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Original Research

Modification of hand muscle strength training equipment: study of the development of a ball stick for handball shooting

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Authors' contribution:

A. Conception and design of the study; B. Acquisition of data; C. Analysis and interpretation of data; D. Manuscript preparation; E. Obtaining funding

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Abstract

Background and Study Aim. This study aims to modify the ball stick as a hand muscle strength training aid for shooting handball as a training aid that can be used to train hand muscle strength against shooting strength.

Material and Methods. The research method used is Research and Development (R&D) with the Borg & Gall Development Model. This research was conducted in several steps, namely: potentials and problems, data collection, product design, design validation, design revision, trial use. The development of modifications to hand muscle strength training tools for shooting handball was first validated by material experts, expert practitioners, 7 product trial respondents, and 15 product use trial respondents.

Results. The results of this study indicate that the development of modified hand muscle strength training tools for shooting handball sports can be seen from material experts (78.75% in the appropriate category) and expert practitioners (78.09% in the appropriate category), 75.82% in small-scale trials in the appropriate category, and 82.46% in large-scale trials. eligible category. Thus, it can be concluded that the development of modified hand muscle strength training tools for shooting handball sports is declared feasible to be used as an exercise aid.

Conclusions. The results of this study also provide a new reference for hand muscle strength training tools for shooting in handball sports and can be used by sports practitioners and sports coaches in providing exercise programs.

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Modification_1;

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Introduction

Handball is a sport that is also the oldest in the world at the time of Ancient Greece. Handball is a game that uses a large ball, in which this game is played in a team by putting the ball into the

opponent's goal to win (Rahayu et al., 2020). The game of handball is more like the basic techniques of basketball (Hermansah, 2018). The basic handball techniques consist of passing, dribbling, shooting, catching, feinting, defending and attacking, and goalkeeping, which is the same as the basic basketball techniques, namely throwing, catching, dribbling techniques, shooting techniques (Suryadi, Saputra, et al., 2022). The playing field and its forms are also more like a soccer field, consisting of netted goals and areas limited by regulations that limit the opportunities for player movement including the mechanics of the game.

The basic technique of playing handball in the learning process must be taught, one of which is Passing (Hermansah, 2018), and other basic techniques consisting of dribbling catching the ball, shooting the ball. Shooting the ball is one of the most important techniques in handball because this technique determines the success or victory of a team in scoring goals. under two hands, throw throw while dropping the body. For the shooting section there are also several shooting styles, namely the standing throw shot, the jump shot, the dive shot, the fall shot, the side throw, the flying shot, and the reverse shot.

In addition, success in playing handball can be influenced by several factors, namely technique, tactics and physical condition (Al-ayyubi & Irawan, 2022), so it is important to do sports activities to stay physically fit. Sport is an activity that everyone can do (Suryadi, Gustian, et al., 2022), to maintain physical and mental health (Suryadi, Rubiyatno, et al., 2022). Various sports activities are played in order to get the ideal body (Khairunnisa Balqis et al., 2020), and physical fitness (Baek et al., 2020; Darmawan, 2017; Fikri, 2017; Prativi et al., 2013; Rubiyatno et al., 2023; Saputra, 2015; Sukendro & Triadi Santoso, 2019; Suryadi, 2022; Suryadi et al., 2021; Suryadi & Rubiyatno, 2022). Physical fitness is an activity carried out without experiencing significant fatigue (Suryadi, 2022)(Suryadi et al., 2023). So that sports activities carried out regularly can prevent obesity so that the body remains ideal and can expedite the body's metabolism, so that diseases experienced such as hypertension can decrease (Kristiawan & Adiputra, 2019).

Judging from the components of the physical condition. In this regard, handball is a sport that requires overall physical abilities and anthropometry (Ardian & Sifaq, 2018), so that they can do all the movements in handball properly, as mentioned Suryadi that a sportsman must have good physical fitness in order to be able to perform sports perfectly and achieve achievement (Suryadi, 2022). An article says that physical condition is also affected by shooting practice in handball (Al-ayyubi & Irawan, 2022). In the shooting department itself, grip strength or what is called hand muscle strength has a very important factor for shooting, passing and catching the ball. This is in line with the research results of Ardian and Sifaq which state that individual hand muscle strength has the greatest contribution to the accuracy of handball shooting, namely 63.04% (Ardian & Sifaq, 2018).

Factors that affect shooting are hand muscle strength, arm muscles, shoulder muscles, leg muscles, and abdominal muscle strength (Al-ayyubi & Irawan, 2022). Based on a survey on the field, the current training process is provided with a training program and makeshift facilities in the form of: futsal field, ball, skun, and stopwatch. Then, based on the results of interviews conducted with the Pontianak City Handball Club coach, he said that there were no specific training aids for shooting strength training for Pontianak city athletes. Based on the importance of training hand muscle strength in shooting for handball athletes, the researcher modified the tool to provide solutions and create new models of training equipment for athletes during shooting practice, the researchers made innovations by modifying the tool, namely the ball stick.

Based on this opinion, researchers are also in line with the theory of motion learning, where a movement learning occurs through muscular responses expressed in movements of body parts in part or in whole according to the principle of learning motion from easy to difficult or from simple to more. Because the throwing motion used is in the form of the muscles in the upper and lower arms, the muscles around the back and also the muscles in the legs. Related to the theory of motion in handball, special training is needed to improve movement skills in the handball shooting section so that it requires supporting tools for increasing hand muscle strength. In addition, research on the

development of training tools in handball is very rarely carried out, so this is one of the gaps that can be developed as well as the reason why this study is important.

Materials and Methods

Participants.

The small-scale product trial phase was carried out in a limited group by 7 students of handball sports coaching education, then the trial use used more subjects than product trials, totaling 15 Pontianak city handball athletes.

Research Design.

The method used in this research is the Borg & Gall development research (RnD) model according to (Sa'adah & Wahyu, 2021; Sugiyono, 2016). The research method provides an overview of how the research design includes; procedures or steps that must be fulfilled, time of research, data sources, and with what steps the data was obtained and then processed and then analyzed. Research development procedures include analysis of potential problems, data collection, product design, design validation, design revisions, trials, product revisions, re-trials, product revisions, mass production (Sa'adah & Wahyu, 2021; Sugiyono, 2016).

Statistical analysis.

Data collection in this development research uses closed and open questionnaires, which are accompanied by a suggestion column on the next page. The questionnaire was given to material experts, practitioner experts and tested on students of Sports Science FKIP Untan. The data that has been collected will be analyzed to determine the quality of the resulting product development. Product validation will use a feasibility formula based on (Sugiyono, 2016). Data analysis techniques were assisted by using Microsoft Excel 2016 software.

Table 1. Score Interpretation Criteria

Percentage	Category
86 - 100 %	Very worth it
71 - 85 %	Worthy
56 - 70 %	Pretty decent
41 - 55 %	Not worth it
< 41 %	Not feasible

Results

Product Development Modification of Hand Muscle Strength Training Tools for Shooting Handball Sports before conducting trials needs expert validation first. To test the product, it is carried out by material experts and practitioner experts.

Table 2. Mathematician calculation

No	Aspects Assessed	Score Obtained	Maximum Score	Percentage (%)	Category
1	Physical	23	30	76'66%	Worthy
2	Design	19	25	76%	Worthy
3	User	21	25	84%	Worthy
	Total score	63	80	78,75%	Worthy

Based on the results of the material experts on the product development of the development of modified hand muscle strength training tools for shooting handball sports regarding the assessment of the physical aspect of 76'66% which is categorized as Feasible while for the design of 76% which is categorized as Very feasible and for aspects of the user of 84% categorized as Feasible. From the total results of the research test according to the material expert of 78.75%, it is categorized as "Feasible" to be used as a training aid and tested in the next stage.

Table 3. Practitioner expert calculation results

No	Assessed Aspect	Score Obtained	Maximum Score	Percentage (%)	Category
1	Material	15	20	75%	Worthy
2	Physical	19	25	76%	Worthy
3	Design	24	30	80%	Worthy
4	User	24	30	80%	Worthy
	Total score	82	105	78.09%	Worthy

Table 3 shows the assessment of expert practitioners regarding the assessment of the material aspect 75% which is categorized as "Feasible", for the physical aspect 76% which is categorized as "Feasible Enough" while for the design aspect 80% which is categorized as "Feasible" and for the user aspect 80% which is categorized as "Feasible". From the results of the assessment test according to the expert practitioner of 78.09%, it is categorized as "Feasible" to be used as a training aid and tested at the next stage.

Table 4. Small-scale calculation results

No	Assessed Aspect	Score Obtained	Maximum Score	Percentage (%)	Category
1	Security	136	175	77.71%	Worthy
2	Comfort	103	140	73,57%	Worthy
3	Ease	106	140	75,71%	Worthy
	Total Score	345	455	75,82%	Worthy

Table 4 shows that for the safety aspect 77.71% is categorized as "Feasible" while for the comfort aspect 73.57% is categorized as "Feasible Enough" and for the convenience aspect 75.71% is categorized as "Feasible". For the total calculation of the feasibility of research according to the results of the calculation of the respondent test of 75.82%, it is categorized as "Feasible" to be used as a training aid to be tested at the next stage.

Table 5. Results of Large-scale respondent Counting

No	Assessed Aspect	Score Earned	Maximum Score	Percentage (%)	Category
1	Security	304	375	81.33%	Worthy
2	Comfort	244	300	84%	Worthy
3	Ease	256	300	90.67%	Very worth it
	Total score	804	975	82.46%	Worthy

Based on what was obtained in table 5 on 15 respondents, which was analyzed using the score interpretation criteria, namely from the product trial, it shows that for the safety aspect 81.33% is categorized as "Feasible" while for the comfort aspect 84% is categorized as "Feasible" and for the convenience aspect 90.67% is categorized as "Very Feasible". For the total calculation of the feasibility of research according to the results of the respondent test calculation of 82.46% categorized as "Feasible" to be used as a training aid.

Discussion

Based on that obtained in table 5 for 15 respondents, who were analyzed using the score interpretation criteria, namely from product trials, it showed that for the safety aspect 81.33% were categorized as "Decent" while for the comfort aspect 84% were categorized as "Decent" and for the convenience aspect 90.67% categorized as "Very Eligible". For the total calculation of research feasibility according to the results of the respondent's test calculation of 82.46%, it was categorized as "Easy" to be used as a training aid.

At the beginning of the development of this ball stick tool it was designed and produced into an initial product in the form of a hand muscle strength training tool for shooting handball games. An article says that hand muscle strength and shooting ability have a significant relationship (Mahyuddin

& Sudirman, 2021; Saputro, manurizal, 2020). The development process through research and development procedures. Then the product is developed with the help of someone who masters the ballstick tool, after the initial product is produced it needs to be evaluated by material experts and practitioner experts. The next research phase was carried out with product trials on a small scale and trial use on a large scale.

Products in phase I have passed the manufacturing stage and are ready to be validated by material experts and practicing experts. Then the product in stage I produces data on the assessment of material experts and practitioner experts accompanied by suggestions. In the expert's assessment of the change in the shape of the ballstick tool design and the loading inside the ball using sand and water as a load. Meanwhile, the assessment of expert practitioners giving added training models using existing tools and variations of paired exercises. Furthermore, small-scale respondent trials where the product has revisions to be changed in the hook section become not easily separated.

The results of the questionnaire test for material experts who initially gave an assessment of 62% in the category were quite feasible. After the product was revised, the material expert gave an assessment of 78.75% with a feasible category to try out, which means that research on the development of modifications to hand muscle strength training tools for shooting handball sports increased by 16.75%, where arm muscle power is an important physical component. required in handball (Ardian & Sifaq, 2018). Furthermore, the results of the questionnaire test for expert practitioners, which initially gave an assessment of 60.95%, were in a fairly decent category. After the product was revised, expert practitioners gave an assessment of 78.09% with a feasible category to be tried out, which means research for the development of modifications to hand muscle strength training tools for shooting handball sports increased by 17.14%. In previous research conducted on the sport of football, it is very feasible to use it to practice shooting skills (Perdana, 2021).

The results of research conducted by (Rihatno & Tobing, 2019) also proves the development of an arm muscle strength training model that is easy and interesting to do and effective for increasing the throwing ability of athletes in softball. Based on the results of small-scale respondent trials regarding the product Development of Modification of Hand Muscle Strength Training Tools for Shooting Handball Sports at 75.82% it was categorized as feasible with several product revisions to be tested in the next stage. After the revision of the small-scale product, the results of the large-scale trial of respondents regarding the product Development of Modification of Hand Muscle Strength Training Equipment for Shooting Handball Sports amounted to 82.46% which were categorized as feasible for use as training aids and an increase of 6.64%. Other research conducted by Kumbara, developed a smash variation training model that proved to be effective for implementing smash skill training in volleyball games (Kumbara et al., 2022).

Conclusion

The results of the research on the development of modifications to hand muscle strength training tools for handball shooting are categorized as suitable for use as hand muscle strength training aids for handball shooting. This can be seen from the results of assessments from material experts, practitioner experts, small-scale product trials and large-scale product trials. The results of this study prove that the modified training equipment is feasible to use and can be utilized by sports practitioners and sports coaches, especially handball. The weakness in this study is that the trial sample is still limited, due to time limitations, limited respondents due to conditions in the UAS state which is quite a hindrance to research. Further research recommendations can provide ballstick treatment in the sport of handball games and, of course, with a wider sample and population.

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Conflict of Interest And Funding

There is no conflict of interest.

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Original Research

The use of audio-visual media: how does it affect rhythmic movement skills?

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Authors' contribution:

A. Conception and design of the study; B. Acquisition of data; C. Analysis and interpretation of data; D. Manuscript preparation; E. Obtaining funding

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Abstract

Background and Study Aim. Audio-visual media is a tool for conveying information used in learning in the form of sound and image messages. This study aims to determine the effectiveness of using audio-visual media to improve rhythmic movement skills.

Material and Methods. The study used an experimental method using a one group pretest and posttest design. Students in this study were given treatment in the form of audiovisual media. The subjects of this study were grade V students of State Elementary School 4 Tebas Sambas Regency, totaling 27 people, consisting of 13 male students and 15 female students. The sampling technique used was total sampling. Data collection instruments use non-test instruments in the form of performance observations. The SPSS version 26 application was used to help with data analysis in this investigation.

Results. The results showed a significance value of $0.000 < 0.05$, so the data can be said to be significant. Based on these results, it can be concluded that the use of audiovisuals to develop rhythmic movement skills in students shows significant effectiveness.

Conclusions. These results provide evidence that audiovisual media can be applied to improve rhythmic movement skills in students, especially in elementary schools.

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Introduction

Physical education Sports and health are one of the subjects studied at school (Hasrion et al., 2020), early childhood education level to high school (Suryadi, 2022). Sports education helps

improve the quality of a healthy life through the principles of physical education (Wardana et al., 2020), physical activity is one of the media used in achieving learning goals (Haris, 2018). Physical activity that is carried out makes the body fit (Hardinata et al., 2021), in learning activities, physical activity is often carried out by playing methods (Syafriadi et al., 2021). Thus making the body healthy and increasing body fitness (Baek et al., 2020; González-Fernández et al., 2021). The learning process of physical education in schools includes affective, cognitive, and psychomotor aspects (Hanief et al., 2018). However, the main learning in physical education is in the psychomotor domain, namely in the activity of movement skills (Musthofa, 2016).

Learning is an educational interaction with students when learning to learn actively, so as to change thinking behavior and have learning experiences (Masdul, 2018). Provide facilities for students to learn together according to their needs (Angga et al., 2022), and deliver knowledge provided by educators to students in order to increase knowledge, attitude formation, and self-confidence (Fitrah et al., 2022). In the 21st century, learning is developed with a variety of models and strategies based on the characteristics of competencies and learning materials (Fitriyani et al., 2021). Because a learning can go well, one of which is influenced by the characteristics of students (Safithri et al., 2021). Therefore, as an educator, you must have the ability to facilitate and choose learning strategies that are in accordance with the characteristics of students (Fadhilah, 2021).

Educators have a big role in contributing to the success achieved by students (Hidayat & Kosasih, 2019; Suryadi et al., 2023). Changes in behavior, thinking ability, and movement skills are indicators of the success of students in learning, which can be seen from learning outcomes (Kunahyono et al., 2020; Mulia et al., 2021). Evaluation activities are carried out after learning is complete in order to determine deficiencies during the learning process that need to be corrected so that the desired competencies can be achieved (Haryani et al., 2022). Therefore, improving the ability of educators, especially the application of models or methods, is very important to improving the quality of education (Trimantara, 2021). Teacher creativity when teaching is very helpful for students in terms of mastering material by providing guidance, directing, and making good learning designs (Hasana et al., 2021). Besides that, the development of learning media is one way to convey it so that it is easier to understand (Pranata et al., 2021). The achievement of learning physical education, sports, and health is bound by the existence of learning media, both facilities and infrastructure (Sukanto et al., 2022).

Learning media is a means of communicating material information (Khozain & Mumaisaroh, 2020). The use of learning media yields positive results for educators and learners, because it creates effective and efficient learning processes and makes concentration more focused (Achmad et al., 2021; Fauzi & Rosliyah, 2020) and has the advantage of putting two senses working simultaneously (Herlina & Suherman, 2020). Teaching is often done using media such as books, pictures and magazines (Cahyono et al., 2021). Besides, one of the learning media that can be used is visual audio based media (Kurniawan et al., 2022).

Audio-visual media is a delivery of information that can comprehensively reveal elements of images and sound (Wati, 2016). In learning using audiovisuals, educators can express objects and events as real situations so that students can obtain information (Cahyono et al., 2021). In addition, audio-visual-based learning media has an attractive design and provides innovation (Pranata et al., 2021). Because the material conveyed visually in the video is very effective in helping teachers convey material that is dimensional in nature, such as performing motor movement skills (Jusmiana et al., 2020). However, the use of the media must also be in accordance with the learning material (Muslim, 2021). In the subject of physical education, sports, and health, there are several materials whose dominant aspect is movement skills, one of which is the material for rhythmic movement activities.

Rhythmic movement activities are a series of human movements carried out in motion patterns that are adjusted to changes in tempo or are merely movements of body expression following musical accompaniment or beats outside of music (Mashud & Ihwanto, 2022). This activity shows the

expression of children's movements that will appear by themselves according to the rhythm of the song listened to because through songs it can lead to children's creativity, social sensitivity to the environment, and all the potential development of children (Hariyani & Anggraeni, 2022). In this rhythmic movement activity, students must have body flexibility, especially in swinging arms and footsteps that must be adjusted to the beat of the rhythm either with music or without music (Kemendikbud., 2018).

Based on the results of the initial observations of researchers conducted at the State Elementary School 4 Tebas in class V, totaling 30 people. The skills of students to perform rhythmic movements are still low. This can be seen when taking scores at the end of the learning process the movements displayed are less varied, and there is a lack of coordination between movements in their implementation. After being observed from the beginning of learning, it can be seen that learning is still teacher-centered, the media used is in the form of motion demonstrations that do not interest students, as a result, students' movement activities become minimal and they become unmotivated to participate in learning. In overcoming these problems, a teacher must improve his ability to use learning models (Trimantara, 2021) and use learning models creatively (Abidin, 2019). The development of creative and innovative learning media in physical education learning is one way to overcome problems (Pranata et al., 2021). Thus, students' interest in learning will be high, so it will produce good achievement (Apriliani & Panggayuh, 2018).

Based on the problems, exposure to theoretical studies, and results of relevant research above, the solution that researchers use to improve students' rhythmic movement skills is to use audio-visual media in the form of learning videos. Video tutorials can be used as learning media (Hasana et al., 2021), learning materials that require visualization that demonstrate certain things so that they will be more effective when presented through the use of video technology (Adliani & Wahab, 2019). Videos that are displayed provide teaching in the form of skills, shorten or extend time, and influence attitudes so that students will feel they are in the conditions shown in the video (Damitri, 2020). Research conducted by (Rupawati et al., 2017) revealed that the application of learning media through audiovisuals can improve economic learning outcomes. In addition, the results of research conducted by (Khozain & Mumaisaroh, 2020) regarding learning media in the form of videos have an influence and are able to improve student learning outcomes in moral creed lessons. Then research conducted by (Jusmiana et al., 2020) related to the use of audio-visual media showed an increase in math learning outcomes during the COVID-19 Pandemic.

Based on the problems and the explanation of the study of the theory and previous relevant research related to the application of audio-visual media in the context of learning, which was carried out during the COVID-19 pandemic in subjects other than physical education, Therefore, researchers want to apply audio-visual media to learning whose characteristics are moving, namely in physical education, sports, and health subjects, more specifically in rhythmic movement activity material. This is a good application to make and a step toward innovation in learning media in physical education and health subjects. Because one of the characteristics of a professional teacher is being able to use and modify learning media (Raibowo & Nopiyanto, 2020). So that it can produce a pleasant atmosphere to encourage students to participate in learning and make it easier to understand the material (Cahyono et al., 2021).

Materials and Methods

Participants.

The subjects of this research were 5th grade students of State Elementary School 4 Tebas, Sambas Regency, totaling 27 students, consisting of 13 boys and 15 girls. The sampling technique uses total sampling, so that the entire population is sampled.

Research Design.

The study used an experimental method using a one group pretest and posttest design. Students in this study were given treatment in the form of audiovisual media. Before the treatment was carried

out, a pretest was carried out to find out the initial data of the study. Then students were given audiovisual media treatment for 12 meetings to improve rhythmic movement skills. Then the final test was conducted to obtain data for comparison.

Data collection instruments use non-test instruments in the form of performance observations. The following are performance indicators to measure students' skills in rhythmic movement activities:

Table 1. Skill Assessment Indicators

Instrument	Indicator	Descriptor
	Footsteps	Marching Single Step (forward/ sideways) Double Step (forward/ sideways)
	Arm Swing	Easy walk / V Step Heel touch Arm Curl (Flexy) Bicep Curl (Flexy) Butterfly Open Your Up Up right row Push Chest Over Hard
	Combination movement	Footsteps Arm Swing

Source: (Mashud & Ihwanto, 2022)

Statistical analysis.

Data analysis in this study uses descriptive quantitative. Where the data obtained in the field is analyzed with the help of the SPSS version 26 application through the stages of prerequisite testing and hypothesis testing.

Results

Research data on student learning outcomes on rhythmic movement activity material using audio-visual media starting from pretest and posttest can be seen in the following table. The results in table 2 show the normality test value with a significance of $0.200 > 0.05$, so the conclusion is that the data is normally distributed. Furthermore, the t test can be done.

In table 3, the data shows the results of the t test, namely the significance value of $0.000 < 0.05$, so the data can be said to be significant. Based on these results, it can be concluded that the use of audiovisuals on rhythmic movement skills in students shows significant effectiveness. These results provide evidence that audiovisual media can be applied to improve rhythmic movement skills in students, especially in elementary schools.

Table 2. One-Kolmogorov Smirnov Normality Test

		Unstandardized Residual
N		27
Normal Parameters ^{a,b}	Mean	0,0000000
	Std. Deviation	3,92417081
Most Extreme Differences	Absolute	0,168
	Positive	0,131
	Negative	-0,168
Test Statistic		0,168
Asymp. Sig. (2-tailed)		.050 ^c

Table 3. Paired Sample t Test Results

Rhythmic Movement Skills	Result	Mean	Std. Deviation	t	df	Sig. (2-tailed)
Pair 1	pretest - posttest	-7,77778	8,28499	-4,878	26	0,000

Table 4. Descriptive Results of Pretest and Posttest of Rhythmic Movement Skills

Result	N	Range	Minimum	Maximum	Mean	Std. Deviation
Rhythmic motion pretest	27	20,00	60,00	80,00	71,0370	5,28045
Rhythmic motion posttest	27	17,00	68,00	85,00	78,8148	4,41185

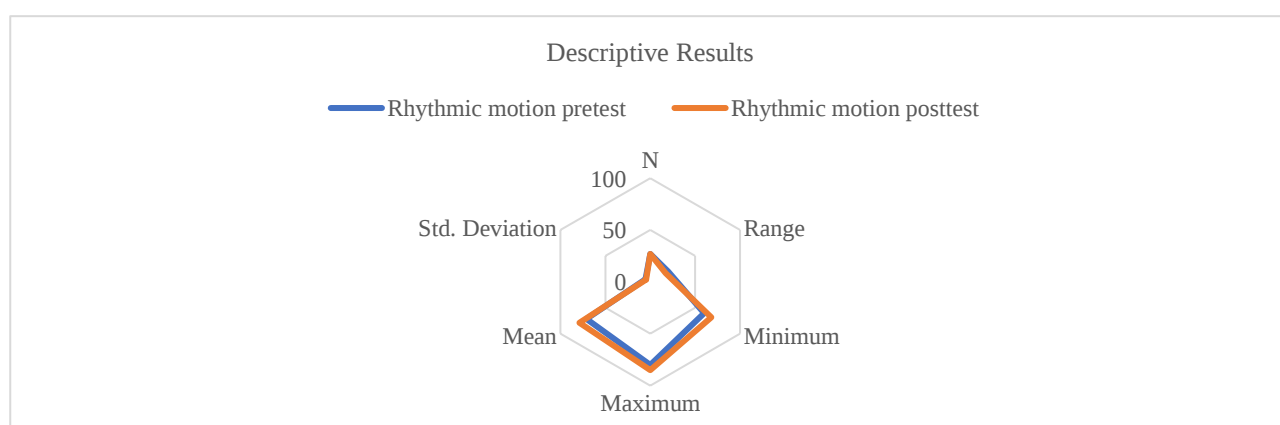


Figure 1. Descriptive Results of Pretest and Posttest

Based on the results in Table 4, it shows that the mean posttest value is greater, namely 78.81, while the pretest mean value is 71.03. These results reinforce the fact that the use of audiovisual media provides an increase in rhythmic movement skills. That way, audiovisual media can be an alternative to be applied to learning.

Discussion

This study aims to determine the effectiveness of using audio-visual media on rhythmic movement skills. The results showed an increase in student learning in rhythmic motion activities using audio-visual media accompanied by videos. The results based on the significance value also show a significant increase. Therefore, the results show that the use of audio-visual media is able to improve student learning outcomes, especially rhythmic movement skills. The results of this study are supported by various relevant previous studies, including Sukowati's (Sukowati, 2023) which states that the use of audiovisuals is able to increase students' interest in learning physical fitness exercises.

Based on research (Hayati & Harianto, 2017) said that there is a significant relationship between the use of audio-visual learning media and students' interest in learning. This affects learning outcomes, because high interest in learning will result in good achievement, but on the contrary, low interest in learning will also result in low achievement (Apriliani & Panggayuh, 2018). The results of the study are relevant, but different in the independent variables, namely learning interest and rhythmic movement skills. In addition, this research was conducted during the CO-19 pandemic and during normal times. The use of audio-visual media has also been carried out by (Lutfhi & Rahayu, 2022) the results of this study indicate a significant effect of the use of audio-visual media on improving the basic techniques of sprint athletics.

In line with this research, the difference lies in the material conveyed, namely, basic athletic techniques with rhythmic movement skills. Based on the results of research conducted by (Hasana et

al., 2021) revealed that ICT-based audio-visual learning media can be used in small groups, both face-to-face and online, as a learning resource for students. According to research conducted by (Lestari et al., 2021) audiovisual media are effectively used in physical education learning. This can be seen when students are able to understand learning material, and their learning outcomes have also increased. Meanwhile, research conducted face-to-face, one of which was conducted by (Anggraini et al., 2022) found that the use of audio-visual media is very effective in improving learning outcomes. This can be seen from the fact that the learning outcomes of students who were initially low can increase significantly.

Audio-visual media has advantages when used in learning, including being fun for students, being able to present concrete information, and being able to present learning experiences (Hadi, 2017). In addition, in research (Louk & Sukoco, 2016) said that audio-visual media in learning gross motor skills of lower grade children with disabilities is very good and effective. However, the use of audio-visual media should be adjusted to the facilities and infrastructure available at the school. This is because the most basic obstacle is inadequate facilities, because usually teachers and students carry out the learning process with adequate facilities but are faced with facilities that only depend on the internet (Mastura & Santaria, 2020).

Conclusion

Based on the results of the research and discussion described above, The results show that the use of audio-visual media in the form of learning videos improves rhythmic movement skills. These results also provide evidence that the use of audio-visual media can be applied to improve rhythmic movement skills. These results have added references for field practitioners to overcome learning problems, especially in rhythmic motion activity material. Future research recommendations include using other media and control classes so that the effectiveness of each medium used will be more visible.

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Conflict of Interest And Funding

There is no conflict of interest.

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Original Research

Retreat dribble and tight zig-zag combo training: does it affect the improvement of basketball athletes' dribble skills?

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Authors' contribution:

A. Conception and design of the study; B. Acquisition of data; C. Analysis and interpretation of data; D. Manuscript preparation; E. Obtaining funding

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Abstract

Background and Study Aim. Basketball is one type of sport that is often played by the community, especially among students. In the game of basketball, effective and efficient movements need to be based on the mastery of good basic technical skills. The purpose of this study is to determine the effect of retreat dribble and tight zig-zag combos on improving dribbling to support techniques that aim to get points for basketball athletes.

Material and Methods. This study uses a "quantitative" research method with a pseudo-experimental technique, which is research conducted strictly to determine the cause and effect between variables. The sample for this study was 12 athletes from SMPK Santa Maria Kediri. This research design uses a matching-only design. The research instrument used is a basketball dribbling test. Furthermore, the analysis in the study was assisted using the SPSS version 26 application.

Results. Hypothesis testing results using a one-sample test with a significance level of 0.05 obtained a value of 0.000 for backward dribbles and 0.000 for tight zig-zag combos. Based on these results, it shows that backward dribble training and tight zig-zag combos provide a significant increase in basketball dribble improvement.

Conclusions. Based on the statistical results, it can be concluded that both have an effect on dribbling ability. These results also provide evidence that the combo of retreat dribble and tight zig zag can be applied to train basketball dribbling ability.

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Introduction

Basketball is one of the team sports that has two teams with five players each (Suryadi et al., 2022). Where players grab each other and put as many balls as possible into the ring (Haïdara et al., 2023). Basketball is played in groups consisting of two teams, both male and female, who compete against each other to score points by putting the ball into the opponent's basket (Simanjuntak & H, 2014). A statement by Aris & Mu'arifuddin, (2020) said that the game of basketball is a game that

takes place in an area that has a hard floor or mat, measuring no more than 94 feet in length (29 meters) and no more than 50 feet in width (16 meters).

Furthermore, basketball is one type of big-ball sport that is often played by the community, especially by students. Through this sport, several benefits can be gained, including fitness, health, recreation, and achievement (Nursalam, 2016, 2013). The sport discovered by James A. Naismith has experienced a relatively advanced development; this is evident from the increase in basketball associations and quality athletes at the student and student level as seeds of professional basketball players. The holding of championships between associations, between schools, and between regions that are age groups adds to the rapid development of sports (Susanto & Nurharsono, 2022). In basketball games, effective and efficient movements need to be based on good mastery of basic technical skills (Fallis, 2013). Basic technical skills in basketball games can be divided into six categories: 1) throwing and catching techniques; 2) dribbling techniques; 3) shooting techniques; 4) pivoting movement techniques; 5) layup techniques; and 6) crawling techniques (Arif Abdul Malik, 2019).

According to Rustanto, (2017) to be able to play basketball, everyone must master some basic skills in basketball games such as dribbling, passing, and shooting. From some of the above opinions, researchers can conclude that to be able to play basketball, it is necessary to master basic techniques, namely, footwork (footwork), dribble (dribbling), pass and catch (throwing and catching), and shoot (shooting). When a player is able to master shooting, he can master the rhythm of the game so that he can score maximum points for his team. If this player is able to deceive the enemy and even fail to grab the ball in various conditions, for example, dribbling and being unable to pass the enemy, then the technique (shooting) can be used to get points and get victory easily.

Good physical condition is needed in shooting so that it can be done precisely and accurately. Physical condition is a requirement that an athlete must have in order to improve performance. A study states that physical fitness (Rubiyatno et al., 2023; Suryadi, Suganda, et al., 2023), and physical condition are indispensable prerequisites in efforts to improve the performance of an athlete (Supriatna et al., 2023; Suryadi, Yanti, et al., 2023). So it is said that physical conditions should not be postponed or bargained for as a basic need (Arwih, 2019). Meanwhile, Hibatullah et al., (2020) that the relationship between physical abilities and techniques cannot be separated. The ability to shoot basketball well needs to be supported by good physical abilities as well. In basketball, skill in shooting is very important. Preparation for basketball shots, according to Indrayogi & Heryanto (2019) mentions how to prepare for carrying out shots, namely hand position, view, balance, and shooting rhythm. The learning steps in class action research activities have four main components, namely planning, implementation, observation, and reflection (Ahmad, 2022).

The results of the interview with Agustinus Oni, the coach of Santa Maria Kediri Catholic Junior High School, found a lot of problems for athletes there. The most basic is the ability to dribble which is not in accordance with the wishes of the coach. Most coaches do have a basketball philosophy that the basic dribble technique is the initial foundation of playing basketball because it has several advantages. This is supported by several expert opinions, according to Arif Abdul Malik, (2019) dribbling is one of the ways allowed by the rules to carry the run in all directions. Further research reveals that the benefits of dribbling include 1) moving the ball out of a crowded area when passing is not possible, when the recipient is not free of guarding, and during fast-breaks to score, 2) penetrating the guard towards the ring, 3) attracting the attention of the guard to free teammates, 4) improve position or angle, 5) create scoring opportunities (Effendi & Rhamadhansyah, 2017).

Many studies do not specifically discuss the type of exercise to improve dribble skills, such as research conducted by Nurba as et al (2019) with the title "Efforts to improve basketball dribble skills with the playing method". This research is not specific to the dribble technique. This is supported by Suryadi Yusuf, (2017) with the title "Basketball Dribble Training Model for Beginners" which is not directly on dribble techniques. Therefore, researchers see a gap that can be developed and is one of the importance of this research to be carried out. Based on these problems, this study aims to see the

effect given After looking at the background above retreat dribble and tight zig zag combo on improving basketball dribbling.

Materials and Methods

Participants.

The population in this study was 12 male basketball athletes from Santa Maria Catholic Junior High School Kediri in 2020. The population in this study was 12 people, so the sampling technique used was a population study because all the people in this study were appointed as samples.

Research Design.

This research is quantitative research with a type of quasi-experiment where researchers do not randomize in determining the subject of the research group (Sugiyono, 2013). This research design uses a matching-only design. This design does not use randomization as a way to enter subjects into groups but uses matching, which pairs subjects with others based on certain variables (Ali Maksum, 2012). The treatment given is a retreat dribble and tight zig-zag combo. This research was conducted for 8 weeks with 3 meetings in 1 week with moderate intensity and carried out for 10–20 minutes. The research design can be seen in Figure 1.

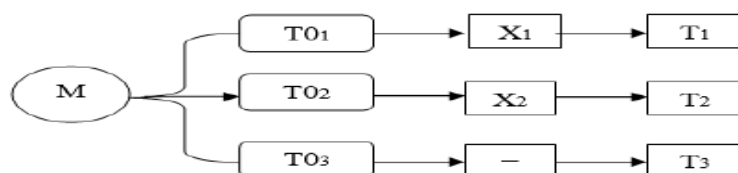


Figure 1. Research design Source: (Ali Maksum, 2012)

The research instrument uses a ball menggiriang test based on (Efendi & Widodo, 2019). The test instrument can be seen in Figure 2. The research design can be described as follows:

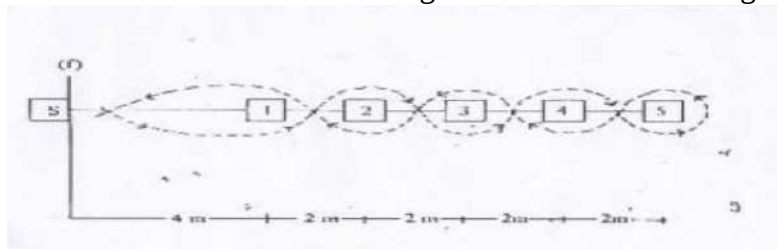


Figure 2. Dribbling Test Source: (Efendi & Widodo, 2019)

Statistical analysis.

The data analysis in this study is descriptive; the results of the data obtained are analyzed using the SPSS version 26 application. The data analysis used includes normality tests, homogeneity tests, and hypothesis testing.

Results

The measurement of dribbling ability before (pre-test) and after (post-test) treatment can be seen in the following table. The results of Table 1 show that the value of the dribble ability variable can be seen from the average value and standard deviation obtained from the results of research comparing the pre-test and post-test values. These results provide evidence that the mean posttest value of 9.77 is smaller than the pretest mean of 9.85, which means that there is an increase in basketball dribbling ability.

Based on the results in Table 2, the mean posttest value of 9.77 is smaller than the pretest mean of 9.85, so the tight zig-zag combo shows an increase of 0.08. Furthermore, the acquisition of pretests and posttests in group III (control) shows a value on the mean posttest of 9.85 that is smaller than the mean pretest of 9.89. The results can be seen in Table 3.

Table 1. Pretest and posttest data of group I (retreat dribble)

No	Name	Dribble ability (retreat dribble)	
		Pre-test	Post-test
1	David	9,47	9,40
2	Eka	9,53	9,47
3	Romoaldus	10,12	10,03
4	Immanuel	10,30	10,20
Jumlah		39,42	39,10
Rata-rata		9,85	9,77
St. Dev		0, 39971	0, 38003

Table 2. Pretest and posttest data of group II (tight zig zag combo)

No	Name	Dribble ability (tight zig zag combo)	
		Pre-test	Post-test
1	Yosua	9,47	9,4
2	Robi	9,53	9,47
3	Mobi	10,12	10,03
4	Obari	10,3	10,2
Jumlah		39,42	39,1
Rata-rata		9,85	9,77
St. Dev		0, 39971	0, 38003

Table 3. Pretest and posttest data of group III (control)

No	Name	Dribble ability (control)	
		Pre-test	Post-test
1	Hosea	9,48	9,45
2	Yohanes	9,58	9,55
3	Stanislaus	10,15	10,1
4	Aurellio	10,35	10,32
Jumlah		39,56	39,42
Rata-rata		9,89	9,85
St. Dev		0,4256	0, 42162

Table 4. Results of Data Normality Test of the Three Dependent Variables

Result Dribble ability	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Pretest_ Group 1	,286	4	.	,825	4	,154
Posttest_ Group 1	,265	4	.	,842	4	,201
Pretest_ Group 2	,283	4	.	,812	4	,125
Posttest_ Group 2	,277	4	.	,863	4	,269
Pretest_ Group 3	,267	4	.	,883	4	,352
Posttest_ Group 3	,265	4	.	,891	4	,389

Normality test table with a 5% error rate using Shapiro-Wilk. It is said to be normal if the score is greater than 0.05, and based on the table above, it can be said to be normally distributed. The results show $p > 0.05$, so it can be said that the data is normally distributed. The results can be seen in Table 4.

Table 5. Homogeneity Test

Pre_ Group 1 & Post_ Group 1	Pre_ Group 2 & Post_ Group 2	Pre_ Group 3 & Post_ Group 3
7	7	8

4	4	4
39,17	39,31	39,56
38,77	39,205	39,49
0,257	0,065	0,036
1,555	1,625	1,941
0,120	0,104	0,052

Table 5 shows the results of the homogeneity test with a significance value of $p > 0.05$, which means that the data is homogeneous. Furthermore, tables 6 and 7 show a significance value of $0.000 < 0.05$, so it can be concluded that the retreat dribble and tight zig-zag combo exercises are proven to have an influence on increasing basketball dribbling.

Table 6. One-Sample Test Group I (retreat dribble)

Result Dribble ability	t	df	Sig. (2-tailed)	Mean Difference
Pretest dan Posttest Group 1	53,012	3	0,000	9,7925
	58,498	3	0,000	9,5925

Tabel 7. One-Sample Test Kelompok II (tight zig zag combo)

Result Dribble ability	t	df	Sig. (2-tailed)	Mean Difference
Pretest dan Posttest Group 2	48,911	3	0,000	9,775
	51,719	3	0,000	9,8275

Table 8. Hypothesis Test Results (Correlation)

	Result	Variable Group 1	Variable Group 2
Variable Group 1	Pearson Correlation	1	,919**
	Sig. (2-tailed)		,001
	N	8	8
Variable Group 2	Pearson Correlation	,919**	1
	Sig. (2-tailed)	,001	
	N	8	8
	Pearson Correlation	,920**	,995**

Based on Table 8, the variables of treatment groups I (retreat dribble) and II (tight zig-zag combo) both have a very significant interpretation of the dependent variable (dribble ability). So it can be said that both treatment groups affect the ability to dribble basketball.

Discussion

This study aims to determine the effect of retreat dribbling and tight zig-zag combo training on improving basketball dribbling. The results showed a description of the data that had been obtained, showing that the treatment group experienced a decrease in time on the dribble. The post-test results show an increase in dribbling ability based on the average test results. In treatment group I, the average pre-test result was 9.85, while treatment group II had an average post-test value of 9.77. The results are also reinforced by the significance value, which shows a significant increase. Relevant research has found that the use of exercises is proven to improve basketball dribbling skills significantly (Anang Idris, 2019).

A study proves that the application of ballhandling training has an effect on improving basketball dribbling results (Rizhardi, 2020). The use of training methods using one ball and two balls simultaneously also affects basketball skills (Mayasari et al., 2018). The results of research conducted by Zahrina & Nurrochmah, (2021) provide evidence that direct and indirect t-drill dribble agility training has a significant effect on improving dribbling skills. Giving direct t-drill form dribble agility training turns out to be better than indirect.

Further research found that learning the jigsaw method provided an increase in basketball dribbling ability (Riyanto, 2019). Next, a cooperative learning-type group investigation can improve passing and dribbling basketball games (Amiruddin et al., 2020). This evidence will certainly strengthen the results obtained in this study, where retreat dribbling and tight zig-zag combo exercises have a significant effect on improving dribbling skills. So that these results can be considered in determining further research, especially in basketball games.

Other studies have found that there is a significant relationship between eye-hand coordination and basketball dribbling skills (Saputra et al., 2023). It turns out that agility has a significant relationship with dribbling skills (Arwih, 2019; Fatahillah, 2018). According to the results of research by Neldi, (2019) player speed also has a significant relationship with dribbling ability. The next study found that self-confidence and dribbling skills have a significant relationship (Kurnia, 2019). Some of the research evidence illustrates that basketball dribbling skills are a very important technique to improve. For that, it is necessary to do various kinds of training so that improvement occurs and achievement is achieved.

Conclusion

The results showed that the use of retreat dribbling and tight zig-zag combo exercises proved to have an influence on basketball dribbling skills. These results show a significant increase by using retreat dribble and tight zig-zag combo exercises. The results also found that retreat dribbling and tight zig-zag combos both have a very significant interpretation of the dependent variable (dribble ability). Researchers recommend that it be used as a reference for training patterns for coaches who develop or improve dribble skills and conduct deeper research on similar training. Furthermore, it can add other variables that can affect the results of this study, and of course, with a larger sample.

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Conflict of Interest And Funding

There is no conflict of interest.

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Original Research

Effectiveness of massage therapy injury sports methods ali satia graha: experimental study against chronic ankle

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Authors' contribution:

A. Conception and design of the study; B. Acquisition of data; C. Analysis and interpretation of data; D. Manuscript preparation; E. Obtaining funding

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Abstract

Background and Study Aim. The chronic ankle injury will interfere with the range of motion of the ankle joints, such as dorsiflexion, plantarflexion, inversion, and eversion. The motion of the ankle joint will be painful and limited. However, many methods are applied instead of curing the situation. Thus, the purpose of this study was to determine the effectiveness of massage therapy for sports injuries using the Ali Satia Graha method on pain and range of motion in the ankle.

Material and Methods. This study used a Pre-experimental design with a one-group Pretest-Posttest Design. The subjects in this study were determined by the purposive sampling technique, so 15 male patients aged 25–50 years were sampled. Where patients have chronic ankle injuries. In this study, the subjects were given treatment in the form of massage therapy for sports injuries using the Ali Satia Graha method. Instruments in the study were a numeric rating scale (NRS) for pain measurement and a goniometer with units of degrees for range of motion. Analysis in this study was assisted using the SPSS version 26 application.

Results. The results of the treatment of sports injuries with massage therapy by the Ali Satia Graha method on pain perception showed a significance value of $0.000 < 0.05$. So it can be said that there is significant effectiveness in reducing pain perception in chronic ankle pain. Furthermore, massage therapy for sports injuries using the ali satia graha method on dorsiflexion, plantarflexion, inversion, and eversion movements shows a significance value of $p = 0.000 < 0.05$. Based on these results, it provides evidence that massage therapy for sports injuries using the Ali Satia Graha method has a significant effect on range of motion in chronic ankles.

Conclusions. Based on these results, it has been established that the treatment of sports injuries with massage therapy by the Ali Satia Graha method can reduce pain perception and provide an increase in the range of motion in chronic ankle injuries.

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Introduction

Ankle injuries are common among athletes and non-athletes alike. Possible injuries include ligament and muscle tears (Barelds et al., 2018). The injury will interfere with ankle joint motions such as dorsiflexion, plantarflexion, inversion, and eversion. So that the motion of the ankle joint will be painful and limited (Jona James & Al-Dadah, 2021). Ankle injuries can occur due to sudden sprains laterally or medially, which result in the tearing of ligament fibers in the ankle joint (van den Bekerom et al., 2013). In addition, this is also influenced by the pressure of movement, physical contact, and non-physical contact between players (Konseptual & Sumartiningsih, 2012). Based on the results of research by Clifton et al., (2017) the incidence rate of causes of ankle sprain injuries is influenced by physical contact between players (58.3%) and non-physical contact (40.2%).

The ankle is formed by three joints: the talocrural articulation, the subtalar articulation, and the distal tibiofibular articulation. The foot and ankle are very complex joint structures consisting of many bones, ligaments, muscles, and tendons. This serves for stabilization and locomotion. Muscles and ligaments are joint stabilizers, including in the sensorimotor system (Kisner et al., 2012). Ankle sprain injuries can occur due to overstretching of the ankle lateral ligament complex in inversion and plantar flexion positions that suddenly occur when the foot does not rest perfectly on the floor or ground. It generally occurs on uneven surfaces. Ligaments in the lateral ankle include the anterior talofibular ligament, which functions to resist movement towards plantar flexion (Mustaqim et al., 2022). Posterior talofibular ligament, which serves to resist movement in the direction of inversion. The calcaneocuboideum ligament, which functions to resist movement in the direction of plantar flexion, Talocalcaneus ligaments that function to resist movement in the direction of inversion and calcaneofibular ligaments that function to resist movement in the direction of inversion (Chan et al., 2011).

Ankle injuries will result in limited ROM (range of motion) or limited joint motion, which results in discomfort when performing daily activities. ROM limitations are caused by many factors, including a lack or imbalance of muscles and disruption of the normal function of the entire kinetic chain. Limitations in joint range of motion are caused by pain, swelling, muscle spasm, muscle stiffness, joint contractures, and nerve damage, as well as increasing age (S. M. Wilson et al., 2011). Not only is the limitation of ankle ROM felt, but when experiencing an ankle injury, you will definitely feel pain when doing activities. Pain is an unpleasant sensory and emotional experience as a result of actual and potential tissue damage that hurts the body and is expressed by the individual experiencing it. When a tissue is injured or damaged, it results in the release of materials that can stimulate pain receptors such as serotonin, histamine, potassium ions, bradykinin, prostaglandins, and other substances that will result in a pain response (Kozier et al., 2009).

Seeing the description above, we can conclude that this ankle injury must be handled properly, quickly, and precisely. Because if it is not good at handling, then the ankle injury will become a more serious injury and will greatly interfere with daily activities and training time (A. Wilson & Lichtwark, 2011). Injuries to the ankle, from mild to severe, can be treated with medical treatment such as surgery or with traditional treatment. According to survey results in a study by Cooke et al., (2003), ankle injuries account for 3–5% of all visits to the UK Emergency Department, or the equivalent of 5,600 incidents per day. Another study by Bridgman et al., (2003) explained that the incidence rate of ankle injuries per year in UK A&E departments for new cases reached 302,000 and the rate of severe injuries reached 42,000.

Many people and even sportsmen do not know how to handle acute and chronic injuries. Incorrect handling will cause the injury to worsen and even make the athlete lose his best performance. Injuries to the ankle, from mild to severe, can be treated with medical treatment such as surgery or with traditional treatment. Efforts to cure pain disorders and decreased ROM can take the form of pharmacological and non-pharmacological treatments. In this study, the solution offered is non-pharmacology, which is a treatment carried out with various types of therapies such as acupuncture, shiatsu, heat therapy, cold therapy, masage, and others. One form of non-pharmacological treatment

is masase therapy, namely masase therapy for sports injuries by the Ali Satia Graha method. In the Ali Satia Graha method of sports injury therapy, there are friction (friction and effleurage), pulling or traction, and repositioning techniques.

Scouring or friction techniques are useful for destroying myogilosis or piles of residual combustion in the muscles. Effleurage is useful for improving blood circulation. Pulling or traction is useful for providing space from both joints that have experienced joint shift errors and repositioning to be returned to a normal position without shifting between the two joint bones so that it will increase the range of ROM (Graha, 2019). Therefore, this study aims to further investigate the effectiveness of the ali satia graha method of sports injury massage therapy to reduce pain and increase ROM in chronic ankle injuries. This is expected to be a new option for both athletes and non-athlete patients in the selection of alternative healing for chronic ankle injuries.

Materials and Methods

Participants.

The subjects in this study were determined by the purposive sampling technique. So that a sample of 15 male patients aged 25–50 years was obtained. Where patients have chronic ankle injuries and experience pain and limited range of motion (ROM) in the ankle. The time carried out in this study began in April–May 2023, while the research site took place at the Ali Satia Graha Method of Sports Injury Therapy Masage service at Plaza UNY Lt. 4 Yogyakarta.

Research Design.

This research method is an experimental design using a one-group pretest and posttest design. This data collection method uses two stages: the initial stage and the final stage, namely before treatment and after treatment (Pelamonia & Puriana, 2023; Suryadi et al., 2021, 2023). The initial stage in collecting this data is that the respondent first fills out a medical record questionnaire before being given treatment, and the researcher divides the respondent into several groups according to the criteria determined by the researcher, which are seen from the medical records that the respondent has filled out. After the treatment is given, the feeling of pain and ROM will be measured again by filling out the medical record questionnaire. A comparison of the results of filling out the two questionnaires (pretest and posttest) will show the effect and comparison between the Ali Satia Graha Method of Sports Injury Therapy Massage.

The pain measurement instrument is a tool used to obtain the results of the degree of pain, namely the Numeric Rating Scale (NRS) or Numeric Scale, which has a score of 1 to 10 to determine signs of red inflammation, pain, swelling, and heat. Furthermore, measurement of the space of motion (ROM) using a goniometer with units of degrees is needed to see the space of motion of the joints in the ankle before and after treatment. The number on the goniometer shows the angle in degrees, like an arc.

Statistical analysis.

The type of data obtained in this study is quantitative, obtained from measurements of the ROM of the ankle joint and pain scales in the ankle. The data analysis in this study used the SPSS version 26 application through the normalistas test and hypothesis testing stages.

Results

Descriptive statistical data analysis of pain perception data and ROM pretest and posttest values for dorsiflexion, plantarflexion, eversion, and inversion. Before the effect test is carried out, the normalization prerequisite test is first carried out. If the data is normally distributed $p > 0.05$, the t test will be carried out, while if the data is not normal $p < 0.05$ then use a non-parametric test. The data from the normality test results with the Kolmogorov-Smirnov and Shapiro-Wilk formulas show a significance value of $p > 0.05$, which means that the data is normally distributed. Therefore, it can be continued using the paired sample t test. The results can be seen in Table 1.

Table 1. Prerequisite Test of Normality

	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Pretest Pain	0,217	15	0,056	0,862	15	0,126
Posttest Pain	0,280	15	0,122	0,812	15	0,105
Pretest Dorsoflexion	0,178	15	0.200*	0,945	15	0,451
Posttest Dorsoflexion	0,184	15	0,182	0,854	15	0,120
Pretest Plantarflexion	0,101	15	0.200*	0,986	15	0,996
Posttest Plantarflexion	0,129	15	0.200*	0,958	15	0,653
Pretest Eversion	0,140	15	0.200*	0,945	15	0,445
Posttest Eversion	0,295	15	0,131	0,751	15	0,201
Pretest Inversion	0,186	15	0,172	0,949	15	0,511
Posttest Inversion	0,193	15	0,139	0,942	15	0,403

Table 2. Hypothesis Test of Pain and Range of Motion

Group	Result	Mean	Std. Deviation	t	df	Sig. (2-tailed)
Pair 1	Pre Pain – Post Pain	3,733	1,387	10,425	14	0,000
Pair 2	Pre Dorsoflexion – Post Dorsoflexion	-6,000	1,254	-18,537	14	0,000
Pair 3	Pre Plantarflexion -Post Plantarflexion	-9,000	2,330	-14,960	14	0,000
Pair 4	Pre Eversion – Post Eversion	-5,800	1,014	-22,149	14	0,000
Pair 5	Pre Inversion - PostInversion	-7,867	1,407	-21,647	14	0,000

Based on the results of hypothesis testing, it is found that the effect of massage therapy for sports injuries by the Ali Satia Graha method on pain perception shows a significance value of $0.000 < 0.05$. These results can be concluded to show that sports injury massage therapy using the ali satia graha method has a significant influence on the perception of pain in chronic ankle pain. Furthermore, the sports injury massage therapy ali satia graha method on dorsiflexion, plantarflexion, eversion, and inversion shows a significance value of $p = 0.000 > 0.05$. Based on these results, it proves that the sports injury massage therapy method of Ali Satia Graha has a significant effect on increasing Range of Motion (ROM) in chronic ankle injuries. Results can be seen in Table 2.

Table 3. Results of Descriptive Analysis of Pain Perception and ROM

Result	N	Range	Minimum	Maximum	Mean	Std. Deviation
Pretest Pain	15	3	5	8	6,87	1,060
PosttestPain	15	3	2	5	3,13	1,125
Pretest Dorsoflexion	15	6	9	15	12,33	1,799
Posttest Dorsoflexion	15	5	15	20	18,33	1,718
Pretest Plantarflexion	15	14	15	29	22,47	3,603
Posttest Plantarflexion	15	12	25	37	31,47	3,662
Pretest Eversion	15	5	6	11	8,33	1,543
Posttest Eversion	15	2	13	15	14,13	0,915
Pretest Inversion	15	10	13	23	17,33	2,944
Posttest Inversion	15	10	20	30	25,20	3,052

Based on the data in the table, the mean posttest pain value is 6.87 and the pretest is 3.13, which means there is a decrease in chronic ankle pain. Furthermore, the mean posttest dorsiflexion was 18.33 and pretest 12.33, the mean posttest plantarflexion was 31.47 and pretest 22.47, the mean posttest eversion was 14.13 and pretest 8.33, and the mean posttest inversion was 25.20 and pretest 17.33, which means an increase in ROM in chronic ankles after being given the treatment of massage therapy for sports injuries by the Ali Satia Graha method. The results can be seen in Table 3 and Figure 1.

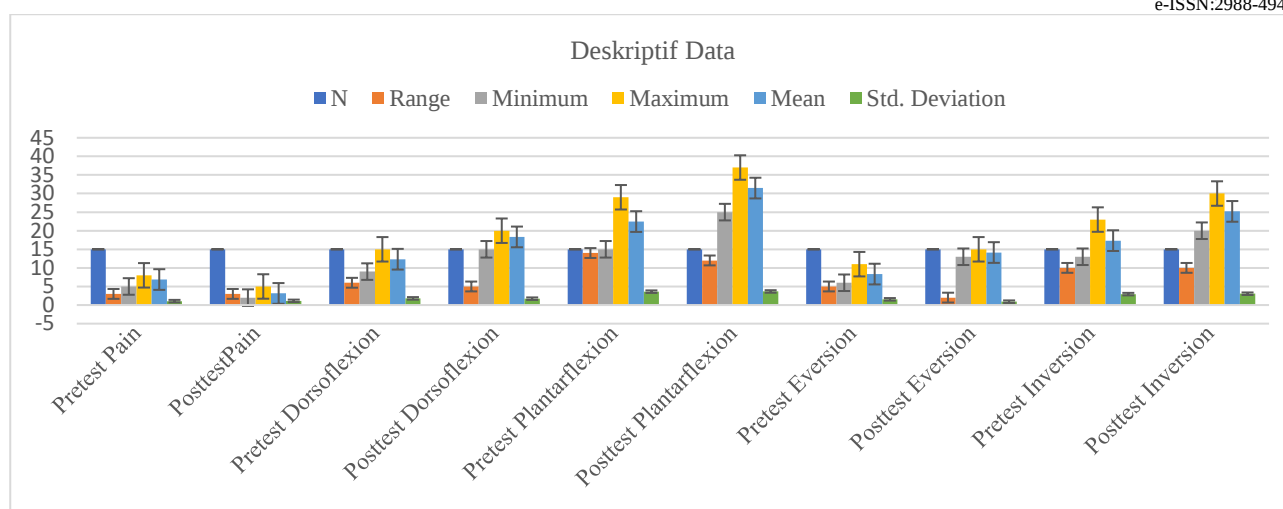


Figure 1. Results of Descriptive Data Analysis

Discussion

This study aims to further investigate the effectiveness of sports injury massage therapy using the Ali Satia Graha method to reduce pain and increase ROM in chronic ankle injuries. The results showed that massage therapy for sports injuries using the Ali Satia Graha method had an effect on pain perception and ROM in chronic ankle injuries. The results of the t count are greater than the t table, and the value is significant. So it can be concluded that the treatment of sports injuries with massage therapy using the Ali Satia Graha method can reduce pain and increase the ROM of chronic ankle injuries. The results of research by Delano, (2021) show that massage therapy using the Ali Satia Graha method with stretching has a significant effect on blood pressure in the elderly.

Another study revealed that massage, which has a distraction effect, can also increase the formation of endorphins in the descending control system and create muscle relaxation (Ilmi, 2018). In addition, sports massage treatment on the lower extremities is proven to increase the flexibility of soccer players (Ripai & Graha, 2019). Massage therapy and stretching performed on martial arts athletes turned out to provide good benefits for injury management (Satia Graha, 2015). From some of these reviews, it has been illustrated that massage therapy can have a positive effect on injury healing.

Incorrect handling will cause the injury to worsen and even make the athlete lose his best performance. Injuries to the ankle, from mild to severe, can be treated with medical treatment such as surgery or with traditional treatment. This statement is reinforced by the results found by Maulana & Graha, (2019) where massage with heat therapy has a significant effect on the recovery of trapezius muscle pain disorders. The use of traditional therapy and physiotherapy can be done by someone in the healing process. Traditional therapy can be done by massaging, such as sports injury massage therapy using the Ali Satia Graha method (Delano, 2021).

There was a decrease in pain and an increase in ROM in the chronic ankle after being treated with sports injury massage therapy by the Ali Satia Graha method. In its application, the manipulation of sports injury massage therapy will cause relaxation in the muscles by pressing and grinding on the muscles that have contracted with high intensity so that the muscles will relax and the pain will disappear. The weakness of this study is that it does not know exactly how to handle and treat injuries experienced by patients. This is because the research sample used is a patient with a chronic ankle injury, which is indicated by complaints of pain and limited ROM of the impaired ankle joint.

Conclusion

The results of the study have a strong foundation related to the handling of chronic ankle injuries that have been listed in the discussion. The results of the study found that sports injury massage therapy using the Ali Satia Graha method had a significant effect on pain perception in chronic ankle

pain. Furthermore, sports injury massage therapy using the ali satia graha method has a significant effect on increasing Range of Motion (ROM) in chronic ankle injuries. Based on these results, it provides evidence that the massage treatment of sports injuries using the Ali Satia Graha method is the right method to overcome the problem of pain perception and increase ROM in chronic ankles. These results have provided new references related to chronic ankle injury treatment. Recommendations for further research can compare the massage method Ali Satiagraha with other therapies to see the difference in the effect given.

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Conflict of Interest And Funding

There is no conflict of interest.

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Original Research

Stimulating game performance skills in students: experimental studies using net games

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Authors' contribution:

A. Conception and design of the study; B. Acquisition of data; C. Analysis and interpretation of data; D. Manuscript preparation; E. Obtaining funding

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Abstract

Background and Study Aim. Game performance is the quality and quantity of a person in carrying out the game that has been given in accordance with the responsibilities and results specified. But so far, it is still rare to find research that discusses games performance. This study aims to determine whether the stimulation of elementary school students' game performance ability through net games

Material and Methods. This research is a pre-experiment with a one-group pretest and posttest design. The sampling technique used purposive sampling so that 12 elementary school students could be obtained. In this study, students were given treatment in the form of net games. As for pretest and posttest data using instruments in the form of tests with rubrics, Data analysis uses Microsoft Excel 2019 and SPSS version 26 applications.

Results. The results showed a significance value of $0.000 < 0.05$, so the net game treatment had a significant effect on game performance. Furthermore, 16.7% were in effective performance, 58.3% were in moderately effective performance, and 25% were in weak performance. These results provide evidence that children are dominant and moderately effective.

Conclusions. Based on these results, this study proves that net games can be used to stimulate game performance.

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Introduction

Physical education is a component of education that, as a whole, has been based on many circles (Mashud et al., 2023; Suryadi, Samodra, et al., 2023). Physical learning in elementary school is intended to improve movement abilities and skills (Hanief, Nanda & Sugito, 2015). The existence of physical education affects the development of students by improving their abilities and movement skills (Dwi et al., 2020). Furthermore, physical education plays an important role in an effort to provide opportunities to move students; therefore, this is the teacher's job so that students remain active in learning. Then physical learning can use command learning methods that make students

happy to play. So that it can encourage cognitive, affective, psychomotor, intellectual, verbal information, attitudes, and emotional development by modifying games (Lestari et al., 2019).

Game performance can be related to performance or appearance to show the extent to which individuals or groups interpret the performance of achievements or improvements obtained as relevant to certain goals. The point is that it is a form of achievement achieved by individuals based on the target to be achieved or the level of achievement of the workload that has been targeted at individuals. To achieve performance, a target is usually set for athletes. To achieve these targets, it is usually planned before the match starts (Rubiyatno et al., 2023; Suryadi et al., 2021; Suryadi, Suganda, et al., 2023). To achieve maximum performance, athletes and coaches need clear goals.

A process result is a person's degree of achievement or genuine outcomes that are calculated on a regular basis, both in terms of quality and quantity, based on set objectives and predetermined criteria. Furthermore, decision-making, skill execution, successful game performance, number of decisions made, number of game involvements, and intention to be physically active through play and apply knowledge in the game improved (Barquero-Ruiz et al., 2021; Levenberg et al., 2020; Morales-Belando & Arias-Estero, 2017; Thomas et al., 2013). The periodic efficacy of a game based on standards established from the start is referred to as game performance.

The problem in this study is based on the results of observations and interviews with sports teachers, which found that students are still not active in PE learning. In addition, the sports teacher's understanding factor related to performance games also affects success. This statement is reinforced by Gustian et al., (2022) lack of understanding of sports teachers about physical learning in elementary schools. Furthermore, there are still few games that can improve performance in students (Farias et al., 2018), and the lack of sports practice hours in schools is related to performance (Praça et al., 2015).

The solution offered in this study is to apply net games, where net games have a significant effect on student movements (Rifai & Dwi Intani, 2020). Net games training has an effect on throwing, hull, jumping, and stepping movements (Kusumawati, 2017). These results are supported by Setiawan, (2019) net games consist of four categories of games in the TGfU approach: invasion games, fielding games, net games, and wall games. However, this study only focuses on online games. Net games can be played individually or in teams to score by hitting the ball in the field area using strength and accuracy. Where it is intended that the opponent cannot return before the ball falls with one bounce, like a volleyball.

Then it is also explained that in net games, the same game characteristics can be modified provided that the concepts and motion activities contained in the game are the same as in net games. Furthermore, the implementation of PE learning must be able to make students happy and fun and be carried out consistently (Domville et al., 2019). The practical game model is effective in improving the basic movements of elementary school students (Hasan et al., 2015). Physical education learning for students is to facilitate students in playing games. According to Rizki Burstiando et al., (2017) from the explanation above, game performance is one of the components that is the purpose of implementing PE learning at school. Facilitating practical tools so that learning can run smoothly and assessment is carried out continuously (Kovar, 2012).

There are principles of application that are carried out and components of learning for students to make it simpler to play net games. The modified net game makes it simpler for students to have strong movement abilities; therefore, it is used to help students reach their goals. However, in this study, students designed net games using a new game model as a result of modifications in the bounce media. As a result, this becomes the benefit and significance of the research to be conducted. Based on this description, the researcher wants to undertake research titled "stimulating elementary school students' game performance skills through net games."

Materials and Methods

Participants.

Subjects in the study were male students of the public elementary school 06 Batu Ampar Kuburaya Regency. Where in determining the sample using purposive sampling, a sample of 12 students was obtained.

Research Design.

This research includes quantitative research with an experimental approach, namely a one-group pretest and posttest design. As for this study to see the results of the ability of games performance in students after being given net games treatment, Before treatment is given to the sample, first conduct a pretest using the net games instrument, and then give a posttest after treatment to the sample. The measurement instrument uses the Game Performance Assessment Instrument (GPAI) to get the results of the game's performance ability.

Table 1. GPAI Assessment

Decision making			Skill execution	
Name	A	IA	E	IE
Score	20	0	0	20
Indeks (%)	DMI = A/(A + IA) DMI = 20/(20 + 0) = 1,0 (100%)		SEI = A/(A+IA) SEI = 0/(0+20)= 0,00(0%)	
GP John (%)	GP = DMI + SEI/2 GP = (1 + 0)/2 = 0,5 (50%)			
GI John	GI = sum of all appropriate and inappropriate behaviors (i.e., appropriate decisions made (20) + inappropriate decisions made (0) + appropriate skills execution (0) + inappropriate skills execution (20). GI = 20 + 0 + 0 + 20 = 40			

Statistical analysis.

The data analysis in this study used descriptive percentages. This aims to determine game performance in elementary school male students. Furthermore, the calculations in this study were assisted by the Microsoft Excel 2019 application and SPSS version 26.

Results

The data is described with descriptive and statistical data; this is intended to make it easier to understand the final results by clarifying the research results. Based on table 2 above, descriptive statistics show that the value of game performance is 6.16, so it can be said to be quite good. Furthermore, in Table 3, the results show that the value of game performance in students is a minimum of 56, a maximum of 66, and a mean of 6200. Where these results are classified as quite good values.

The results in Table 4 show that there are 16.7% in effective performance, 583% in moderately effective performance, and 25% in weak performance. These results provide evidence that children are predominantly moderately effective.

Table 2. Categories of Game Performance in Students

No	Student's Name	Basic Techniques			Decision-making			Cover			Games Performance
		E	TE	SEI	T	TT	DMI	T	TT	CI	GP
1	Nabil	9	8	0,52	12	8	0,6	13	7	0,56	0,56
2	Hardi	5	7	0,41	6	8	0,42	7	10	0,41	0,39
3	Akbar	4	8	0,33	5	6	0,45	6	10	0,37	0,38
4	Riski	5	8	0,38	6	8	0,42	4	7	0,36	0,38
5	Fatan	8	6	0,57	12	6	0,66	12	5	0,7	0,63

6	Faith	7	9	0,43	8	11	0,42	7	11	0,38	0,41
7	Ismail	9	8	0,52	9	5	0,64	9	4	0,69	0,61
8	Aldo	9	6	0,6	13	10	0,56	12	8	0,6	0,58
9	Fadli	10	8	0,55	11	8	0,57	10	7	0,58	0,56
10	Vian	11	9	0,55	10	9	0,52	10	6	0,62	0,56
11	Rabuan	9	8	0,52	10	8	0,55	8	6	0,57	0,54
12	Gunawan	12	10	0,54	11	8	0,57	12	9	0,57	0,56
Total											6,16

Table 3. Descriptive Statistics

Result	N	Minimum	Maximum	Mean	Std Deviation
Posttest Games Performance	12	.56	.66	.6200	.02558

Table 4. Games Performance Results

Games Performance Score	Absolute	Relative %	Deskriptive Rating
0,80-1,00	0	0%	Very Efektive Performance
0,60-0,79	2	16,7%	Efektive Performance
0,40-0,59	7	58,3%	Moderately Efektive
0,20-0,39	3	25%	Weak Performance
0,00-0,19	0	0%	Very Weak Performance

Table 5. One-Sample Kolmogorov-Smirnov Test

Result	Unstandardized Residual
N	12
Normal Parameters ^{a,b}	
Mean	.0000000
Std. Deviation	.02526327
Most Extreme Differences	
Absolute	.236
Positive	.181
Negative	-.236
Test Statistic	.236
Asymp. Sig. (2-tailed)	.064 ^c

Table 6. Homogeneity Test

Result	Levene Statistic	df1	df2	Sig.
Games Peformance	Based on Mean	4.748	1	22
				.140

Table 7. Paired Sample T Test

Result	t	df.	Sig.(2 tailed)
Pair 1 Pretest Games Performance - Posttest Games Performance	7.516	11	.000

Based on the results of the normality test with Kolmogorov-Smirnov, it is known that the significance value is $0.64 > 0.05$, so it can be concluded that the residual value shows a normal distribution. Thus, the data in this study continued with the t test. The results can be seen in Table 5. The results of the homogeneity test in Table 6 show that the significance value is $0.140 > 0.05$, so it can be concluded that the value is homogeneous. It is known that with a significance value of $0.000 < 0.05$, which means smaller, it can be concluded that net games have a significant effect on game performance. Based on these results, this study proves that net games can be used to stimulate game performance.

Discussion

This study aims to prove the stimulation of elementary school students' game performance abilities through net games. The results of this study indicate that net games have an effect on providing stimulus for game performance. In addition, net game treatment provides an increase in posttest game performance results, where there are 7 students in the moderately effective category, 2 students in the effective performance category, and 3 people in weak performance. Previous research results have proven that net games given to students have a significant effect on their basic movements (Rifai & Dwi Intani, 2020).

Further research obtained the results that throwing, hull, jumping, and stepping movements were influenced by net games (Kusumawati, 2017). These results are supported by Setiawan, (2019) finding that there is an increase in basic movements through net games. By playing online games, it can make learning easier and help improve student skills. Net games can also be played individually or in teams to score by hitting the ball in the field area using strength and accuracy so that the opponent cannot return before the ball falls (Doolittle, 1995).

Based on this review, it can be concluded that net games are games that use barriers between one team and another and can train discipline and good cooperation. In addition, net games can be used to stimulate game performance. As we can see from the results of the t test: 16.7% Effective performance, 58.3% Moderately effective performance, and 25% weak performance, it proves that there is an increase (Setiawan, 2019). In playing net games, there are principles of application that are carried out and aspects of learning for students to make it easier to play net games. The modified net game makes it easier for students to have good movement skills, so it is implemented to help students achieve predetermined goals (Kovar, 2012).

Then game performance can be improved through modified net games (Jensen et al., 2018). In addition, this study aims to determine the index of net games to stimulate game performance and improve children's movement skills (Karisman et al., 2020). Further research by Doolittle, (1995) proves that net games are able to stimulate game performance in children. Based on these results, this reinforces the evidence that net games can be used as learning designed in the form of games to improve game performance.

Another study found that game performance in water polo games can be improved by using shuttle swimming exercises (Sarimanah & Mulyana, 2020). Furthermore, in basketball games, it turns out that modifying Hybrid SE-IGCM learning can be used as a method to improve game performance (Agustan et al., 2020). The results of the review illustrate that applying various exercises related to physical activity can affect game performance.

Conclusion

Based on the results of the analysis and discussion, it has provided a strong basis for understanding game performance in students. The results provide information that shows that after treatment, net games have a positive impact on game performance. This is evidenced by the results in the moderately effective category. The results also showed that stimulating game performance skills were successfully improved by using net games. Where the significant results have a significant value. These results have certainly added new references related to improving game performance among elementary school students. So that net games can be applied by sports practitioners and teachers to stimulate game performance. Further research recommendations can provide additional variables that can affect the results of this study.

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Conflict of Interest And Funding

There is no conflict of interest.

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