

Performance analysis of dolyo chagi kick technique on disabled taekwondo athletes at the NPC special region of Yogyakarta

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ABSTRACT

The study aimed to analyze the technical performance of the *dolyo chagi* kick among athletes with disabilities at the DIY NPC Regional Training Center. This study employed a quantitative descriptive research design with an analytical approach. The study population consisted of athletes with disabilities participating in taekwondo at the 2024 DIY NPC Regional Training Center. A total sampling technique was used, including all six athletes with disabilities in the K44 classification. Data were collected through observations conducted by judges using a scoring rubric (observation sheet). The data were obtained from video recordings of the athletes performing the *dolyo chagi* kick technique. Descriptive percentage analysis was used to analyze the data. The results showed that the technical performance of the *dolyo chagi* kick was classified as "very poor" for 0.00% (0 athletes), "poor" for 83.33% (5 athletes), "good" for 16.67% (1 athlete), and "very good" for 0.00% (0 athletes). Based on the mean score, the technical performance of the *dolyo chagi* kick among athletes with disabilities at the DIY NPC Regional Training Center was classified as poor. Future researchers are encouraged to examine the overall technical performance of movements required in para-taekwondo, as well as the athletes' physical performance.

KEYWORDS

Performance Analysis; Dolyo Chagi Kick; Taekwondo Athletes; Disability

1. INTRODUCTION

Athletes with disabilities are individuals who have physical, mental, or social limitations that affect their sporting activities (Rudiyati, 2013; Septianisa & Caninsti, 2018). Limitations in athletes with disabilities can be temporary or permanent, so they require more intensive attention during the

training process compared to non-disabled athletes (Sudarko et al., 2023). Despite physical or mental limitations, disabled athletes have significant skills and potential to develop. Therefore, the development of their potential should not be limited by the differences between disabled and non-disabled athletes. Specialized assistance during the training process is essential so that disabled athletes can adapt to the challenges they face as well as meet their specific needs (Diahwati & Hanurawan, 2016; Yunita et al., 2019).

Athletes with disabilities are individuals with incomplete physical conditions, which can increase the risk of physical injury during training or competition. Therefore, a structured coaching program is needed so that athletes with disabilities can practice safely and optimally (Nicholls et al., 2023). The National Paralympic Committee (NPC) of Yogyakarta Special Region (DIY), as an institution that houses athletes with disabilities, is committed to improving athlete performance with a systematic approach. One of the strategic steps taken by NPC DIY is through the organization of Regional Training Centers (Puslatda) for athletes with disabilities.

Puslatda, which is implemented in an organized and systematic manner, aims to create a safe, directed training environment and improve athlete performance. This program is also in line with the global approach to the development of athletes with disabilities which emphasizes the importance of safe physical activity adaptations (Coppinger et al., 2017). With the proper implementation of *Puslatda*, it is expected that DIY disability athletes can achieve optimal performance at the 2024 National Paralympic Week (Peparnas). This program not only focuses on physical improvement but also on mental and technical development, so that athletes can compete well at the national level.

Taekwondo is one of the sports competed in the 2024 National Paralympic Week (Peparnas). A total of 6 athletes with disabilities in the K44 classification (upper physical disability) have been prepared to take part in the 2024 Peparnas. To obtain optimal results, taekwondo disability athletes must have good physical, technical and mental qualities. Based on the results of the observation, it performed that the weakness of taekwondo athletes with disabilities was in the ability to move the *dolyo chagi* technique which was not perfect. This is because the previous coaching process was more oriented towards physical abilities, so that the correctness of the technical movements was less considered.

The tendency to lose balance when kicking is very high, especially in the implementation of the *dolyo chagi* technique. For this reason, it is necessary to analyze the implementation of the *dolyo chagi* technique so that the problem can be found and the right solution can be found immediately.

The analysis of technical motion will be oriented to four stages, namely: prefix, just before take-off, impact, and follow-through.

An athlete's performance can be said to be good if they are able to display perfect quality of movement, namely being able to apply technical movements correctly and appropriately, supported by adequate physical ability and a strong mentality. In order to achieve optimal performance in competitive sports, a touch of sports science is indispensable for coaches and athletes. This is because most of the training systems that are applied are still classical, which means that the training process is still based on a culture that has been passed down from generation to generation or based on the experience of the coach when he was an athlete. They still believe that the success that has been achieved is based on historical values that must be maintained, so sports science is relatively difficult for some coaches to accept.

Almost all sports try to show perfect performance in order to win every match. The better the performance, the higher the chances of winning the match. To achieve this goal, coaches must understand how athletes' performance can be improved and the factors and things that can affect athletes' performance during competitions. Thus, the coach must have the ability to identify the various strengths and weaknesses of his athletes in competition. The results of the identification in the form of data are then used as evaluation material for the coach in an effort to improve or enhance the quality of his athletes. The following factors must be considered by the coach in order to help analyze the athlete's performance correctly: theory, fitness, conditioning, and periodization.

Knowledge of sports biomechanics is one solution for coaches to make it easier to overcome various movement problems faced by athletes. Biomechanics is the study of the internal and external forces acting on the human body and the effects of these forces in sports and exercise (Lan et al., 2000; Mailapalli et al., 2015). Biomechanics can also be defined as a study that uses the concepts of mechanics and machines to reveal human motion efficiently (Hughes & Bartlett, 2002; McGinnis, 2013). Through the study of sports biomechanics, it is hoped that it can provide various movement problems for taekwondo disability athletes, especially when performing *dolyo chagi* kicks.

Taekwondo is a modern martial art that originated in Korea. Taekwondo comes from the word *tae* which means foot, *kwon* which means hand, and *do* which means art, meaning the way to discipline oneself (Firdausi et al., 2023; Mahardika et al., 2023). Therefore, taekwondo means a martial art that uses empty hand and kicking techniques. The kicks in taekwondo include: *ap chagi*

(front kick using the front foot), *dolyo chagi* (kick using the instep), *yeop chagi* (side kick using the instep), *dwi chagi* (back kick), and *twieo ap chagi* (front kick performed while jumping).

Dolyo chagi is a kicking technique that is predominantly used in taekwondo matches in the *kyoruki* category. The *dolyo chagi* kick is also very effective for scoring points during a match. For this reason, the *dolyo chagi* kick must receive special attention in the training process. *Dolyo chagi* is a taekwondo martial arts kick technique that is performed in a circular motion, upwards with the instep of the foot. The target of the *dolyo chagi* kick is the entire body and head that is protected.

The *dolyo chagi* kick technique is not easy to do, especially for beginners. The execution of the *dolyo chagi* kick technique is a series of complex movements, namely lifting the leg in a curved forward motion quickly and precisely on target. For beginners, the *dolyo chagi* kick technique often misses the intended target. A common mistake when performing the *dolyo chagi* kick technique is the level of accuracy on target (Tirtawirya, 2005).

Based on the explanation above and the results of research through a study of sports biomechanics, it is necessary to conduct research related to the motion performance of the *dolyo chagi* kick technique of taekwondo athletes with disabilities at the DIY NPC Training Center through motion analysis of the initial stage, just before take-off, impact and follow-through. The study aims to analyze the performance of the *dolyo chagi* kick technique of disabled taekwondo athletes at the DIY NPC Regional Training Center.

2. METHODS

2.1. Design and Participants

This type of research was quantitative descriptive research through an analytical approach. To answer and solve problems encountered during the research, it was carried out with observation by a judge. The research was carried out in August 2024 at the Juang Building in Yogyakarta City. The population in this study were taekwondo athletes with disabilities from the Yogyakarta Special Region NPC Regional Training Center. The sampling technique used total sampling, namely all 6 taekwondo athletes with disabilities from the Yogyakarta Special Region NPC. The research instrument used a rubric or observation sheet. Observations were made to directly observe the object under study. Research data was taken by observing a video that documented the subject performing a *dolyo chagi* kick. The research data collection technique used observation and assessment by a judge.

2.2. Procedure

The evaluation method in this study was carried out by observing and assessing the performance of *dolyo chagi* kick techniques performed by taekwondo athletes with disabilities at NPC Yogyakarta Special Region through video recordings which were systematically analyzed. The assessment was carried out by three expert judges using an observation sheet containing technical indicators such as balance, accuracy, speed, coordination, and the final position of the kick. Each indicator was scored based on a previously validated rating scale. The scores from each judge were then calculated to obtain the average value of each athlete's final performance. In addition, an inter-rater reliability test was conducted using the Spearman correlation coefficient to ensure consistency and objectivity of the evaluation results.

2.3. Statistical Analyses

The data analysis technique in this study uses descriptive percentage data analysis technique. To ensure the objectivity of the assessment in analyzing the performance of *dolyo chagi* kick techniques in taekwondo athletes with disabilities at NPC Yogyakarta Special Region, a statistical approach through the Spearman correlation coefficient was used. Three judges/experts who have qualifications in the field of disability taekwondo provide an assessment of technical performance based on predetermined technical indicators. The scores given by each judge were then analyzed using Spearman's correlation to measure the level of perception similarity between judges. High coefficient results (close to +1) indicate consistency and objectivity in performance assessment, while low values reflect significant differences in assessment that may indicate an element of subjectivity.

3. RESULTS

The results of the study are a description of the data from the analysis of the kick technique performance of taekwondo athletes with disabilities from the DIY NPC Training Center, which was measured using a rubric. The process of data collection was carried out by each athlete performing the *dolyo chagi* kick technique 3 times and then being judged by judges. The assessment of the *dolyo chagi* kick technique of disabled taekwondo athletes from the DIY NPC Training Center is based on a study of sports biomechanics with a series of technical movement stages, namely: the initial stage, the moment just before take-off, the impact stage and the follow-through stage. The overall results of the technical performance assessment of the *dolyo chagi* kick of the disabled taekwondo athletes of the DIY NPC Central Training Center can be seen in Table 1 as follows:

Table 1. Dolyo Chagi kick technique of disabled taekwondo athletes

Subject	Initial	Moment Before Take-Off	Impact	Follow-Through	Average
1	60.00%	60.83%	60.00%	60.00%	60.25%
2	55.00%	58.33%	54.17%	55.00%	55.75%
3	60.71%	61.67%	55.83%	60.00%	59.50%
4	63.57%	70.83%	65.00%	70.00%	66.50%
5	55.71%	56.67%	55.00%	70.00%	56.50%
6	69.29%	71.67%	60.83%	60.00%	67.00%

The results of the analysis through the assessment standards of the *dolyo chagi* kick technique of taekwondo athletes with disabilities from the DIY NPC Regional Training Center can be seen in Table 2 as follows:

Table 2. Frequency distribution of *Dolyo Chagi* kick technique

Interval	Category of	Frequency	Percentage
85%-100%	Very Good	0	0,00%
65%-84%	Good	2	16,67%
45%-64%	Less	5	83,33%
25%-44%	Very Less	0	0,00%
Amount		7	100%

Table 2 indicates that the *dolyo chagi* kick technique of taekwondo athletes with disabilities Puslatda NPC DIY is in the “very less” category of 0.00% (0 athletes), “less” of 83.33% (5 athletes), “good” of 16.67% (athletes), and “very good” of 0.00% (0 athletes). Based on the average value of *dolyo chagi* kick techniques, taekwondo athletes with disabilities NPC DIY Puslatda are in the less category.

After going through the assessment stages of the judge, then analyze the data that has been obtained. Data analysis of the *dolyo chagi* kick technique for taekwondo athletes with disabilities NPC DIY is carried out based on the initial stage, the stage just before take-off, the impact stage and the follow-through stage. The results of the data analysis of the *dolyo chagi* kick technique for taekwondo athletes with disabilities DIY NPC can be explained as follows:

First, in the initial stage, the results of the analysis through the assessment norms for the *dolyo chagi* kick technique of the DIY NPC Puslatda taekwondo athletes with disabilities based on the prefix stage are presented in Table 3 as follows:

Table 3. Frequency distribution of *Dolyo Chagi* kicks in the initial stage

No	Interval	Category	Frequency	Percentage
1	85%-100%	Very Good	0	0.00%
2	65%-84%	Good	1	16.67%
3	45%-64%	Less	5	83.33%
4	25%-44%	Very Less	0	0.00%
Amount			6	100%

Table 3 demonstrates that the *dolyo chagi* kicking technique of taekwondo athletes with disabilities from the DIY NPC Training Center based on the initial stage is in the category of “very poor” at 0.00% (0 athletes), “poor” at 16.67% (2 athletes), “good” at 83.33% (4 athletes), and “very good” at 0.00% (0 athletes). Based on the average score of the *dolyo chagi* kick technique, taekwondo athletes with disabilities at the DIY NPC Training Center are in the poor category at the initial stage.

To obtain more accurate data on the research results, an analysis of each indicator is needed. The results of the analysis of the *dolyo chagi* kick technique indicators of disabled taekwondo athletes from the DIY NPC Training Center based on the preliminary stage are presented in Table 4 as follows:

Table 4. Percentage of *Dolyo Chagi* kick indicators in the initial stage

No	Indicators	%	Category
1	head upright and eyes on the target	65.00	Good
2	arms in front of the body with elbows flexed as needed	65.00	Good
3	upright position and projection of center of gravity on the supporting leg	61.43	Less
4	legs open at least shoulder width apart	59.29	Less
5	supporting leg in front with heel of supporting leg and heel of attacking leg in a straight line from front to back	65.00	Good
6	The sole of the supporting foot faces the target. while the sole of the attacking foot faces slightly outwards.	65.00	Good

Table 4 illustrates that the indicators in the initial stage that obtained a low percentage score in the implementation of the *dolyo chagi* kicking technique for taekwondo athletes with disabilities at the DIY NPC Regional Training Center was in the upright stance position and the projection of the center of gravity on the supporting leg at 61.43%, and the indicator of legs open at least shoulder-

width apart at 59.29% (poor). Those who obtained a high percentage value were indicators number 1, 2, 5, and 6, which was 65.00% (good).

Second, the results of the analysis through the assessment norms of the *dolyo chagi* kick technique of disabled taekwondo athletes at the DIY NPC Training Center based on the momentary stage leading up to take-off are presented in Table 5 as follows:

Table 5. Frequency distribution of *Dolyo Chagi* kick momentary stage leading up to take-off

No	Interval	Category	Frequency	Percentage
1	85%-100%	Very Good	0	0,00%
2	65%-84%	Good	2	33,33%
3	45%-64%	Less	4	66,67%
4	25%-44%	Very Less	0	0,00%
Amount			6	100%

Table 5 reveals that the *dolyo chagi* kicking technique of the disabled taekwondo athletes based on the moment before take-off is in the category of “very poor” at 0.00% (0 athletes), “poor” 66.67% (4 athletes), “good” 33.33% (2 athletes), and “very good” 0.00% (0 athletes). Based on the average score of the *dolyo chagi* kick technique, the disabled taekwondo athletes of the DIY NPC Regional Training Center are in the poor category at the moment before take-off.

To obtain more accurate data on the research results, an analysis of each indicator is needed. The results of the study of the *dolyo chagi* kick technique indicators of taekwondo athletes with disabilities based on the momentary stage just before take-off are presented in Table 6 as follows:

Table 6. Percentage of *Dolyo Chagi* kick indicators at momentary stage just before take-off

No	Indicators	%	Category
1	Head held upright and gaze towards the target	65.00	Good
2	Normal arms in front of the body with elbow flexion adjusted as needed	65.00	Good
3	Hips rotated to the left/right so that both shoulders are facing the target	61.43	Less
4	Position of the projection of the center of gravity on the supporting leg		
5	Sole of supporting leg facing forward with knee flexion adjusted as needed	65.00	Good
6	The attacking foot rests on the base of the toes (on tiptoes) and faces forward (in the same direction as the supporting foot) with the knee flexed as needed.	62.86	Less

Table 6 demonstrates that the indicators that get a low percentage value in the implementation of the *dolyo chagi* kick technique for taekwondo athletes with disabilities in the DIY NPC Puslatda based on the stage just before take-off, namely the hip indicator rotated towards the left / right so that the position of the two shoulders is facing the target by 61.43% and the indicator of the attack foot resting on the base of the toe (tiptoe) and facing forward (in the direction of the fulcrum / left foot) with sufficient knee flexion of 62.86% (less). The indicators that obtained a high percentage were indicators number 1, 2, 5 amounting to 65.00% (good).

Third, in the impact stage, the results of the analysis through the assessment norms of the *dolyo chagi* kick technique for taekwondo athletes with disabilities in the DIY NPC Puslatda are showed in Table 7 as follows:

Table 7. Frequency distribution of *Dolyo Chagi* kicks at impact stage

No	Interval	Category of	Frequency	Percentage
1	85%-100%	Very Good	0	0.00%
2	65%-84%	Good	1	16.67%
3	45%-64%	Less	6	83.33%
4	25%-44%	Very Less	0	0.00%
Amount			6	100%

Table 7 presents that the *dolyo chagi* kicking technique of taekwondo athletes with disabilities from the DIY NPC Training Center is based on the impact stage, which is in the category of “very lacking” at 0.00% (0 athletes), “lacking” at 83.33% (6 athletes), “good” at 16.67% (1 athlete), and “very good” at 0.00% (0 athletes). Thus, the average score for the *dolyo chagi* kick technique of disabled taekwondo athletes at the Puslatda DIY NPC based on the impact level is in the poor category.

To obtain more accurate data on the research results, an analysis of each indicator is needed. The results of the analysis of the *dolyo chagi* kick technique indicators of disabled taekwondo athletes from the DIY NPC Training Center based on the impact stage are presented in Table 8 as follows:

Table 8. Percentage of *Dolyo Chagi* kick indicators at impact stage

No	Indicators	%	Category
1	Head upright and gaze towards the target	57.14	Less
2	Normal arms are at the sides with elbows flexed as needed	58.57	Less
3	The front stance is a <i>counter balance</i> (reaction) to the left/right attacking leg	55.71	Less
4	the attacking leg is pulled back so that the knee of the attacking leg is at waist level	57.86	Less
5	The sole of the attacking foot is relaxed and the sole of the supporting foot faces diagonally to the left/right	60.71	Less
6	The knee flexion of the supporting foot is adjusted as needed	52.14	Less

Table 8 shows that all taekwondo athletes with disabilities from the DIY NPC Training Center fall into the low category when performing the *dolyo chagi* kicking technique during the impact of the kick.

Fourth, the analysis result of follow-through stage illustrated through the assessment standards of the *dolyo chagi* kick technique of disabled taekwondo athletes from the DIY NPC Training Center are presented in Table 9 as follows:

Table 9. Frequency distribution of *Dolyo Chagi* kick in follow-through stage

No	Interval	Category	Frequency	Percentage
1	85%-100%	Very Good	0	0.00%
2	65%-84%	Good	2	33.33%
3	45%-64%	Less	4	66.67%
4	25%-44%	Very Less	0	0.00%
Amount			6	100%

Table 9 indicates that the *dolyo chagi* kick technique of taekwondo athletes with disabilities from the DIY NPC Training Center is based on the follow-through stage, which is in the category of “very lacking” at 0.00% (0 athletes), “lacking” at 66.67% (4 athletes), “good” at 33.33% (2 athletes), and “very good” at 0.00% (0 athletes). Thus, the average score for the *dolyo chagi* kick technique of taekwondo athletes with disabilities at the DIY NPC Training Center based on the follow-through stage is in the poor category.

To obtain more accurate data on the research results, an analysis of each indicator is needed. The results of the analysis of the *dolyo chagi* kick technique indicators of taekwondo athletes with disabilities from the DIY NPC Training Center based on the follow-through stage are presented in Table 10 as follows:

Table 10. Percentage of *Dolyo Chagi* kick indicators at the follow-through stage

No	Indicators	%	Category
1	Head upright and gaze towards the target	60.00	Less
2	Normal arm in front with elbow flexion as needed	57.86	Less
3	The front stance is a <i>counter balance</i> (reaction) to the action of the attacking leg	60.71	Less
4	The projection of the center of gravity is on the supporting leg	52.14	Less
5	The attacking leg is placed in front of the supporting leg at a distance of shoulder width and parallel to the supporting leg	57.14	Less

Table 10 showed that all the disabled taekwondo athletes of the DIY NPC Regional Training Center are in the low category when performing the *dolyo chagi* kicking technique.

4. DISCUSSION

Dolyo chagi is a kicking technique that is predominantly used by disabled taekwondo athletes because it is considered to have a high degree of efficiency and effectiveness in scoring points during a match. The efficiency and effectiveness of the *dolyo chagi* kicking technique can be assessed based on the accuracy and correctness of the athlete when performing optimally. Based on the results of the observation, it was noted that the disabled taekwondo athletes of the DIY NPC Training Center had not been able to perform the *dolyo chagi* kicking technique as expected by the coach. Based on the results of research through a study of sports biomechanics, it is necessary to conduct research related to the motion performance of the *dolyo chagi* kick technique of taekwondo athletes with disabilities at the DIY NPC Training Center through motion analysis of the initial stage, just before take-off, impact and follow-through.

In the initial stage of the *dolyo chagi* kick, the position of the head and torso at the initial stage of the *dolyo chagi* kick must be upright so that the gaze can focus on the target at the beginning. Because the eyes are one of the center of balance, they will have a major influence on every movement made by the athlete. By focusing the gaze on the target, it is hoped that the other parts of the body will also be more focused, thus facilitating the performance of the body segments in

the next stage of movement. Furthermore, the position of the legs has a major influence on the success of the *dolyo chagi* kick. Based on a study of sports biomechanics, the position of the legs in the initial stage is opened at least shoulder-width apart with the supporting leg in front and the attacking leg behind so that the athlete can perform efficient movements in the moment before take-off. The position of the heel on the supporting leg and the heel on the attacking leg in the initial stage of the *dolyo chagi* kick is not on a straight line, with the aim of facilitating rotational movement in the *articulatio coxae* in the moment just before take off (Hariono & Lubis, 2020).

In the moment before take-off, the head and torso positions as a whole meet the assessment criteria. The normal position of the arms affects the angular velocity at the *articulatio coxae* in the moment just before take-off, so that it can provide additional force (strain energy) for hip rotation. If flexion at the elbow is not performed, it can increase the moment of inertia so that abduction movements of the arm cannot be performed quickly. As a result, the arm cannot provide an optimal role for rotational movement of the hip (*articulatio coxae*). In addition, the function of the normal arm position at the initial stance stage of *dolyo chagi* is to keep the body position in a balanced state.

The situation where the center of gravity is on the supporting leg can cause the body position to be in a labile balanced state, so that it does not require too much force to rotate the hip (*articulatio coxae*) in the momentary stage just before take-off. This shows that the efficiency of leg performance in the initial stage is more dominantly influenced by the accuracy in placing the supporting leg position. Based on a review of sports biomechanics, a smaller angle of flexion of the supporting leg at the initial stance of the kick will increase the inertia of the body, requiring a greater force to change the body's position. Conversely, a larger flexion angle of the supporting leg will cause the addition of force (strain energy) to not be able to be done optimally (Hariono & Tirtawirya, 2023).

To obtain efficient movement results in the moment right before take-off, when performing a *dolyo chagi* kick, the stance and head must be kept upright. If the stance and head can be kept upright, the eyes will always be looking at the target so that the orientation of movement will also be more focused on the target to be kicked. The position of the arms in the moment before take-off also plays a big role in the scythe kick. The position of the arms and the amount of elbow flexion in the moment before take-off play a role in maintaining balance (Hughes & Bartlett, 2002; McGinnis, 2013). This means that athletes who have poor balance abilities must form a larger flexion angle at the elbow of the arm, while athletes who have good coordination abilities can form a smaller flexion angle at the elbow of the arm (*articulatio cubiti*).

Apart from maintaining balance, the position of the right arm in the moment before take-off also affects the speed of the attacking leg. For this reason, there needs to be a minimum standard and a maximum standard for elbow flexion. Based on a review of sports biomechanics, in order to obtain better speed at take-off, the elbow flexion of the right arm (*articulatio cubiti*) is made as small as possible (not less than 90°), so that the position of the arm is closer to the center of gravity (Hariono & Tirtawirya, 2023). The athlete's level of balance when performing a *dolyo chagi* kick is not only influenced by the height of the target but also by the knee extension movement made by the attacking leg at the point of impact. The greater the angle of knee extension made by the attacking leg; the lower the athlete's balance level will be. For this reason, there needs to be a counter balance movement made by the supporting leg, namely by flexing the knee joints (*articulatio genus*).

The results of the analysis reveal that knee flexion at the point of impact is still too small, so that the projected center of gravity is still inside the body. This condition causes increased inertia in the lower extremities, making it difficult for athletes to generate greater force and reduce angular velocity. As a result, athletes cannot generate optimal power when the target is impacted.

Although the follow-through movement is a continuation movement carried out in the final stage, the position of the head and torso must be kept upright so that the eyes remain focused on the target. By keeping the eyes on the target, the performance of the other body parts can be maintained to keep moving on the axis. In addition, keeping the head and neck in an upright position will cause the center of gravity to remain inside the body so that balance can be maintained.

The position of the right and left arms in the follow-through stage serves more to maintain balance. For this reason, the arm is more oriented to the position of the arm in relation to the body, because the amount of flexion of the right arm and the left arm is more influenced by the athlete's ability to balance and the speed of the attacking leg movement. Thus, the flexion of the arms in the follow-through stage is adjusted to the needs of each athlete.

One way to maintain balance is to lower the projection of the center of gravity as close as possible to the support surface. This also results in an increase in the level of inertia, requiring greater force to perform the next movement. To anticipate this, flexion movement of the knee of the supporting leg is needed so as not to increase body inertia and not lose balance. In addition, knee flexion in the supporting leg will make the range of motion in the knee joints still wide enough to cushion the force caused by the movement of the attacking leg.

5. CONCLUSIONS

The performance of the *dolyo chagi* kick technique of taekwondo athletes with disabilities from the Yogyakarta Special Region NPC Training Center is in the category of “very poor” at 0.00% (0 athletes), “poor” at 83.33% (5 athletes), “good” at 16.67% (1 athlete), and “very good” at 0.00% (0 athletes). Based on the average score, the *dolyo chagi* kicking technique of taekwondo athletes with disabilities at the Yogyakarta Special Region NPC Training Center is in the poor category.

The suggestions that need to be conveyed in connection with the results of this study include: 1) to develop further research on the *dolyo chagi* kicking technique of taekwondo athletes with disabilities at the Yogyakarta Special Region NPC Training Center, 2) the research results can be used as input and evaluation for Puslatda NPC DIY disability taekwondo coaches in preparing and compiling training programs, especially to improve *dolyo chagi* kicking techniques, and 3) it is recommended that future researchers analyze the overall technical movement performance required by disabled taekwondo athletes and physical performance.

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AUTHOR CONTRIBUTIONS

All authors listed have made a substantial, direct and intellectual contribution to the work, and approved it for publication.

CONFLICTS OF INTEREST

The authors declare no conflict of interest.

FUNDING

This research received no external funding.

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