

Content validation of training means for taekwondo

Authors' Contribution:

- A Study Design
- B Data Collection
- C Statistical Analysis
- D Manuscript Preparation
- E Funds Collection

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Abstract

Background & Study Aim: The validation of training means can efficiently direct the selection and prescription of training means for taekwondo beyond consolidated knowledge about this sport. The objective of the present study was the list of exercises employed during taekwondo training, categorize these exercises in training means and perform the content validation of these means.

Material & Methods: Seven coaches from the Taekwondo Brazilian Selection Team participated in the first phase of this study by listing the exercises. In the second phase, five experts in sports training with expertise in taekwondo modality collaborated in the study by judging the exercises. The content validation was tested using the content validity coefficient on three indicators: clarity of language, practical relevance and theoretical relevance. The categorization of the exercises was checked by Kappa Cohen's coefficient. The intra- and inter-judge variability was assessed using the intraclass correlation coefficient and the average Kappa Cohen's coefficient.

Results: The content validity coefficients were 0.82, 0.86, and 0.83 for clarity of language, practical pertinence and theoretical relevance, respectively. Kappa Cohen's coefficients for the categorization of theoretical dimensions confirmed a moderate level of agreement among the judges for the three dimensions used: general, special and specific training means. The results of the intraclass correlation coefficient and the average test/re-test kappa values were considered good and substantial, respectively.

Conclusion: The results of this study indicate that is possible to elaborate and validate a catalogue of training means for taekwondo. Thus, a tool was produced that can be used as a theoretical framework in the organization of planning, registration and analysis of sports training loads.

Keywords: combat sports · general exercise · special exercise · specific exercise

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Planning, Register and Analysis of Sport Training Load (PRACTE) – theoretical model that interprets and organizes sports training in a complex system [3, 9]

Training means – combination of exercises with physical training methods [3,10-12]

INTRODUCTION

According to Szmuchrowski [1], it is necessary for athletes to undertake a high training load to elevate their sport performance level. Gabbet [2] described that some factors, such as periodized training and the monitoring and regulation of the training load are fundamental strategies that offer athletes proper recovery, ensure training load progression, decrease injury risk and help them attain the best possible performance.

Given these assumptions, it is proposed to apply the concepts of general systems theory to sports training theory, thus enabling the provision of tools that help in the process of planning, executing and controlling the training load [3-7]. General systems theory generalizes biological thinking for all areas and defines the system as a grouping of interdependent parts that work and interact with the environment, aiming for the same goals. These parts are processed on macro or micro scales, and their function is to overcome adversity [8]. Sports training theory originated from the relation among different areas, such as exercise physiology, biomechanics and sports psychology, contributing to the concepts of the grounding and organization methods of the training process and overcoming the difficulties imposed by sports practice [3].

Based on the relation between these theories, Szmuchrowski [9] presented a theoretical model of a complex system called Planning, Registration and Analysis of Sports Training Load (PRACTE). PRACTE is composed of three subsystems: planning, execution and control [3-7]. To establish efficient communication among these three subsystems, it is necessary to use a tool to ensure proper exercise selection based on the training period. This tool can also assist in training load registration and the facilitation of more efficient sports planning, execution and control [10, 11]. This tool is called the catalogue of training means.

The catalogue consists of groups of training means. The training means are composed of the combination of exercises with training methods [12, 13]. The elaboration of this tool needs to be specific to each sport modality, and severe methods to achieve validation are required. The validation model proposed by Pasquali [14-16] suggests three distinct phases: theoretical procedures, experimental procedures and analytic procedures. Although this model was developed for validating questionnaires, a personality test and an educational test, it has also been used for validating training means for judo [11], tests of declarative tactical knowledge for tennis [17], tests of tactical processual

knowledge on basketball [18, 19] and tests of tactical processual knowledge in children and teenagers.

Taekwondo is an Olympic modality that is widely practiced in several nations and by thousands of athletes and coaches. This wide coverage can provide undue differences between the prescriptions of exercises and training methods, particularly when prescriptions are based on empiricism and employed randomly [20-28].

The validation of training means can efficiently direct the selection and prescription of training means for taekwondo beyond consolidated knowledge about this sport.

Thus, the objective of the present study was the list of exercises employed during taekwondo training, categorize these exercises in training means and perform the content validation of these means.

MATERIAL AND METHODS

The present study was composed of two distinct phases. The first phase was the elaboration of taekwondo exercises, and the second phase was the content validation and categorization of exercises, which comprised the training means. A survey of potential volunteers was performed with the following institutions: state taekwondo federations, the Brazilian Taekwondo Federation and universities with post-graduate programs in sports science, physical education, sports training and related fields. This study was approved by the Ethics Committee in Research of the Federal University of Minas Gerais under protocol number 26729814.7.0000.5149.

The subject sample from the first phase was composed of seven coaches who were working or had worked for the Taekwondo Brazilian Selection in several categories. The coaches' expertise is shown in Table 1.

The volunteers from the first phase viewed a video and engaged in an audio-recorded interview where they reported their exercise during the training routine, their goals for each exercise (physical, technical and tactical training) and the objective to be achieved (e.g., strength, speed, flexibility). These interviews were transcribed in an Excel spreadsheet (Microsoft, version 97-2003, US).

The sample in the second phase was composed of five judges with varying levels of practice and theoretical experience but with remarkable knowledge in taekwondo. The judges' expertise is presented in Table 2.

Table 1. Coaches' expertise

| No | Education degree | Taekwondo graduation | Experience time as coach (in years) | Main achievements (Gold/Silver/Bronze) |
|----|---|----------------------|-------------------------------------|--|
| 1 | Degree in Physical Education | Black belt 6° dan | 11 | South American (2010) International Open World Army Tournament (2011, 2012 and 2014) |
| 2 | Post-graduate in Sports Marketing | Black belt 5° dan | 9 | Mundial Youth (2010, 2012 and 2014) Pan-American (youth) (2011, 2012 and 2013) Olympic Games for youth (2010 and 2014) |
| 3 | Post-graduate in Exercise Physiology | Black belt 6° dan | 23 | 5-time Brazilian Champion Pan-American Senior (2013) and Adult (2014) |
| 4 | Degree in Journalism | Black belt 5° dan | 25 | 4 Pan-American 5 times World Tournament |
| 5 | Post-graduate in Sports Training | Black belt 6° dan | 10 | Pan American (2007) Olympics (2008) |
| 6 | Post-graduate in Sports Psychology | Black-belt 1° dan | 5 | South American Pan-American (2010) |
| 7 | Master's degree in Exercise Science and Sport | N/A | 6 | South American (2010) Internationals open World Army Tournament (2011, 2012 and 2014) |

Note: N/A= not applied

Table 2. Judges' expertise

| No | Title Education | Age (years) | Taekwondo graduation | Experience as coach (years) | University teaching practice (years) |
|----|--|-------------|----------------------|-----------------------------|--------------------------------------|
| 1 | Master's degree in Sport Sciences | 35 | N/A | 3 | 12 |
| 2 | Master's degree in Sport Sciences | 38 | Black Belt 6° dan | 11 | 2 |
| 3 | Doctorate degree in Sport Sciences | 35 | N/A | N/A | 10 |
| 4 | Post-graduate degree in Physical Education | 32 | Black Belt 6° dan | 9 | N/A |
| 5 | Doctorate degree in Sport Sciences | 38 | Black Belt 2° dan | 5 | 5 |

Age average = 35,6 years. Standard deviation = $\pm 2,5$ years. N/A (not applied)

In the second phase, the judges read the transcription on the spreadsheet, analysed the exercises, and consequently determined the content validation of the clarity of language (CL), the practical pertinence (PP) and the theoretical relevance (RT). These criteria were evaluated by the judges, who used a Likert scale with 5 points [29], where 1 – inadequate, 2 – slightly adequate, 3 – adequate and 4 – very adequate.

The reliability was checked one month after the first evaluation, when the judges performed a second evaluation of the exercises to check the analysis reliability. This test/re-test procedure was used to calculate the correlation between the scores obtained using the same instrument for the same subjects in two different time situations [15]. In the re-test, the exercises were organized randomly in a spreadsheet to ensure the same rigor of the first evaluation. After the judges' evaluation, the training means were grouped and coded following the procedures presented in Pedrosa et al. [11] regarding the exercise descriptions, training methods, levels of intensity, training means, goals and objectives. The codes for the training methods, levels of intensity and goals [3, 10-13] are shown in Frame 1. Table 3 presents the fifteen training means groups for taekwondo.

STATISTICS ANALYSIS

As suggested by Pasquali [16] and demonstrated by Pedrosa et al. [11], to deny or affirm the content validity, it is necessary to calculate the coefficient of content validity (CCV) for CL, PP and RT. This calculation was performed for each exercise individually (CCVi) and for all catalogues simultaneously (CCVt). The data analysis was performed in an Excel spreadsheet (Microsoft, version 97-2003, US).

At the end of these analyses, the exercises that did not achieve scores equal to or higher than 0.80 for CL were reformulated and were posteriorly reevaluated by the judges. Exercises that reached scores equal to or higher than 0.80 for PP and RT were kept in the catalogue of the group of training means. Any other exercise that scored below 0.80 for PP and RT was excluded from the catalogue [30, 31].

The level of intra- and inter-rater agreement was checked by Kappa Cohen's coefficient (*K*). This coefficient represents the proportion of times the judges agreed divided by the proportion of times that they disagreed, corrected by chance [32-38]. The results were interpreted as shown in Table 4.

To accomplish this analysis, it was necessary to compare all judges with themselves, calculating *K* with judges 01 and 02, judges 01 and 03, judges 01 and 04, and judges 01 and 05 successively until all judges were compared. The average of all *K* values was posteriorly calculated to achieve a final score. A moderate level of agreement (Table 4) between judges was required to establish the content validation of the training means. The test/re-test correlation level was checked by the intraclass correlation coefficient (ICC) [16, 39].

The statistical analyses were performed using the Statistical Package for Social Science, version 20.0.

RESULTS

Two hundred eight exercises were listed. The number of exercises per goal is shown in Table 5.

The exercises were associated with training methods by the judges taking into account the suggestion of coaches regarding the training load variables (the

Frame 1. Codification for catalogue of training means group

| Methods | Code | Levels of intensity | Assigned Code | Goals | Assigned Code |
|-------------------------------|------|--|---------------|-----------|---------------|
| Continuous stable intensity | 1 | Aerobic, utilized for recovery or maintenance training | 1 | Physical | 1 |
| Continuous variable Intensity | 2 | Aerobic, utilized for long lasting training | 2 | Technical | 2 |
| Fractioned repetitive | 3 | Aerobic, corresponding to anaerobic threshold | 3 | Tactical | 3 |
| Fractioned interval intensity | 4 | Aerobic but with important anaerobic contribution | 4 | | |
| Fractioned interval extensive | 5 | Anaerobic lactic | 5 | | |
| Repetitions | 6 | Anaerobic alactic | 6 | | |

Table 3. Catalogue of groups of training means for taekwondo

| Group | Amount of exercises per group | Description | Methods | Intensity | Goal | General Objective | Mean |
|-------|-------------------------------|--|-----------|-----------|--------------|-----------------------------|---------------------|
| 1 | 3 | Perform workout exercise. | 3 / 4 / 5 | 5 / 6 | 1 | Strength | General |
| 2 | 4 | Perform stretching exercises. | 6 | 1 / 6 | 1 | Flexibility | General Special |
| 3 | 3 | Perform deep squat following a sequence of kicks. | 3 / 4 / 5 | 4 / 5 | 1 | Strength | Special |
| 4 | 1 | Throw a medicine ball. | 3 / 4 | 6 | 1 | Strength | Special |
| 5 | 6 | Execute kicks against trimmer kicks, a racket or punching bags applying maximal speed. | 3 / 4 | 5 / 6 | 1 | Speed | Special Specific |
| 6 | 16 | From the seated or lying position, get up, perform free motion, and perform kicks. | 4 / 5 | 4 / 5 | 1 | Strength | Special Specific |
| 7 | 5 | Perform kicks against trimmer kicks or punch bags as hard as possible. | 3 / 4 | 5 / 6 | 1 | Strength | Specific |
| 8 | 1 | Move forward, backwards and sideways, randomly, performing skips | 4 / 5 | 2 / 3 | 1 / 2 | Aerobic Technical | Specific |
| 9 | 5 | Execute aleatory movements and perform kicks against a trimmer kicks, a racket or a passive opponent. | 3 / 5 | 4 / 5 | 1 | Aerobic Anaerobic | Specific |
| 10 | 1 | Execute technical defence and blocking with upper limbs (block techniques with the forearm, hands and elbow). Pakat Palmok (external side of forearm), and An Palmok (internal side of forearm) against different techniques of predetermined kicks. | 3 / 4 / 5 | 5 / 6 | 2 | Technical | Specific |
| 11 | 1 | Execute a random sequence of kicks against a trimmer kicks or a racket, kicking as fast as possible, deciding which technique to employ based on when and where the trimmer kick is positioned. | 3 / 4 / 5 | 5 / 6 | 2 | Technical | Specific |
| 12 | 5 | Perform a sequence of kicks moving freely, not allowing the kicking foot to touch the ground before the end of the sequence. | 3 / 4 / 5 | 5 / 6 | 2 | Technical | Specific |
| 13 | 2 | Perform video analysis. | 6 | N/A | 2 / 3 | Technical/Tactical | Specific |
| 14 | 24 | Fighting drills | 4 / 5 | 4 / 5 | 2 / 3 | Technical/Tactical | Specific |
| 15 | 1 | Internal competitions between athletes from the same team | 4 / 5 | 4 | 1 / 2 / 3 | Physical/Technical/Tactical | Specific |

Table 4. Levels of agreement for Kappa Cohen's coefficient

| Scores | Levels of agreement |
|--------------|---------------------|
| 0.01 to 0.20 | Poor |
| 0.21 to 0.40 | Light |
| 0.41 to 0.60 | Moderated |
| 0.61 to 0.80 | Substantial |
| 0.81 to 1.00 | Perfect |

Note: Source: Landis and Koch [32]

Table 5. Number of exercise associations and their respective goals

| | Goals | | | | | |
|------------------------|----------|-----------|----------|--------------------|-------------------|-----------------------------|
| | Physical | Technical | Tactical | Physical Technical | Physical Tactical | Physical Technical Tactical |
| Number of associations | 153 | 19 | 6 | 5 | 23 | 2 |

Table 6. Number of exercises associated with each training method

| | Training methods | | | | | | Total |
|------------------------|------------------|--------------------|-----------------------|-------------------------------|-------------------------------|-------------|-------|
| | Continuum Stable | Continuum Variable | Fractioned Repetitive | Fractioned Interval Extensive | Fractioned Interval Intensive | Repetitions | |
| Number of associations | 5 | 0 | 52 | 71 | 62 | 25 | 215 |

Table 7. Number of associated exercises per intensity level

| | Intensity levels | | | | | | Total |
|------------------------|------------------|-----------|-----------|---------|----------|-----------|-------|
| | 1 Aerobic | 2 Aerobic | 3 Aerobic | 4 Mixed | 5 Lactic | 6 Alactic | |
| Number of associations | 17 | 1 | 1 | 58 | 92 | 76 | 245 |

number of sets and repetitions, the time exposed to the stimulus and the time for recovery). Table 6 presents these results.

It is important to highlight that one exercise could be associated to more than one training method. The judges also associated exercises with intensity levels, taking into account the exercise description, goals and objectives. The results of these associations are shown in Table 7. More than one level of intensity was also associated with one exercise.

Coefficient of Content Validity

Of the 208 exercises, 42 obtained scores of $CCV_i \geq 0.80$ for all three criteria (CL, PP and RT). The other 36 exercises obtained scores of $CCV_i \geq 0.80$ for PP and RT but not for CL. Thus, these exercises were adjusted for a new evaluation of this criteria. The results of this second evaluation demonstrated that 22 exercises obtained scores of $CCV_i \geq 0.80$, and the remaining 14 scored below 0.80. However, in this second evaluation, a higher score for CL was found in comparison to the first evaluation. Due the high score of CCV_i for PP and RT, these 14 exercises were kept in a catalogue. Regarding the CCV_t of all 78 exercises, the following scores were found: 0.82, 0.86 and 0.83 for CL, PP and RT, respectively. Appendix shows all exercises that compose the catalogue of means.

Inter-rater agreement

The inter-rater agreement related to the choice of training methods, intensity levels and training means was checked by K . The average of all ten coefficients was $K = 0.229$, $K = 0.496$ and $K = 0.441$ for the training methods, level of intensity and training means, respectively.

Reliability

The average K of the training methods, intensity levels and training means was $K = 0.643$, $K = 0.741$ and $K = 0.768$, respectively. The ICC was performed with the averages found at the first and second analyses. The ICC value found was = 0.93, which is considered a high value of correlation [39].

DISCUSSION

The objective of the present study was to elaborate a list of exercises, to categorize these exercises into dimensions and to validate the content of the training means for Taekwondo according to the PRACTE model [9] and the validation model proposed by Pasquali [16]. The results of CCV demonstrated that the content validation of training means for taekwondo is possible because scores higher than 0.80 for the criteria CL, PP and RT were found. The values of ICC and average K demonstrated high and substantial correlations with intra-rater agreement,

respectively, which increased the accuracy of the results and consolidated the content validation for the instrument because the values found were considered satisfactory for the validation process [33-39].

No other study that sought to investigate the validation of training means for taekwondo was found, which made it difficult to discuss the results presented. In a similar study, Pedrosa et al. [11] performed the validation of 76 training means for judo modality. These authors found CCV scores from 0.60 to 1.00 and the training means classified as specific for judo obtained the highest values for PP. The other criteria (CL, RT) were not tested by Pedrosa et al. [11]. The results of the present study also demonstrated higher CCV scores for the training means classified as specific. Moreover, the sum of exercises classified as specific training means in this study and in Pedrosa et al. [11] was greater than the sum of exercises classified as general or special. These two results suggest the coaches from these two combat modalities have a greater repertory of specific means than general or special means.

The divergence between this study and that of Pedrosa et al. [11] is related to the number of goals proposed. In their study, there were 13 different goals related to judo training, whereas in the present study, there were only 3 broader goals. The procedure in this study aimed to simplify the catalogue codification system and to facilitate the registration of the training process. The association process of exercises with training methods and intensity levels is another difference between these studies. In the present study, this procedure was performed by the same judges, who categorized the exercises as belonging to one of the three training means dimensions, whereas in Pedrosa et al. [11], the main researchers performed this association. As the theoretical model PRACTE proposes, the training means are characterized by the exercises associated with training methods [12, 13], which can be considered a limitation of Pedrosa et al. [11] study, in which these associations were possibly not performed by experts of modality.

Biases in the process of associating exercises with training methods can negatively influence the categorization of training means. The same associated exercise with different training methods can compose distinct training means, and the same training methods associated with different exercises also can result in similar means. These methodological differences can influence the results, indicating a need for the adequate selection of validation methods for the catalogue of means to different sports modalities.

Several authors have proposed that fractioned methods are more appropriate for Taekwondo training because this modality has intermittent characteristics [20-22, 24]. The results of the present study suggest the methods chosen by judges are in accordance with this indication, and these methods the majority in the validated means. There is a notable relationship in the levels of intensity, and the methods' association with exercises had a scientific endorsement because more exercises were associated with high levels of intensity. According to several authors, such an association is more adequate for developing specific physical capacities for taekwondo [23, 25-28].

Comparing the scores of K in this study ($K = 0.44$) with the scores found in Pedrosa et al. [11] ($K = 0.53$), it is possible to note in both studies that an agreement level considered moderate [38] was found regarding the categorization of the training means. We noted little divergence when judges had to determine whether the training means was special or specific. However, when judges had to determine whether the training means was special, they were undecided. These results demonstrate that the general and specific division of training means in general, special and specific should be didactic. However, the training means are part of a continuum, where one extremity contains purely general training means and the other contains training means that are purely specific. Between extremities, some training means should be considered general-special, and others are special-specific.

CONCLUSIONS

The results of the present study showed that it is possible to elaborate and validate a catalogue of training means for taekwondo. Thus, a tool that can be used as a theoretical reference at the moment of planning, registration and analysis of the sports training load was produced.

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COMPETING INTERESTS

The authors declare they have no competing interests.

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Appendix. Taekwondo catalogue with 78 exercises

| No | Description of exercises |
|----|---|
| 1 | Execute deep squats following a sequence of at least 2 and up to 10 predetermined kicks, using the non-dominant leg and the same kick technique. E.g.: 8 sets of 2 deep squats followed by 5 Dollyo chagui. 30 second intervals between sets. |
| 2 | Execute deep squats following a sequence of at least 2 and up to 10 predetermined kicks, using both the dominant and the non-dominant leg and the same kick technique. E.g.: 5 sets of 10 deep squats followed by 5 Bandal chagui using the dominant leg and 5 Bandal chagui using the non-dominant leg, alternately. 90 second intervals between sets. |
| 3 | Execute deep squats following a sequence of at least 2 and up to 10 predetermined kicks, using the dominant leg and performing the same kick technique. E.g.: 4 sets of 6 deep squats followed by 10 Ap chagui. 45 second intervals between sets. |
| 4 | Execute kicks with the dominant leg against the kicking pads, a racket or punching bags as fast as possible performing the same kick technique. E.g.: 1 set of 10 Bandal chagui as fast as possible. |
| 5 | Execute kicks with the dominant leg against the kicking pads, racket or punching bags as fast as possible performing different kick techniques. E.g.: 1 set of Bandal chagui, 10 Ap. chagui and 10 Dollyo chagui as fast as possible. 3 minute intervals between sets. |
| 6 | Execute kicks with both the non-dominant and the non-dominant legs against the kicking pads, a racket or punching bags as fast as possible performing the same kick technique. E.g.: 1 set of Bandal chagui and 5 Dollyo chagui as fast as possible. |
| 7 | Execute kicks with the non-dominant leg against the kicking pads, a racket or punching bags as fast as possible performing different kick techniques. E.g.: 1 set of 5 Bandal Chagui and 5 Dollyo chagui as fast as possible. |
| 8 | Execute kicks with both the dominant and non-dominant legs against the kicking pads, a racket or punching bags as fast as possible performing the same kick technique. E.g.: 3 sets of 10 Bandal chagui, alternating legs as fast as possible. 3 minute intervals between sets. |
| 9 | Execute kicks with both the dominant and non-dominant legs against the kicking pads, a racket or punching bags as fast as possible performing different kick techniques. E.g.: 2 sets of 10 Bandal chagui and 10 Dollyo chagui, alternating legs as fast as possible. 3 minute intervals between sets. |
| 10 | Execute kicks with both dominant and non-dominant legs against the kicking pads, a racket or punching bags as hard as possible performing the same kick technique. E.g.: 3 sets of 10 Yop chagui alternating the dominant and non-dominant leg against punching bags. 90 second intervals between sets. |
| 11 | Execute kicks with both the dominant and non-dominant legs against kicking pads, a racket or punching bags as hard as possible performing the different kick techniques. E.g.: perform 10 sets of 5 Bandal chagui as fast as possible. 1 minute intervals between sets. |
| 12 | Execute kicks with dominant leg against kicking pads, racket or punching bags as hard as possible performing different kick techniques. E.g.: perform 10 sets of 5 Bandal chagui and 5 Dollyo chagui as fast as possible with one minute intervals between sets and 4 minute intervals between sets. |
| 13 | Execute kicks with the non-dominant leg against the kicking pads, a racket or punching bags as hard as possible performing the same kick techniques. E.g.: 1 set of 5 Bandal chagui and 5 Dollyo chagui as fast as possible. |
| 14 | Execute kicks with the non-dominant leg against the kicking pads, a racket or punching bags as hard as possible performing different kick techniques. E.g.: 3 sets of 5 Yop chagui and 5 Bandal chagui against punching bags. 60 second intervals between sets. |
| 15 | Move forward, backward and sideways and skip randomly. E.g.: 5 sets of forward, backward and sideways movements, with 2 minutes each for set and 30 second intervals between sets. |
| 16 | Move forward, backward and sideways randomly, skip, perform kicks with both the dominant and the non-dominant leg and employ the same kick technique against kicking pads, a racket or a passive sparring partner (a fighter that does not attack or counter-attack but moves freely). E.g.: 3 sets of forward, backward and sideways movements, randomly, with a Bandal chagui kick with both the dominant and non-dominant legs. Two minutes for each set; 30 second intervals between sets. |
| 17 | Move forward, backward and sideways randomly, skip, perform kicks with the dominant leg, employ the same kick technique against kicking pads, a racket or a passive sparring partner (a fighter that does not attack or counter-attack but moves freely). E.g.: 3 sets of forward, backward and sideways movements, randomly, with Bandal chagui with the dominant leg. Two minutes for each set; 30 second intervals between sets. |
| 18 | Move forward, backward and sideways randomly, skip, perform kicks with the dominant leg, employ different kick techniques against kicking pads, a racket or a passive sparring partner (a fighter that does not attack or counter-attack but moves freely). E.g.: 5 sets of forward, backward and sideways movements, randomly, with Bandal chagui kick, Dollyo chagui and Ap chagui with the dominant leg. Two minutes for each set; 30 second intervals between sets. |
| 19 | Move forward, backward and sideways randomly, skip, perform kicks with the non-dominant leg, employ the same kick technique against kicking pads, a racket or a passive sparring partner (a fighter that does not attack or counter-attack but moves freely). E.g.: 3 sets of forward, backward and sideways movements, randomly, with Bandal chagui kick with the non-dominant leg. Two minutes for each set; 30 second intervals between sets. |

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| 20 | Move forward, backward and sideways randomly, skip, perform kicks with the non-dominant leg, employ different kick techniques against kicking pads, a racket or a passive sparring partner (a fighter that does not attack or counter-attack but moves freely). E.g.: 3 sets of forward, backward and sideways, movements, randomly, with Bandal chagui kick, Dollyo chagui and Ap chagui with the non-dominant leg. Two minutes for each set; 30 second intervals between sets. |
| 21 | Execute large and/or small muscle group exercises using machines or free weight lifting, aiming for maximal strength output development. E.g.: 1-3 sets of 1-3 repetitions, with 5 minute intervals between sets in 45 leg press exercises. |
| 22 | Execute large and/or small muscle group exercises using machines, body mass or free weight lifting, aiming for hypertrophy. E.g.: 3-4 sets of 8-12 repetitions with 90 second intervals between sets in free bench press. |
| 23 | Execute large and/or small muscle group exercises using machines, body mass or free weight lifting, aiming for strength endurance. E.g.: 5-10 sets of 15-20 repetitions with 30 second intervals between sets in free shoulder extension, holding the bar with a supine grip. |
| 24 | Execute defence and blocking techniques with upper limbs (blocking techniques with forearms, hands and elbows), Pakat Palmok (external side of the forearm) and An Palmok (internal side of forearm) against different predetermined kick techniques. E.g.: 1 set of 10 repetitions with the right arm and 10 repetitions with the left arm of Pakat Palmok (defence with external side of forearm) against Bandal chagui. |
| 25 | Execute a sequence of non-predetermined kicks against a kicking pads or a racket, kicking as fast as possible, deciding which technique to employ, taking into account when and where the kicking pad is positioned. E.g.: 3 sets of 2 minutes. 60 second intervals between sets. |
| 26 | Execute a sequence of kicks with the dominant leg, moving forward, backward and sideways freely by skipping, performing the same kick technique without letting the kick foot touch the ground until the end of the sequence. E.g.: 3 sets of 10 Bandal chagui. 30 second intervals between sets. |
| 27 | Execute a sequence of kicks with the dominant and non-dominant legs, moving forward, backward and sideways freely by skipping, performing the same kick technique without letting the kick foot touch the ground until the end of the sequence. E.g.: 3 sets of Dollyo chagui (non-dominant leg) followed by 5 Dollyo chagui (dominant leg). 3 minute intervals between sets. |
| 28 | Execute a sequence of kicks with the dominant and non-dominant legs, moving forward, backward and sideways freely by skipping, performing different kick techniques without letting the kick foot touch the ground until the end of the sequence. E.g.: 6 sets of 3 Bandal chagui (dominant leg), followed by 3 Dollyo chagui (non-dominant leg) and 1 Timyo chagui (dominant leg). 2 minute intervals between sets. |
| 29 | Execute a sequence of kicks with the non-dominant leg, moving forward, backward and sideways freely by skipping, performing the same kick technique without letting the kick foot touch the ground until the end of the sequence E.g.: 1 set of 5 Dollyo chagui. 30 second intervals between sets. |
| 30 | Execute a sequence of kicks with the non-dominant leg, moving forward, backward and sideways freely by skipping, performing different kick techniques without letting the kick foot touch the ground until the end of the sequence E.g.: 2 sets of 2 Bandal chagui followed by 3 Dollyo chagui and 1 Yop chagui. 60 second intervals between sets. |
| 31 | Active dynamic stretching exercises for lower limbs. E.g.: execute 3 sets of 10 repetitions of hip flexion at a maximal range of motion |
| 32 | Static active stretching exercises for lower limbs. E.g.: Execute 3 sets of 3 repetitions of hip abduction at a maximal range of motion or slightly above (pain threshold) and sustain the position for 30 seconds. |
| 33 | Stretching exercises for lower limbs using the proprioceptive neuromuscular facilitation method (PNF). E.g.: In a standing position or lying down, with the back on the wall or the ground, execute 5 sets of 1 repetition of hip flexion with the knee straight up. With a training partner, sustain the stretching position at maximal range of motion possible. Execute the contraction of hamstrings for 10 seconds against the resistance imposed by the partner. This partner has to hold the calf of the stretching executer. Posteriorly relax (stop the contraction), and the partner applies an opposite force to the executer contraction, aiming to increase hip flexion. |
| 34 | Passive stretching exercises for lower limbs. E.g.: Execute 2 sets of 2 repetitions of hip extension with a maximal range of motion or slightly above (pain threshold) and sustain the position for 10 seconds. A training partner should pull the stretched leg during the exercise. |
| 35 | From a lying down position in decubiti dorsal, stand up and move forward, backward and sideways, followed by kicks against a kicking pad or racket, with the dominant and non-dominant legs performing the same kick technique. E.g.: In 5 sets of 90 seconds, execute 2 Pakat chagui, with the dominant leg and 2 Pakat chagui with the non-dominant leg. 30 second intervals between sets. |
| 36 | From the lying down position in decubiti dorsal, stand up and move forward, backward and sideways, followed by kicks execution against a kicking pad or a racket, with the dominant and non-dominant legs performing different kick techniques. E.g.: 5 sets of 90 seconds. Execute 1 Ap Dollyo chagui with the dominant leg and 3 Bandal chagui with the non-dominant leg. 30 second intervals between sets. |
| 37 | From the lying down position in decubiti dorsal, stand up and move forward, backward and sideways, followed by kicks execution against a kicking pad or a racket, with the dominant leg performing different kick techniques. E.g.: 5 sets of 45 seconds. Execute 1 Dollyo chagui and 1 Yop chagui. 30 second intervals between sets. |

| No | Description of exercises |
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| 38 | From the lying down position in decubiti dorsal, stand up and move forward, backward and sideways, followed by kicks execution against a kicking pad or a racket, with the dominant leg performing the same kick technique. E.g.: 3 sets of 2 minutes of 1 Mirô chagui. 60 second intervals between sets. |
| 39 | From the lying down position in decubiti dorsal, stand up and move forward, backward and sideways, followed by kicks execution against a kicking pad or a racket, with the non-dominant leg performing different kick techniques. E.g.: 5 sets of 2 minutes with 3 Dollyo chagui and 1 Bandal chagui. 30 second intervals between sets. |
| 40 | From the lying down position in decubiti dorsal, stand up and move forward, backward and sideways, followed by kicks execution against a kicking pad or a racket, with the non-dominant leg performing the same kick technique. E.g.: 10 sets of 30 seconds of 2 Yop chagui. 30 seconds between sets. |
| 41 | From the lying down position in decubiti dorsal, stand up and move forward, backward and sideways, followed by kicks execution against a kicking pad or a racket, with both dominant and non-dominant legs performing the same kick technique. E.g.: 5 sets of 90 seconds. Execute 2 Paka tchagui with the dominant leg and 2 Pakat chagui with the non-dominant leg. 30 second intervals between sets. |
| 42 | From the lying down position in decubiti ventral, stand up and move forward, backward and sideways, followed by kicks execution against a kicking pad or a racket, with both dominant and non-dominant legs performing different kick techniques. E.g.: 5 sets of 90 seconds. Execute 1 Ap Dollyo chagui with the dominant leg and 3 Bandal chagui with the non-dominant leg. 30 second intervals between sets. |
| 43 | From the lying down position in decubiti ventral, stand up and move forward, backward and sideways, followed by kicks execution against a kicking pad or a racket, with both dominant and non-dominant legs performing different kick techniques. E.g.: 5 sets of 45 seconds. Execute 1 Dollyo chagui and 1 Yop chagui. 30 second intervals between sets. |
| 44 | From the lying down position in decubiti ventral, stand up and move forward, backward and sideways, followed by kicks execution against a kicking pad or a racket with the non-dominant leg performing different kick techniques. E.g.: 5 sets of 2 minutes. Execute 3 Dollyo chagui and 1 Bandal chagui. 30 second intervals between sets. |
| 45 | From the lying down position in decubiti ventral, stand up and move forward, backward and sideways, followed by kicks execution against a kicking pad or a racket, with the non-dominant leg performing the same kick technique. e.g.: 10 sets of 30 seconds. Execute 2 Yop Chagui. 30 second intervals between sets. |
| 46 | From the seated position, stand up, perform kicks against the kicking pad, a racket or punching bags with the dominant and non-dominant legs, performing the same kick technique. e.g.: 5 sets of 90 seconds. Execute 2 Pakat chagui with the dominant leg and 2 Pakat chagui with the non-dominant leg. 30 second intervals between sets. |
| 47 | From the seated position, stand up, perform kicks against the kicking pad, a racket or punching bags with the dominant and non-dominant legs, performing the same kick technique. e.g.: 5 sets of 2 minutes. Execute 3 Dollyo chagui and 1 Bandal chagui. 30 second intervals between sets. |
| 48 | From the seated position, stand up, perform kicks against the kicking pad, a racket or punching bags with the dominant and non-dominant legs, performing different kick techniques. E.g.: 5 sets of 90 seconds. Execute 1 Ap Dollyo chagui with the dominant leg and 3 Bandal chagui with the non-dominant leg. 30 second intervals between sets. |
| 49 | From the seated position, stand up, perform kicks against the kicking pad, a racket or punching bags with the dominant and non-dominant legs, performing different kick techniques. E.g.: 5 sets of 45 seconds. Execute 1 Dollyo chagui and 1 Yop chagui. 30 second intervals between sets. |
| 50 | From the seated position, stand up, perform kicks against the kicking pad, a racket or punching bags with the dominant and non-dominant legs, performing the same kick technique. E.g.: 3 sets of 2 minutes. Execute 1 Mirô chagui. 60 second intervals between sets. |
| 51 | Analyse videos of previous fights to identify possible technical and tactical weaknesses and correct them. |
| 52 | Analyse videos of athletes from the same category and possible opponents in future competitions. |
| 53 | Throw a medicine ball. E.g.: 3 sets of 5 throws using a medicine ball, weighing 2 kilos, as far as possible. 30 second intervals between sets. |
| 54 | Simulate a fight where one of the fighters has to use the dominant and non-dominant legs, alternately and randomly, moving forward, backward and sideways freely by skipping, switching bases (front leg with rear leg) and performing different kick techniques. The other fighter should execute, as a unique resource, kick techniques with the dominant leg positioned at front throughout the combat. E.g.: 6 sets of 45 seconds, where one of the fighters performs different kick techniques with only the dominant leg. 30 second intervals between sets. |
| 55 | Simulate a fight where one of the fighters has to use the dominant and non-dominant legs, alternately and randomly, moving forward, backward and sideways freely by skipping, switching bases (front leg with rear leg) and performing different kick techniques. The other fighter should execute, as a unique resource, the same kick technique with only the dominant leg throughout the combat. E.g.: 5 sets of 60 seconds. One of the fighters has to perform different kick techniques as the other performs only Dollyo chagui. 30 second intervals between sets |

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| 56 | Simulate a fight where one of the fighters has to use the dominant and non-dominant legs, alternately and randomly, moving forward, backward and sideways freely by skipping, switching bases (front leg with rear leg) and performing different kick techniques. The other fighter should execute, as a unique resource, the same kick technique with only the non-dominant leg throughout the combat. E.g.: 3 sets of 2 minutes. One of the fighters should perform different kick techniques as the other performs only the Yop chagui. 60 second intervals between sets. |
| 57 | Simulate a fight where one of the fighters has to use the dominant and non-dominant legs, alternately and randomly, moving forward, backward and sideways freely by skipping, switching bases (front leg with rear leg) and performing different kick techniques. The other fighter should execute, as a unique resource, different kick techniques with only the dominant leg throughout the combat. E.g.: 6 sets of 45 seconds. One of the fighters should perform different kick techniques with only the dominant leg. 30 second intervals between sets. |
| 58 | Simulate a fight where one of the fighters has to use the dominant and non-dominant legs, alternately and randomly, moving forward, backward and sideways freely by skipping, switching bases (front leg with rear leg) and performing different kick techniques. The other fighter should execute, as a unique resource, different kick techniques with only the non-dominant leg throughout the combat. E.g.: 4 sets of 2 minutes. One of the athletes can perform different kick techniques with only the non-dominant leg. 60 second intervals between sets. |
| 59 | Simulate a fight where one of the fighters has to use the dominant and non-dominant legs, alternately and randomly, moving forward, backward and sideways freely by skipping, switching bases (front leg with rear leg) and performing different kick techniques. The other fighter should execute, as a unique resource, executing the same kick technique with only the non-dominant leg throughout the combat. E.g.: 5 sets of 2 minutes. One athlete can perform different kick techniques, and the other can perform only Tora Furyo chagui. 270 second intervals between sets. |
| 60 | Simulate a fight where one of the fighters has to use the dominant and non-dominant legs, alternately and randomly, moving forward, backward and sideways freely by skipping, switching bases (front leg with rear leg) and performing different kick techniques. The other fighter should execute, as a unique resource, the same kick technique with only the front leg, using the dominant leg throughout the combat. E.g.: 5 sets of 1 minutes. One athlete can perform different kick techniques, and the other can perform only the Dollyo chagui. 30 second intervals between sets. |
| 61 | Simulate a fight where one of the fighters has to use the dominant and non-dominant legs, alternately and randomly, moving forward, backward and sideways freely by skipping, switching bases (front leg with rear leg) and performing different kick techniques. The other fighter should execute, as a unique resource, the same kick technique with only the front leg, using the non-dominant leg throughout the combat. E.g.: 3 sets of 2 minutes. One athlete can perform different kick techniques, and the other can use only the Yop chagui. 60 second intervals between sets. |
| 62 | Simulate a fight where one of the fighters has to use the dominant and non-dominant legs, alternately and randomly, moving forward, backward and sideways freely by skipping, switching bases (front leg with rear leg) and performing different kick techniques. The other fighter should execute, as a unique resource, different kick techniques with only the front leg, using the non-dominant leg throughout the combat. E.g.: 4 sets of 2 minutes. One athlete can perform different kick techniques with only the non-dominant leg. 60 second intervals between sets. |
| 63 | Simulate a fight where only one athlete can strike, using the dominant and non-dominant legs, alternately and randomly, moving forward, backwards and sideways freely by skipping, switching bases (front leg with rear leg) and performing different kick techniques. The other fighter should execute, as a unique resource, techniques of defence and blocking with his upper limbs. "Palmok" (blocking technique with the forearm, hands and elbow), "Pakat Palmok" (forearm external side), "An Palmok" (forearm internal side) and lower limbs (feet, shank and knee). E.g.: 3 sets of 3 minutes. |
| 64 | Simulate a fight where only one athlete can strike, using the dominant and non-dominant legs, alternately and randomly, moving forward, backwards and sideways freely by skipping, switching bases (front leg with rear leg) and performing different kick techniques. The other fighter should execute, as a unique resource, techniques of defence and blocking with upper limbs. "Palmok" (blocking technique with the forearm, hands and elbow), "Pakat Palmok" (forearm external side), and "An Palmok" (forearm internal side). E.g.: 5 sets of 60 seconds. 30 second intervals between sets. |
| 65 | Simulate a fight where only one athlete can strike, using the dominant and non-dominant legs, alternately and randomly, moving forward, backwards and sideways freely by skipping, switching bases (front leg with rear leg) and performing different kick techniques. The other fighter should execute, as a unique resource, techniques of defence and blocking with lower limbs (feet, shank and knee). E.g.: 5 sets of 60 seconds. 30 seconds between sets. |
| 66 | Simulate a fight where only one athlete can strike, using the dominant and non-dominant legs, alternately and randomly, moving forward, backwards and sideways freely by skipping, switching bases (front leg with rear leg) and performing different kick techniques. The other fighter should execute, as a unique resource, the clinch (an approach used to get away from a sequence of attacks) immobilizing the opponent's arms by holding him). E.g.: 3 sets of 2 minutes. 60 seconds between sets. |
| 67 | Simulate a fight where only one athlete can strike, using the dominant and non-dominant legs, alternately and randomly, moving forward, backwards and sideways freely by skipping, switching bases (front leg with rear leg) and performing different kick techniques. The other fighter should execute, as a unique resource, dodging (moving away to escape a blow). E.g.: 3 set of 2 minutes. 120 second intervals between sets. |
| 68 | Simulate a fight where only one athlete can strike, using the dominant and non-dominant legs, alternately and randomly, moving forward, backwards and sideways freely by skipping, switching bases (front leg with rear leg) and performing different kick techniques. The other fighter should execute, as a unique resource, the Tchrigui (punch). E.g.: 3 sets of 2 minutes. 45 second intervals between sets. |
| 69 | Simulate a fight with no physical contact between fighters, using the dominant and non-dominant leg, switching bases (front leg with rear leg), and performing different kick techniques. E.g.: 2 sets of 1 minute, executing Bandal chagui, Ap chagui, Dollyo chagui, Na chagui, Pakat chagui, etc., alternating legs without straight contact against the opponent, who also performs kicks not predetermined, switching bases (front leg with rear leg), in response to an attack or counterattack. |

| No | Description of exercises |
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| 70 | Simulate a fight where a sparring partner applies the most used attack and counterattack of a future opponent of the main fighter. E.g.: 3 sets of 2 minutes. 1 minute interval between sets. |
| 71 | Simulate a fight in which one of the athletes is at a disadvantage (losing the fight), and he has to try to reverse the situation because time is running out. E.g.: 3 sets of 20 seconds in which one athlete is losing the fight for 3 x 0.60 second intervals between sets |
| 72 | Simulate a fight in which one of the athletes is in the lead (winning the fight), and he has to try to maintain the situation because time is running out. E.g.: 3 sets of 30 seconds, in which one athlete is winning for 3 x 0.60 second intervals between sets. |
| 73 | Simulate a fight in which a predetermined technique counts for more points. E.g.: 3 sets of 2 minutes in which the Furo chagui counts 5 points. 60 second intervals between sets. |
| 74 | Simulate a fight in which a predetermined technique counts for fewer points. E.g.: 3 sets of 2 minutes in which Bandal chagui counts no point. 60 seconds between sets. |
| 75 | Simulate a fight in which head kicks count for more points E.g.: 3 sets of 2 minutes, in which head kicks count for 5 points. 60 second intervals between sets. |
| 76 | Simulate a fight in which trunk kicks count for few or no points E.g.: 3 sets of 2 minutes in which kicks applied at the waist line count for no points. 60 second intervals between sets |
| 77 | Simulate a fight in which two athletes can move freely, performing techniques of different kicks with both legs, and a third athlete is the referee. E.g.: 3 sets of 2 minutes. 60 second intervals between sets. |
| 78 | Organize internal competitions between the athletes from the same team. E.g.: 3 sets of 2 minutes. 60 second intervals between sets. One athlete can fight up to 4 times a day as long as he keeps winning. |