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# Assessment of patients' knowledge level on the prevention of orthopedic injuries: A survey study among physically active individuals

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## ABSTRACT

The study aimed to evaluate young individuals' knowledge of orthopedic injuries. It also included evaluating their physical activity level, injury prevention, and understanding of first aid rules. The study shows the importance of injury prevention and basic first aid understanding, as both significantly improve safety and lower the risk of injuries to physically active young people. Training programs increase joint stability and awareness of prevention techniques, which are key to lowering orthopedic injuries. *Aim of the Study:* The study aimed to assess physical activity habits, injury prevention strategies, and understanding of orthopedic injury treatment among young adults. *Materials and Methods:* The study occurred online from August to September 2024 among 128 adults. Age over 17 and physical activity were requirements for inclusion. Lack of physical activity and age under 18 were the exclusion criteria. They participated in a questionnaire examining the frequency of physical activity, the use of warm-ups, injury protection, experience, and understanding of first aid. *Results:* 41% of the participants performed regular physical activity, and only 6% exercised daily. 23% always performed a warm-up before physical exercise, and half of them used adequate protective equipment. 41% of the participants had experienced orthopedic injuries, including sprains (53%). First aid knowledge and knowledge of the RICE acronym were low (38%). *Conclusions:* The results indicate the need for education in injury prevention and first aid rules, which can potentially increase physical activity safety in young adults.

**Keywords:** Physical activity, injury prevention, risk factors, first aid of orthopedic injury.

## 1. INTRODUCTION

Boden et al., (2000) and Malinzak et al., (2001) observed that professional physical activity increases from an early age. Recognizing the increasing risk of injuries, especially to the knee, is crucial, including injuries like anterior cruciate ligament (ACL) tears. The study by Agel et al., (2005) shows that ACL injuries are common in competitions that put a lot of load on the joints, like basketball and soccer. The danger is obvious among females with higher risk due to anatomical, hormonal, and biomechanical differences. Furthermore, Zazulak et al., (2005) noticed that their higher biomechanical demands link the different injury mechanisms.

However, the studies by Olsen et al., (2004) and Emery and Meeuwisse, (2010) underlined the fact that soccer (a sport that puts stress on the joints) is particularly prone to ACL damage, especially during decisive actions such as variations in the run, jumps, or landing. Shultz et al., (2012) and Taylor et al., (2015) reported that the epidemic of ACL injuries in athletes and the high risk of rupture of the ligaments in the joints is a consequence of the absence of strength training and proprioception training which leads to failures in injury prevention. Nevertheless, an injury preventive component is the establishment of adequate training. Padua et al., (2018) and Taylor et al., (2015) noted the necessity of including neuromuscular training. It provides better knee joint control and technique during dynamic movements.

That, in turn, can decrease the risk of injury. Padua et al., (2018) and Myer et al., (2008) suggest that the implementation of appropriate training programs (including neuromuscular systems) can improve knee joint control and running techniques, which leads to lowering injury risk. Beaulieu et al., (2023) identifies the three-dimensional knee loads that lead to ACL injuries due to microdamage accumulating in the ligament. The greatest occur during single-legged movements, such as landing from a jump, a sharp change of direction, or sudden braking. This highlights the importance of movement techniques in its prevention. Additionally, Hewett et al., (2006) and Mancino et al., (2024) show that neuromuscular training can reduce the risk of injuries among women, who are more vulnerable to such injuries.

Furthermore, Taylor et al., (2015) directed attention to the effectiveness of adapting sports training programs based on balance training and static stretching. Due to specific biomechanical requirements, individualized training programs reduce the risk of ACL injuries as well as improve athletic performance. Furthermore, Gilchrist et al., (2008) point out the methods for preventing non-contact ACL injuries in female collegiate soccer players, which would further contribute to the effectiveness of identical preventive training. All of the above perspectives highlight how important it is to implement an exercise program that includes sport-specific factors.

### Aim

The purpose of the study was to assess the knowledge about injury prevention among young adults, determine the most common injuries, and analyze respondents' answers in the event of joint-related injuries. Moreover, the analysis evaluated the effectiveness of preventive measures and the extent to which youth athletes implement these initiatives.

## 2. MATERIALS AND METHODS

The study was conducted online during August to September 2024 among 128 adults. 69% were young adults aged 18–25 who regularly work out. Age over 17 and physical activity were requirements for inclusion. Lack of physical activity and age under 18 were the exclusion criteria. Respondents answered questions about their gender (male, female), age (18–25, 26–40, 41–60, over 60), and level of education (primary, secondary, higher). They responded how often they warm up (always, often, rarely, never) and how frequently they exercise (daily, every two days, twice a week, once a week). Other questions focused on the type of sport they usually participate in, such as team sports (soccer, basketball), combat sports (karate, boxing), individual sports (Pilates, yoga), or strength sports (weightlifting).

Additionally, they answered questions about any injuries they had experienced (fractures, sprains, ruptured tendons or ligaments) and the reason behind them (fatigue, improper technique, using the equipment, or lack of proper warm-up). Moreover, participants responded to questions about prevention principles e.g. understanding of the RICE acronym (rest, ice, compression, elevation), and diaphyseal fracture treatment (e.g., how to temporarily immobilize a bone). Furthermore, the respondents replied to questions about their experience with ACL injuries, and the use of protective equipment (shoes, knee band, helmet). Additionally, they confirmed or

denied using advice from a doctor, physiotherapist, or trainer. The data analyzed came from various sports disciplines, like soccer, basketball, volleyball, skiing, and running, as described in previous researches by (Grooms et al., 2013; Navarro, 2011).

### 3. RESULTS

Among all participants, 53% were men and 47% were women (Figure 1). 63% of participants had a higher education (Figure 2). Considering the age range, 69% of the respondents were between 18 and 25.

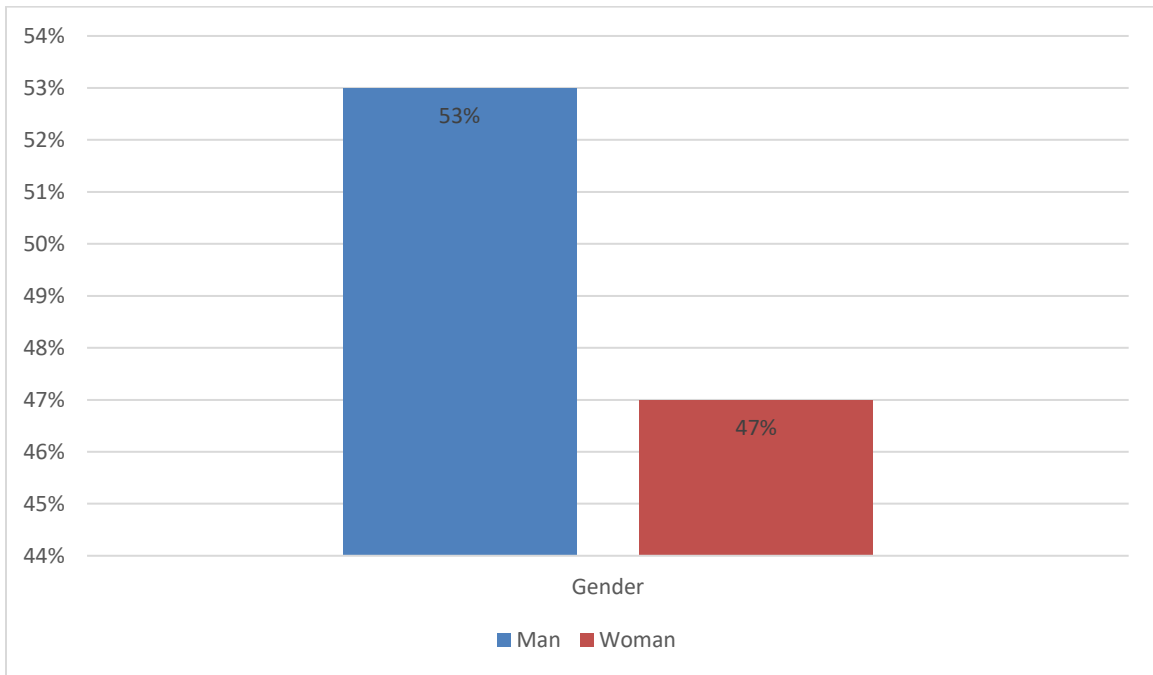


Figure 1 Distribution of respondents by gender.

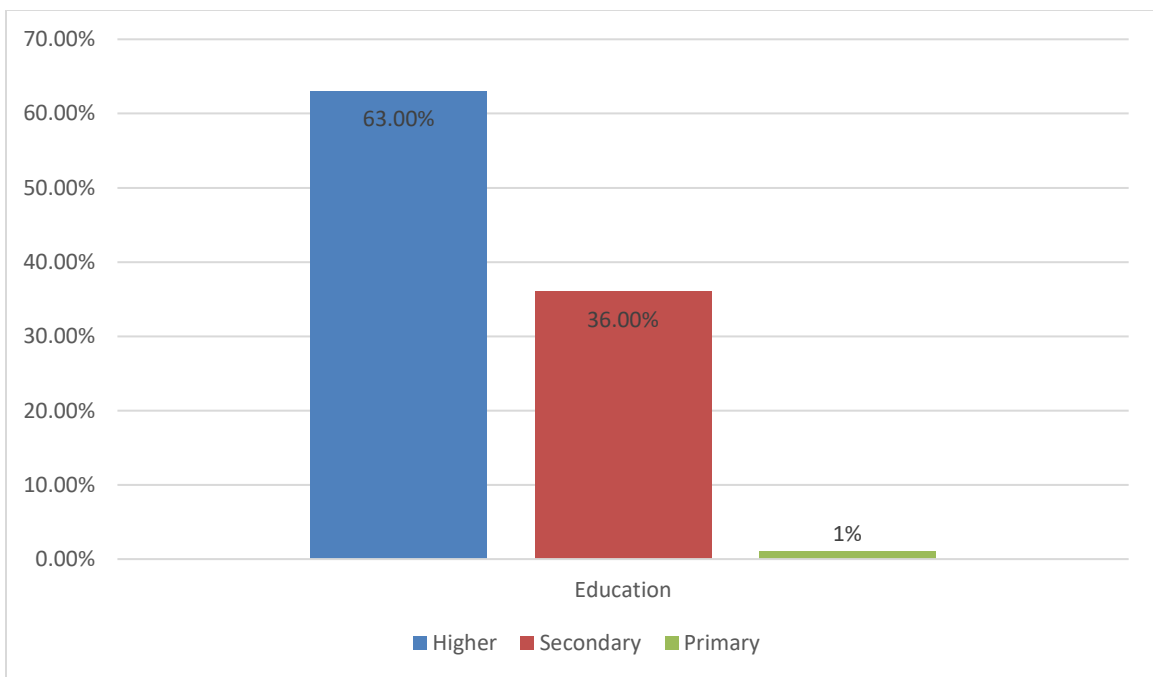


Figure 2 Assessment of level of education by respondents.

The study showed that 40% of respondents had experienced orthopedic injuries, mainly involving knee joint trauma (sprains and ruptured ligaments). The effects of fatigue, incorrect movement techniques, or inadequate body preparation were primarily responsible for the injuries mentioned above. 23% of the participants always perform warm-up exercises (Figure 3), and 53% regularly use protective equipment (Figure 4).

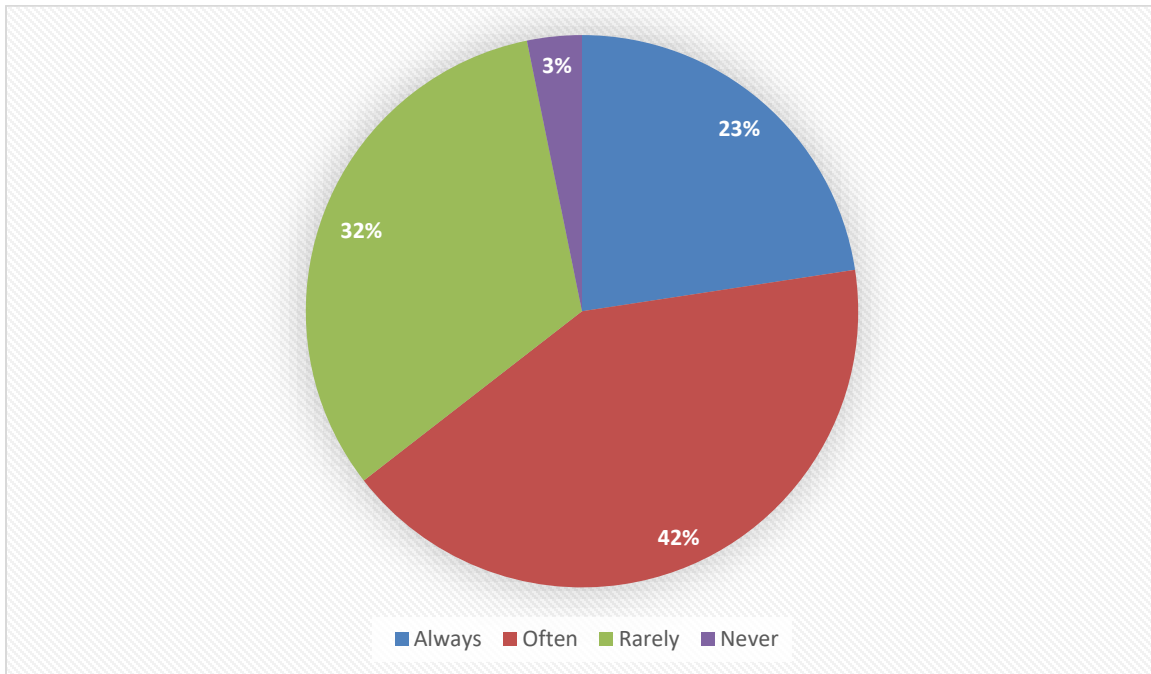


Figure 3 Warming up before training as evaluated by respondents.

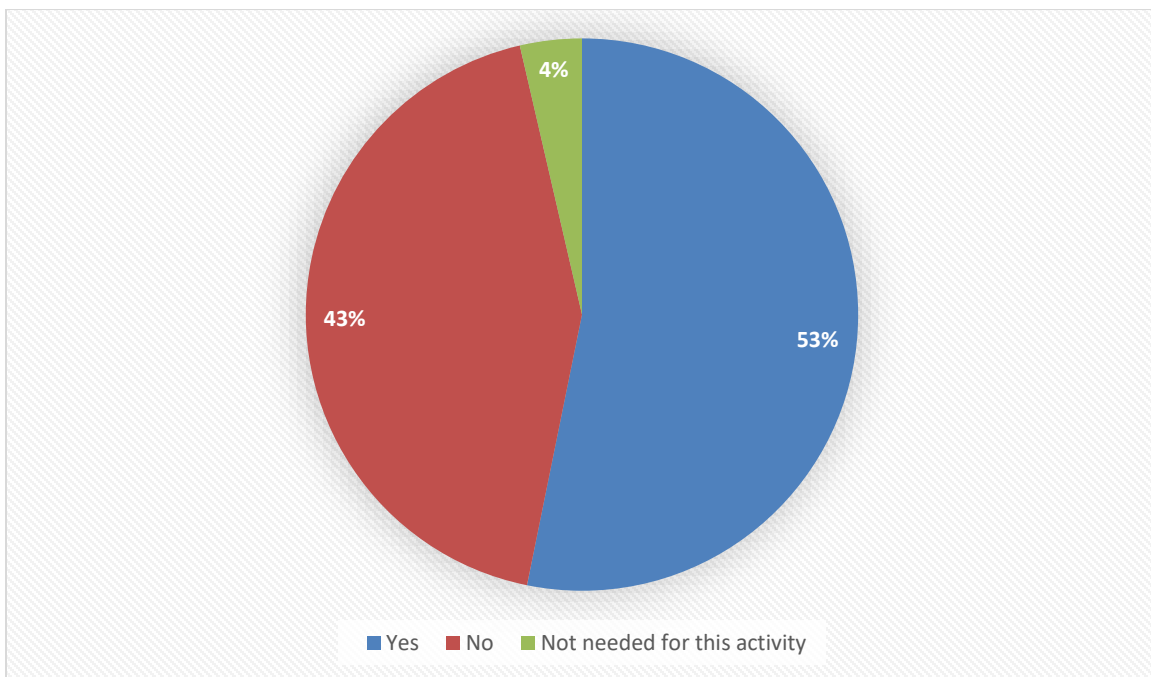


Figure 4 Using protective equipment by respondents.

Moreover, 38 % of the participants could correctly identify the symptoms of orthopedic injuries and provide appropriate treatment. In comparison, over 60% were unsure about the basic principles of first aid in diaphyseal fractures (Figure 5). The knowledge about the acronym RICE (rest, ice, compression, elevation), which is crucial to ensuring effective initial treatment of injuries, was low (only 37%) (Figure 6).

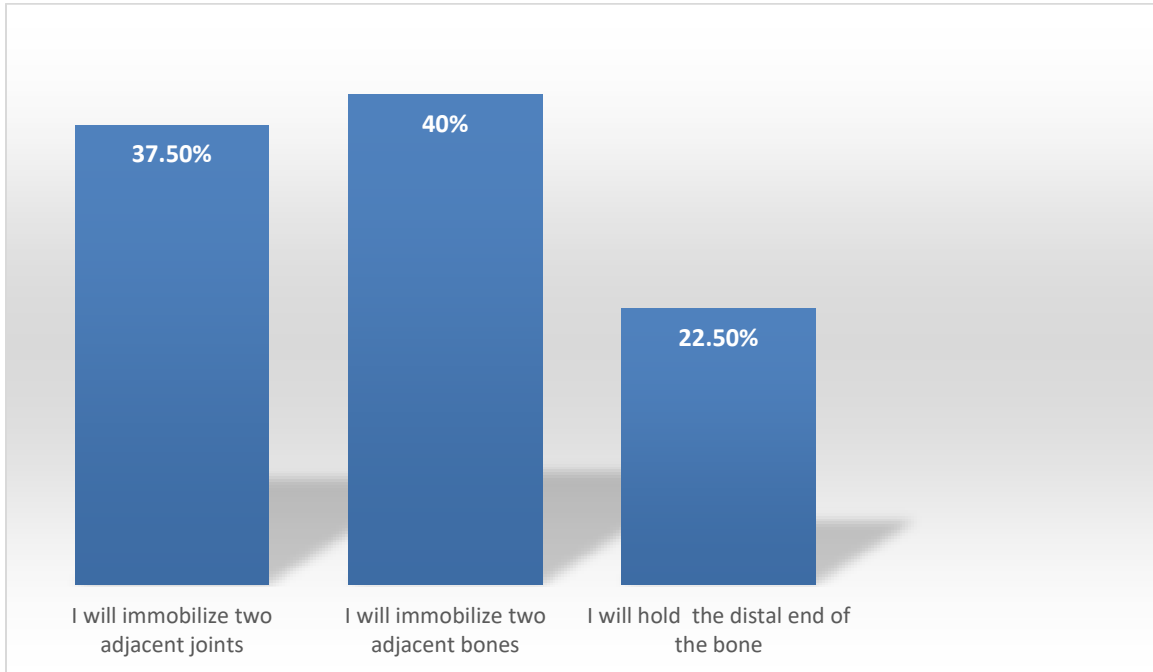


Figure 5 Evaluation of diaphyseal fracture treatment by respondents.

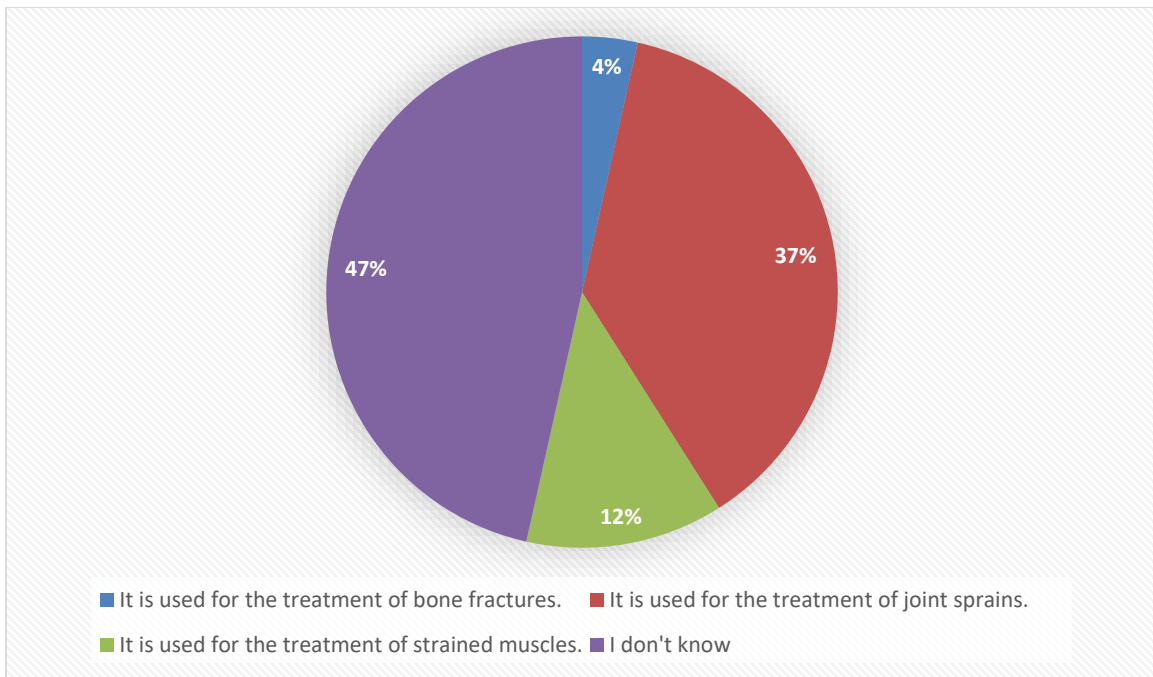
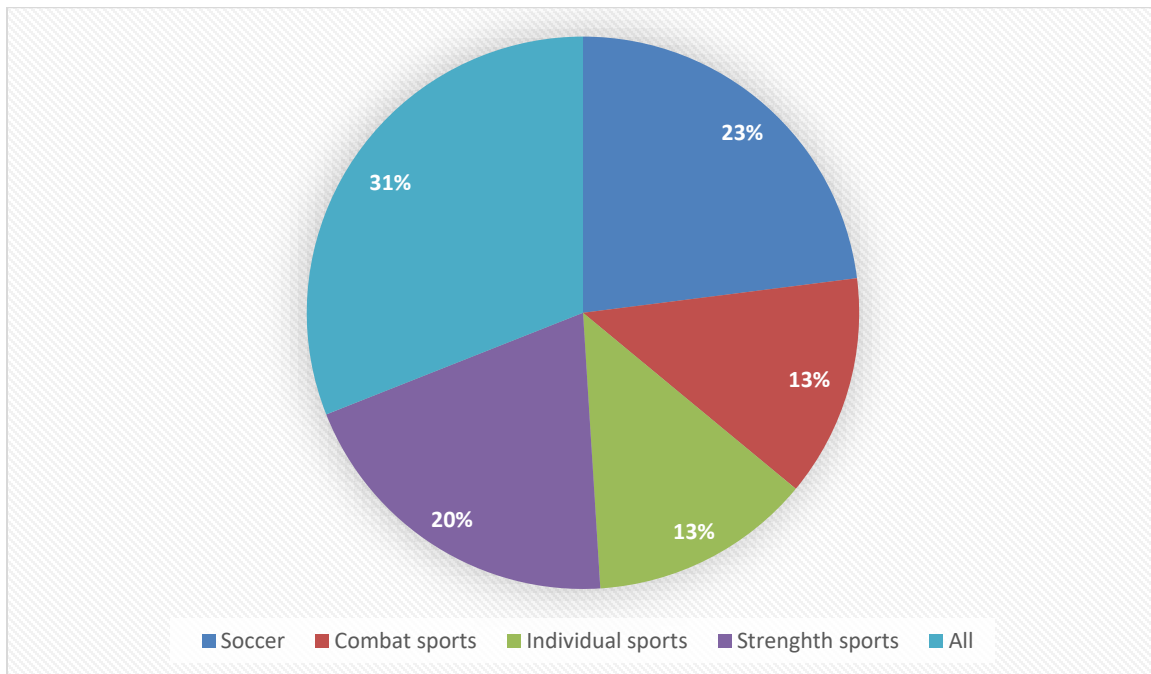


Figure 6 Understanding of the RICE acronym.

According to the study, 23% of people participate in team sports like soccer, 13% in combat sports like karate, 13% in individual sports like yoga and pilates, 20% in strength sports like weightlifting, and 31% in all (Figure 7).



**Figure 7** Percentage distribution of sports among respondents.

#### 4. DISCUSSION

The results of this study show that young adults are not sufficiently prepared for injury prevention even though they engage in physical activity. Only 41% of respondents experienced orthopedic injuries, mainly knee joint injuries (sprains and ruptured ligaments). Furthermore, in the Malinzak et al., (2001) and Mancino et al., (2024) studies, the absence of appropriate warm-up and fatigue, along with other key risk factors for ACL injuries. The study reveals some interesting facts. Only 53% of participants use protective equipment, meaning only half of them took necessary steps to ensure joint safety. Moreover, this also revealed a significant injury prevention gap. Navarro, (2011) point out that regular use of protective equipment supports reduces the risk of joint injuries.

In comparison, a study by Blanchard et al., (2018) confirms that proper tournament footwear, stabilizing the foot and providing cushioning, can reduce the risk of injuries, including knee or ankle injuries, especially in sports requiring dynamic changes in direction, like soccer. Moreover, Boden et al., (2000) and Malinzak et al., (2001) underline the importance of injury prevention, particularly in high-risk tournaments (football, basketball), of appropriate movement patterns and protective equipment. Another significant finding from the study is the limited knowledge of first aid, particularly in the cases of knee injuries such as sprains, or ruptures.

Only 38% of the participants were familiar with the RICE acronym, and only a few understood how to treat an ACL tear. Baoge et al., (2012) emphasize the importance of the RICE acronym to reduce the risk of complications following injuries. Like other studies, the research by Nawas et al., (2023) and Belamjahad et al., (2024) suggests that prevention programs for young athletes are not effective. This highlights the need to improve these programs and make them a regular part of daily training. Arendt and Dick, (1995), Hewett et al., (2006), Fathy et al., (2021) and Mancino et al., (2024) emphasize the need to teach first aid to young athletes at an early stage.

#### 5. CONCLUSIONS

The results of the present study indicate significant gaps in education relating to orthopedic injuries, especially in the context of ACL injuries. Even though many young people are active, the lack of proper warm-ups, the use of protective gear, and basic first aid knowledge may lead to more knee injuries. Based on these findings, the authors suggest that we need to roll out comprehensive educational programs that not only teach injury prevention and first aid but also offer effective ways to manage injuries.

They also recommend incorporating regular neuromuscular training to strengthen the knee joint and lower injury risks especially for women, who appear to be more prone to ACL injuries. Furthermore, attention to biomechanical and anatomical differences between genders, as confirmed in studies, will make it easier to adjust preventive programs to the specific needs of juvenile athletes.

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### Author's Contribution

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Writing – review and editing: Karol Leśniewski, Anita Król

All authors have read and agreed with the final, published version of the manuscript.

### Ethical approval

The ethical guidelines for Human Subjects are followed in the study.

### Informed consent

Written & Oral informed consent was obtained from individual participants included in the study.

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### Conflict of interest

The authors declare that there is no conflict of interests.

### Data and materials availability

All data sets collected during this study are available upon reasonable request from the corresponding author.

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