6	Stretching exercises	1	3	0.711
7	Aerobic running. e.g. run on treadmill	1,2,3	11	0.733
8	Exercises on aerial horizontal ladder. e.g. across side to side a horizontal ladder by hands	5, 6	6	0.733
9	Warm up exercise. e.g. jogging	1,2	1	0.755
10	Intense running exercises e.g. 400 meters running	4,5	13	0.755
11	Cooperative strength resistance exercises in pair. e.g. running along the dojo being hold at behind by other judoist	4,5	6	0.755
12	Competitive recreational activities. e.g. captor flag and dodge ball	2-6	1	0.777
13	Circuit exercises for general motor skills. e.g. jump over cones following by zig zag running	1-6	9	0.777
14	Sprints running. e.g. run very intense in short distances	5,6	5	0.8
15	Classics weight exercises. e.g. bench press, squat and rows	3,4,5	4	0.822
16	Combined exercises involving jumps and any strength resistance exercises. e.g. jump off from a plinth and immediately perform a sequence of push-ups	5	6	0.822
17	Strength resistance exercise to improve gripping. e.g. climbing ropes and crushing grip	4,5	6	0.822
18	Mental training. e.g. image a technique execution before starting the training session	1,2	10	0.822
19	Exercises using only the own body mass as resistance. e.g. push up	5	6	0.822
20	Calming down exercises applied after the training. e.g. stretching	1	12	0.822
21	Specific exercises from others modalities. e.g. snatch	5,6	2	0.844
22	Resistance strength exercises using alternative sources. e.g. throwing medicine ball and dragging tires	5	5	0.844
			CVCs for General TM = 0.753	
	SPECIAL TRAINING MEANS			
23	Horizontal rope crossing. e.g. Judoist shall across side to side a horizontal aerial rope by holding straps of wagui hanged along the rope	3-5	6	0.711
34	Holding a sledgehammer or similar to provoke resistance as performing the Seoi Nage	3-5	5	0.733
25	Fighting in others combat style. e.g. wrestling or jiu jtsu	3-5	2	0.777
26	Strength exercises for legs directing for the Ashi-Waza using rubber. e.g. tie at ankle a rubber and perform the Ashi-Waza	4,5	6	0.8
27	Exercises aiming the improvement of shintai. e.g. to execute sidesteps, backwards steps and free steps been held by someone	3-5	10	0.8
28	Recreational activities aiming the Tai Sabaki. e.g. tail tag	2-5	2	0.8
29	Randori standing on one foot to improve balance.	3-5	10	0.8
30	Randori without wagui aiming ground fight.	3-5	10	0.822
31	Unbalance exercise aiming the improvement of shisei. e.g. Tori pushes Uke along the dojo while Uke tries to keep on balance	3-5	10	0.822
32	Exercise for upper or lower body using rubber to create resistance. e.g. attach a rubber and perform rapidly rows or kicks	3-5	5	0.822
33	Competitive games aiming increase of strength directed to kumi-kata. e.g. tug of war	6	6	0.844
34	Combination of coordinative exercises with any technical actions. e.g. sequence of hops followed by shintai	3-6	10	0.866
35	Exercise to develop the isometric strength grip. e.g. climb a rope and perform an isometric grip as long as possible	3-5	6	0.866
36	Combination of power exercise followed by any Nague-Waza e.g. three barbell power snatch followed by three kusushi and a throw	3-5	5	0.888
37	Perform weight exercises using straps of wagui as handles	3-5	4	0.888
38	Solo Drills. Execution of any technique using the own shadow as reference	3-5	10	0.899
			CVCs for Special TM = 0.821	

	SPECIFIC TRAINING MEANS			
39	Kata. Choreography of judo motions	6	10	0.777
40	Ne-Waza without wagui aiming improvement of the ground technique	3-5	10	0.8
41	Coordinative exercise to improve kumi-kata. e.g. Tori grips uke's sleeves twice with both hands following the necklet and the back of uke's wagi	6	9	0.822
42	De Ashi-Barai	3-5	10	0.822
43	Outnumbered exercise on ground. e.g. on ground, two toris try to immobilize a uke	3-5	10	0.822
44	Special Judo Fitness Test. Exercise performed as the special judo fitness test	4-5	10	0.822
45	Tandoku-Renshu. Exercises performed individually by using the own shadow as reference to improve shintai and blows entrance	6	10	0.822
46	Randori where one judoist wears wagui and the other does not, aiming disadvantage and leading the fight to ground	3-5	10	0.822
47	Exercise aiming maximal power output in a blow. e.g an uke is held at back by other uke. Tori applies three entrances of blow and at the fourth he throws uke	3-5	7	0.844
48	Exercises aiming improvement of the submission technique e.g. Randori golden score for the application of any submission technique (Oseokomi-Waza, Kensetsu–Waza or Shime-Waza)	3-5	10	0.844
49	Static Uchi-komi. e.g. perform Uchi-komi statically	3-5	10	0.88
50	Exercise aiming the isometric strength output during the kumi-kata. e.g. two judoists try to remove the hand gripping of other judoist on wagui	3-5	6	0.888
51	Exercises to improve time decision making and time reaction in a fight. e.g. back to back, Tori might turns and throws uke as fast as possible after the coach sign	3-5	10	0.888
52	Linear uchi-komi e.g. perform uchi-komi moving only forward and backward	3-5	10	0.888
53	Ukemi exercise. e.g. front rolling and back rolling	3-5	10	0.911
54	Exercises to develop Fusegi. e.g. from a previous set situation uke has to escape from tori's technique application	3-5	10	0.911
55	Uchi-komi on ground. e.g. on ground, perform uchi-komi for any Ne-Waza	3-5	10	0.911
56	Randori, long and performed with low intensity	2,4	11	0.933
57	Jump exercises followed by blows entrance. e.g. Tori jumps off from a plinth and applies the entrance of a blow (kusushi and tsukuri)	3-5	7	0.933
58	Exercise on ground to develop the ne-waza thecnique. e.g. at the ground, coach determines to tori to apply any ne-waza technique	3-5	10	0.933
59	Yaku Soku Geiko. The judoists might perform a fight with no resistance	3-5	10	0.933
60	Exercises aiming the technique of Tai Sabaki. e.g. Tori applies a blow against tori who must dodges	3-5	10	0.933
61	Exercises in pair aiming improvement of griping. e.g. Tori seeks for gripping uke who can dodge or neutralize	3-5	10	0.933
62	Kumi-kata. Grip fighting	6	10	0.955
63	Renzoku-henka-waza. e.g. to applicate the technique of the De Ashi Barai and finish with the Osotogari	3-5	10	0.955
64	Gold Score Randori. During the Randori, the judoist who scores first, win	3-5	10	0.955
65	Uchi-komi done in free direction	3-5	10	0.955
66	Exercises aiming the potentiation postactivation effects. e.g. three minutes after a maximal strength output exercise, tori executes a sequence of intense nage-komi	3	5	0.955
67	Exercises aiming the technique of Kaeshi-Waza. Tori applies a blow against uke who defends and applies a counterblow	3-5	10	0.955
68	Randori directed. In a pre-determined combat, one judoist only attacks while the other only defends. They switch positions according to the coach	3-5	10	0.955
69	Renraku-henka-waza. Sucessive technique blows application. Ex. Tori initiates the throw with Ouchi-gari and finish with Ippon-Seoi-Nage	3-5	10	0.977
70	Randori on ground	3-5	10	0.977
71	Nage-Komi. e.g. successive throws	3-5	10	0.977
72	Kakari-keiko. e.g. many ukes are threw sequentially by a tori	4-5	10	0.977
73	Randori without blows aiming kumi-kata supremacy	4-5	10	0.977
74	Randori. e.g. fight	3	10	1.0
75	Shiai. Competition simulation	3	10	1.0
76	Tokui-Waza. Exercise for improvement of the preference technique. e.g. to perform nage-komi or uchi-komi on the preference technique	6	10	1.0
				CVCs for Specific TM = 0.911

PTM * = Physical Training Method; G** = Goals CVC_c = 0.828; *k* =0.533

with the others two groups. Thus, seems that the judo coaches in respect of the principle of specificity rated the specific TM with higher rates.

Years later, Greg et al. [31] analysing isolated the role of many types of strength exercise on the performance of a series of dynamic activities, found that specific exercises produce higher results on performance than any other type. More recently Baker et al [8], Nunez [10] and Issurin [32] showed that the practice of exercises from these three specificities along a training season is fundamental to achieve great performance in sports.

The *k* is and a statistical tool used to inform the level of concordance between a panel of Judges [33]. In this study, was found a $k = 0.533$ what indicates a good concordance between the Judges relative the TM specificity chosen.

To conclude our findings we would like to emphasize multidimensional issue directly related to accurate conclusions made by Barczynski et al. [34]. Namely, one of the most important tasks of the scientists dispersed around the world is to overcome barriers, stereotypes, divisions, etc. in order to share scientific findings with the widest group of people interested in given knowledge. At first, the causes have political grounds (a classic example is constituted by the effects of the Iron Curtain, which led to complete isolation of scientists engaged in identical or similar issues). Second barrier is constituted by the lack of specialised, easy accessible journals dealing with unique issues and publishing the most significant achievements in their native languages. Finally, there are applications of research with athletes in other fields of life (e.g. health promotion), etc.

The issue of language barriers is clearly visible in the analysis of means that have an impact on an athlete' body during training. In this paper our discussion is based on the division made by Baker [8] and Nunez et al. [10], who classified the exercises into general, special and specific. Alternative division as for the terms but not the adaptive properties of given groups of exercises is used by scientists and coaches from the former Eastern Bloc countries. This division is as follows: comprehensive, directed and special [35-38]. Different names conceal identical content (naming two identical terms specific/special is very peculiar).

The appearance of journals devoted to combat sports and martial arts [39] in the global science first in 2005 and then in 2013 allows for exchange of new ideas and concepts. The content of our work corresponds to the division and classification of training means aimed at improving the effectiveness of training developed by Dopico et al. [40]. If we apply judo in health-related training our division and classification of training means are not necessary. Sufficiently accurate methods of measurement, documentation and programming the optimal workload are constituted by a proposal made by Kalina [41]. Other criteria should be also used while selecting judo elements to enhance particular dimension of health and survival abilities [42-44].

Conclusion

A catalogue of judo training means was elaborated with twenty-two general TM, sixteen special TM and thirty-eight specific TM. The results from the statistical proceeding have demonstrated good agreement between the Judges specificity choice and high practical relevance of the catalogue. In regard to the individual analysis of the practical relevance for each specificity group, the specific TM group showed the highest rate and the lowest was shown in the general TM group. This catalogue offers to coaches a repertoire of general, special and specific judo training means what may serve as reference at the moment to select exercises to compose the training program.

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Competing interests

The authors declare they have no competing interests.

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