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Physical Education Teachers Level of Knowledge About First Treatment of Injuries in Learning Using the RICE Method in Middle and High Schools in the West Sleman Region

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ABSTRACT

In physical education (PE) classes, injuries are common due to the active nature of the activities involved. As a result, it is essential for Physical Education, Health, and Sports (PJOK) teachers to be knowledgeable about the correct first aid procedures, including the application of the Rest, Ice, Compress, Elevation (RICE) method. However, there is limited research on the level of knowledge of PJOK teachers regarding the application of RICE for injury treatment, especially in the context of middle and high schools. This research aims to fill this gap by assessing the knowledge of PJOK teachers in the West Sleman area. The purpose of this research is to determine the knowledge level of PJOK teachers regarding the first treatment of injuries using the RICE method in middle and high schools in the West Sleman area. This study used a descriptive quantitative approach with a survey and questionnaire. The subjects were 13 middle school and 8 high school PJOK teachers from West Sleman. Total sampling was applied, and data were analyzed descriptively using percentages. The study found that 15 respondents (71.4%) had very high knowledge, and 6 respondents (28.6%) had high knowledge about the RICE method. Conclusion: Most PJOK teachers in West Sleman have very high knowledge of the RICE method. However, some teachers still have room for improvement. The findings indicate the need for ongoing first-aid training for PJOK teachers. Future research should focus on the effectiveness of continuous training and its impact on injury management in PE classes.

Keywords: Injury; Knowledge; Rest Ice Compress Elevation (RICE)

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INTRODUCTION

Physical education is an integral part of overall education that aims to develop aspects of physical fitness, movement skills, social skills, moral actions, healthy lifestyles, and introduction to a clean environment through systematically planned physical activities. It aims to achieve the goals of national education, which is to form individuals who are healthy, intelligent, and have character (Silvina et al., 2020). Physical education is very important because it can help learners develop various aspects of the body and soul simultaneously. In Indonesia, physical education is regulated as one of the subjects that must be followed by all students from elementary school to senior high school (Yuliza et al., 2022).

Physical education for children who are growing and developing must be considered carefully. During this period, children experience significant physical growth, which requires special attention, especially on aspects of physical fitness and basic motor skills. Therefore, physical education provided at school is expected to contribute to the physical

and mental development of children, as well as forming healthy living habits that are useful in the long run (Fahritsani et al., 2024)

As a subject that supports students' physical development, physical education also has goals that must be achieved through proper planning and effective learning strategies (Aghastya & Rochmania, 2022). In this case, there are many factors that influence the success of physical education learning, such as learning objectives, materials provided, teaching methods, time used, tools used, and assessments applied by teachers (Harmianto et al., 2024). However, although physical education is designed to improve students' physical fitness and skills, there is a risk of injury that may occur during the implementation of this learning. Injuries that occur in sports activities at school are often difficult to avoid, despite prevention efforts. These injuries can involve different parts of the body and can take many forms, such as sprains, bruises, fractures or muscle injuries (Ni luh, 2023)

Injury is one of the unavoidable risks in physical activities, and this is also true in physical education activities. Injury can be defined as damage to the body that occurs due to forces that exceed the body's tolerance or due to other factors that can cause interference with the body's daily functions (Badan Penelitian dan Pengembangan Kesehatan, 2013, p. 384). According to the World Health Organization (WHO), injury occurs when the body experiences a decrease in energy in an amount that exceeds the body's capacity or due to a lack of essential elements such as oxygen (Lubis et al., 2016, p. 1335). Injuries can happen to anyone, including in daily activities, when the body is not prepared for the activities performed. Therefore, it is important for every individual, including physical education teachers, to have a good understanding of injury prevention and the first treatment in case of injury to students (Liputo et al., 2024)

According to Sudirman et al. (2021), there are several factors that cause injury, including internal, external, and overused factors. Internal factors include the condition of the student's body itself, such as the lack of warm-up before activities. If the body is not flexible enough, the risk of injury becomes greater. External factors include environmental conditions or the facilities and infrastructure used, such as uneven fields or unsafe sports equipment. Meanwhile, the overused factor occurs when students do physical activities repeatedly without giving enough time for the body to recover, so that the body experiences fatigue which leads to injury (Huda et al., 2022).

Although there are various factors that can cause injuries, many PJOK teachers lack adequate knowledge regarding the prevention and first treatment of injuries (Sutirta et al., 2023). As a result, injuries that could have been treated immediately become more severe. In addition, many students are also not clear about the risk of injury and its impact, so they do not understand how to avoid or handle injuries properly. In this context, the role of physical education teachers becomes very important because they not only teach physical skills, but are also responsible for maintaining students' health and safety during physical education activities (Nurrokhmah & Anggita, 2024)

Physical education in schools not only aims to develop students' physical skills, but also to provide an understanding of the importance of safety during exercise. Therefore, physical education teachers must have good knowledge about injury prevention and treatment. Teachers must also be able to provide first aid to injuries that occur, both during physical education learning takes place and when students do activities outside of class hours. This is in accordance with the statement of (Muthmainah, 2022, p. 68-76) which states that teachers have an important role in preventing more severe injuries by providing appropriate and simple first aid.

Basic education about first aid, as mentioned by (Graha & Priyonoadi, 2009, p. 68), must be well understood by PJOK teachers. One method commonly used in injury management is the Rest Ice Compress Elevation (RICE) method. This RICE method is the first step that must be taken when someone is injured, especially injuries that cause inflammation or swelling. Rest aims to reduce pressure on the injured part, Ice is used to reduce swelling, Compress aims to further reduce swelling, and Elevation aims to help reduce fluid build-up around the injured area (Siswanti et al., 2021)

Injury management using the RICE method plays an important role in accelerating the healing process. Each component in the RICE method has a complementary function to effectively treat injuries. Rest helps reduce the pressure and load on the injured body part, Ice provides a cold effect that can reduce swelling and inflammation, Compress helps stabilize the injured area and reduce further swelling, while Elevation works to help blood flow out of the swollen area (Syampurma, 2020). If these steps are applied appropriately, the healing process will be faster and the injury will not get worse.

The phenomenon of injuries to students during physical education learning does occur frequently, especially at SMA Negeri 1 Mlati. During learning activities, students can experience minor injuries such as sprains, bruises, or abrasions. The first treatment carried out by the teacher, such as providing rest, using ice, and putting emphasis on the injured part, is in accordance with the level of knowledge possessed by the teacher. If the injury persists, the student will be taken to the nearest health facility (Dewangga et al., 2023). Teachers' knowledge of injury management is very important to prevent injuries from becoming more severe (Candra et al., 2021)

SMP Negeri 1 Mlati has also established cooperation with the nearest health center and hospital to handle health problems in the school environment. Several times counseling on how to maintain personal health and provide first aid was conducted by the health center. In addition, education about first aid is also provided through the scout organization in the school. This shows that the school has tried to improve the knowledge of students and teachers about injury management and prevention (Triyani & Ramdani, 2020)

Seeing the importance of knowledge about injury management, especially with the RICE method, the author feels the need to conduct further research on the level of knowledge of PJOK teachers in the West Sleman area about injury management in physical education learning. This research is expected to provide a clearer picture of the extent to which PJOK teachers understand and apply the RICE method in dealing with injuries that occur during learning.

METHOD

This research is a descriptive study, which, according to (Sugiyono, 2016, p. 147), is used to describe or depict the data that has been collected as it is. Descriptive research aims to provide an accurate and systematic description of a phenomenon or condition. In this case, the study focuses on the knowledge level of PJOK teachers regarding the first treatment of injuries using the RICE method in schools. By utilizing descriptive methods, the study captures a snapshot of the existing conditions and characteristics of the research subjects. The data collected provides an understanding of the subject matter without manipulating the variables.

The type of research

This study uses a descriptive quantitative research approach. The quantitative approach allows for the collection of numerical data, which can be analyzed to measure the level of knowledge. This design fits the research objectives, which seek to quantify and describe the existing knowledge among teachers in a straightforward and objective manner.

The time and location

This research was conducted in junior and senior high schools in the West Sleman area, including SMP Negeri 1 Seyegan, SMP Negeri 1 Godean, SMP Negeri 2 Godean, SMP Negeri 3 Godean, SMP Negeri 1 Minggir, SMP Negeri 1 Moyudan, SMP Negeri 2 Moyudan, SMA Negeri 1 Seyegan, SMA Negeri 1 Minggir, and SMA Negeri 1 Godean. Data collection was conducted from September 8 to September 22, 2023.

The goals or target

The target of this research is PJOK teachers in junior high schools and high schools in the West Sleman area. According to Sugiyono (Sugiyono, 2012, p. 80), population refers to a generalization area consisting of objects or subjects that have certain qualities and characteristics set by researchers to study and draw conclusions. In this study, the population includes all PJOK teachers in junior and senior high schools in West Sleman. Based on Arikunto's (2016) explanation, the sample was selected from the population based on its characteristics. Because the number of PJOK teachers in this area is less than 100, total sampling is used which means that all teachers are used as respondents. Thus, this study involved 21 respondents.

Research procedures

This study involved the development of a questionnaire to assess physical education teachers' knowledge of the RICE method for injury management. A total of 21 respondents from junior and senior high schools in West Sleman were selected using total sampling. Data was collected through questionnaires on September 8 to September 22, 2023. The data collected was analyzed descriptively, with results presented in percentage form to determine the level of teacher knowledge. The findings were then interpreted to provide recommendations for improving teacher training on injury management.

Instruments

Table 1. Research Instrument Framework

Variable	Factor	Indicator	Question Numbers	Total
Knowledge of PJOK teachers regarding first aid in learning with the RICE (Rest Ice Compress Elevation) method	Knowledge about Rest	Definition	1,2	10
	Treatment	Treatment	3,4,5,6	
		Treatment Result	7,8,9,10	
	Knowledge about Ice (Cold Therapy)	Definition	11,12	9
		Treatment	13,14	
		Tool Usage	15,16	
		Treatment Result	17,18,19	
	Knowledge about Compress (Pressure)	Definition	20,21	10
		Treatment	22,23	
		Tool Usage	24,25	
		Treatment Result	26,27,28,29	
	Knowledge about Elevation	Definition	30,31	9

	Treatment	32,33,34
	Treatment Result	35,36,37,38

Source: (Robin, 2016, p. 42)

Data collection techniques

Data were collected using the questionnaire survey method. The researcher first obtained permission from Yogyakarta State University and the schools involved. After informing potential respondents about the study, those who agreed signed a consent form. The questionnaires were then distributed via Google Forms, and the respondents filled out the questionnaires. The collected data were then processed and analyzed by the researcher.

Data analysis techniques

The collected data were analyzed using descriptive techniques with percentages to assess the knowledge of PJOK teachers about first aid in injuries with the Rest Ice Compress Elevation (RICE) method in junior high schools and high schools in the West Sleman area (Minggir, Moyudan, Godean, Seyegan). To process the data, a score was given to each respondent for each question, and the total score for each respondent was then calculated. Data were categorized based on the normal distribution model, which assumes that the scores of subjects in a group are representative of the estimated scores in the population, which is normally distributed. This analysis helped to assess the teachers' level of knowledge and their ability to apply the RICE method to treat injuries.

RESULTS AND DISCUSSION

The results of descriptive analysis for rest obtained from a questionnaire containing 8 statements resulted in a maximum value of 100; minimum value of 38; mean (M) 84.19; median (Me) 88; mode (Mo) 88; and standard deviation (SD) 14.81. Based on these calculations, a frequency distribution and categorization table can be compiled which is presented in the following table.

Table 2. Categorization of Rest of Junior and Senior High School Teachers

No.	Score Range	Frequency	Percentage (%)	Category
1	X ≥ 74,9	19	90,5	Very High
2	58,3 ≤ X < 74,9	1	4,8	High
3	41,7 ≤ X < 58,3	0	0,0	Medium
4	25,1 ≤ X < 41,7	1	4,8	Low
5	X < 25,1	0	0,0	Very Low

Source: personal data

Based on table 2, the rest categorization above, it can be explained that 19 respondents (90.5%) are in the very high category, 1 respondent (4.8%) is in the high category, and 1 respondent (4.8%) is in the low category.

The results of descriptive analysis for ice obtained from a questionnaire containing 8 statements resulted in a maximum value of 100; minimum value of 50; mean (M) 74.67; median (Me) 75; mode (Mo) 75; and standard deviation (SD) 13.43. Based on these calculations, a frequency distribution table and categorization can be compiled which is presented in the following table.

Table 3. Categorization of Ice of Junior and Senior High School Teachers

No.	Score Range	Frequency	Percentage (%)	Category

1	X ≥ 74,9	13	61,9	Very High
2	58,3 ≤ X < 74,9	5	23,8	High
3	41,7 ≤ X < 58,3	2	9,5	Medium
4	25,1 ≤ X < 41,7	0	0,0	Low
5	X < 25,1	1	4,8	Very Low

Source: personal data

Based on table 3, the compress categorization above, it can be explained that 17 respondents (81.0%) are in the very high category, 3 respondents (14.3%) are in the high category, and 1 respondent (4.8%) is in the medium category.

Descriptive analysis results for compress were obtained from a questionnaire containing 8 statements resulting in a maximum value of 100; minimum value of 50; mean (M) 78.85; median (Me) 75; mode (Mo) 88; and standard deviation (SD) 12.02. Based on these calculations, a frequency distribution and categorization table can be compiled which is presented in the following table.

Table 4. Categorization of Compress of Junior and Senior High School Teachers

No.	Score Range	Frequency	Percentage (%)	Category
1	X ≥ 74,9	17	81,0	Very High
2	58,3 ≤ X < 74,9	3	14,3	High
3	41,7 ≤ X < 58,3	1	4,8	Medium
4	25,1 ≤ X < 41,7	0	0,0	Low
5	X < 25,1	0	0,0	Very Low

Source: personal data

Based on table 4, the compress categorization above, it can be explained that 17 respondents (81.0%) are in the very high category, 3 respondents (14.3%) are in the high category, and 1 respondent (4.8%) is in the medium category. The results of descriptive analysis for elevation obtained from a questionnaire containing 8 statements resulted in a maximum value of 100; minimum value of 57; mean (M) 82.38; median (Me) 86; mode (Mo) 86; and standard deviation (SD) 10.26. Based on these calculations, a frequency distribution and categorization table can be compiled which is presented in the following table.

Table 5. Categorization of Elevation of Junior and Senior High School Teachers

No.	Score Range	Frequency	Percentage (%)	Category
1	X ≥ 74,9	15	71,4	Very High
2	58,3 ≤ X < 74,9	5	23,8	High
3	41,7 ≤ X < 58,3	1	4,8	Medium
4	25,1 ≤ X < 41,7	0	0,0	Low
5	X < 25,1	0	0,0	Very Low

Source: personal data

Based on table 5, the elevation categorization above, it can be explained that 15 respondents (71.4%) are in the very high category, 5 respondents (23.8%) are in the high category, and 1 respondent (4.8%) is in the moderate category.

Based on the data above, it can be seen that the strength of the leg muscles, as measured by the Standing Board Jump, falls into the moderate category, which can

certainly be improved. Improving lower body muscle strength, as measured by the Standing Broad Jump (or standing long jump), requires a systematic, structured, and individually tailored training program. One effective approach is through bodyweight training exercises such as squat jumps, lunges, and step-ups. These exercises target the primary muscles of the lower limbs—specifically the quadriceps, hamstrings, gluteus, and gastrocnemius muscles. Consistency in executing the exercise program, combined with gradual adjustments to intensity and load progression, is crucial to ensure optimal muscle adaptation and prevent injuries (Mahendra & Yani, 2025)

In addition to strength training, it is also important to incorporate explosiveness exercises such as plyometric training, which includes box jumps, bounding, and depth jumps. These exercises train the muscles to generate force in a short amount of time, which is highly relevant to the movement mechanics of the Standing Broad Jump. This component relies not only on static strength but also on muscle power, which involves coordination, contraction speed, and postural stability. Integrating mobility and flexibility exercises such as dynamic stretching and foam rolling also supports optimal performance by maintaining good joint range of motion and preventing muscle stiffness after training (Afrinaldi et al., 2021)

Arm and shoulder muscle power components measured by soft ball throw

The results of the soft ball throw test yielded a maximum score of 61.88; a minimum score of 30.11; a mean (average) of 50; a mode of 59.68; and a standard deviation of 10. The arm and shoulder muscle power of students participating in extracurricular soccer at State Junior High School 1 Depok was categorized into 5 categories: very high, high, moderate, low, and very low.

Based on the specified formula, the results of the data analysis of the arm and shoulder muscle power of students participating in extracurricular activities at State Junior High School 1 Depok are as follows:

Table 5. Distribution of Arm and Shoulder Muscle Strength

No	Formula	Categories	Frequency	Persentase (%)
1	$x \geq 66$	Very High	0	0
2	55 – 65	High	9	39,1
3	45 – 54	Curently	6	26,1
4	35 – 44	Less	7	30,4
5	$x \geq 34$	Very Less	1	4,3
Amount			23	100

The results of the table above can be summarized as follows: the overall results of the arm and shoulder muscle strength of students participating in the soccer extracurricular activity at State Junior High School 1 Depok are as follows: (00.00%) in the very high category, 9 students (39.1%) in the high category, 6 students (26.1%) in the moderate category, 7 students (30.4%) in the low category, and 1 student (4.3%) in the very low category.

Discussion

This study investigated the knowledge level of physical education, sport and health (PJOK) teachers in western Sleman, specifically at the junior and senior high school levels, regarding the initial treatment of injuries using the RICE (Rest, Ice, Compress, Elevation)

method. The findings showed that most teachers demonstrated a very high level of knowledge, with some variation between junior and senior high school levels (Astutik & Bakti, 2021). This indicates a strong awareness and understanding among educators regarding proper injury management practices (Palang et al., 2019)

The results of this study reflect the importance of knowledge in shaping effective responses to injuries during physical activity. According to (Gozali & Kartiko, 2019) knowledge-based behaviors tend to last longer and result in more meaningful actions. The presence of well-informed teachers can significantly reduce injury complications among students by ensuring timely and appropriate intervention, especially in the absence of medical professionals during school activities. Consistent application of the RICE method demonstrates teachers' preparedness in managing sports-related injuries (Amiati & Fikri, 2022)

This finding can be attributed to several factors. Firstly, most PJOK teachers come from a Faculty of Sport Science background, where courses such as First Aid for Accidents (PPC) include detailed instructions on the RICE method (Suryo Saputra Perdana et al., 2023). Secondly, access to information through formal education, organizational training such as scouts, and the internet also contributed to the teachers' increased understanding. Finally, repeated exposure to injury cases at school has helped teachers accumulate practical knowledge, thus strengthening their ability to respond effectively (Hadi & Sari, 2023)

The results of this study are in line with previous research, such as that conducted by (Syahadatina, 2022), who found that individuals who had higher knowledge of injury management were less likely to experience severe sports injuries. Similarly, Rukmana (2021) the impact of knowledge of the RICE method in improving first aid response. These studies reinforce the current findings and highlight the importance of teacher knowledge in injury management. This study also extends existing research by providing specific insights into the context of the Sleman region. Furthermore, this is supported by Edgar Dale's theory in (Nursalam & Efendi, 2008, p. 41), who introduced the "cone of experience" theory, which suggests that learning experiences can occur through direct practice, observation, and listening through media or in-person activities. The more practice one gains, the more experience is acquired. Thus, teaching practices that involve real-life objects, such as field practice or simulations, can significantly enhance skills and knowledge (Putri et al., 2022)

Based on the research findings, it is essential to consider integrating more structured injury management training into the curriculum for physical education teachers. Schools could also ensure the availability of first aid tools and provide periodic workshops or simulations to enhance teachers' practical skills. This study supports the development of school-level policies that prioritize safety and equip teachers to manage injuries effectively (Arsyalia et al., 2025). As Edgar Dale's Cone of Experience theory suggests, learning through direct experience such as simulations greatly enhances knowledge retention and skill development (Totok Budi Santoso et al., 2023).

CONCLUSION

Based on the findings and discussion of the data collected, it can be concluded that the knowledge level of PJOK teachers in the West Sleman region regarding the RICE method for injury management is generally high. In both middle and high schools, the majority of teachers demonstrated a solid understanding of the method, with the majority of respondents falling into the very high or high knowledge categories. Specifically, 71.4% of the

teachers in middle and high schools exhibited very high knowledge, while 28.6% showed high knowledge. In the middle school category, 92.3% of teachers displayed very high knowledge, while 7.7% had high knowledge. In high schools, 37.5% of teachers had very high knowledge, and 62.5% showed high knowledge. This result is closely linked to the teachers' educational background, as most of them are graduates of the Faculty of Sports Science, where courses on First Aid (PPC) provide them with the foundational knowledge of injury management.

Additionally, the information they obtained through formal and non-formal education, combined with the use of the internet as a mass media tool to acquire up-to-date information on injury management, contributed to their high knowledge levels. Furthermore, teachers' experience in handling injuries during their careers has also enhanced their skills and knowledge in providing first aid using the RICE method (Anarda et al., 2024). As a result, these factors have significantly contributed to the teachers' ability to apply proper injury management techniques in physical education settings. In conclusion, while the knowledge of RICE among PJOK teachers in the West Sleman area is relatively strong, it is crucial to continue providing training and support to maintain and further develop their competence in injury management. Future research could explore the practical application of the RICE method in real-life situations, and how teachers' knowledge affects their ability to respond to injuries during physical education classes.

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