

## **PENGARUH TINGKAT PENGETAHUAN CEDERA DENGAN KEJADIAN CEDERA PADA ATLET-MAHASISWA**

### ***IMPACT OF INJURY KNOWLEDGE ON THE INCIDENCE OF SPORTS INJURIES AMONG STUDENT-ATHLETES***

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#### **Abstrak**

Penelitian observasional dengan desain cross-sectional ini menganalisis pengaruh tingkat pengetahuan penanganan cedera terhadap insiden cedera pada 108 atlet mahasiswa Pendidikan Jasmani Undikma yang dipilih via purposive sampling. Menggunakan kuesioner skala Guttman dan riwayat cedera, data dianalisis melalui statistik deskriptif, uji Chi-Square, t-test, dan regresi logistik multivariat. Hasil deskriptif menunjukkan tingkat kejadian cedera yang sangat tinggi mencapai 90,7% (mayoritas cedera ringan), dengan rata-rata skor pengetahuan sebesar  $19.2 \pm 2.8$  dari skala 25. Analisis bivariat mendeteksi adanya hubungan signifikan pada riwayat edukasi ( $p=0,048$ ) dan skor pengetahuan ( $p=0,002$ ) terhadap kejadian cedera. Lebih lanjut, model regresi logistik akhir mengonfirmasi bahwa riwayat edukasi OR=3.330; 95% CI: 1.026-10.803) dan skor pengetahuan yang lebih tinggi (OR=0.750; 95% CI: 0.610-0.922) bertindak sebagai faktor protektif yang signifikan secara independen dalam menurunkan risiko cedera. Berdasarkan temuan tersebut, disimpulkan bahwa pemahaman yang baik dan paparan edukasi efektif meminimalisasi insiden cedera pada atlet mahasiswa, sehingga implementasi program edukasi penanganan cedera yang komprehensif dan mudah diakses menjadi rekomendasi krusial yang harus segera diwujudkan.

**Kata kunci:** pengetahuan, kejadian, cedera, atlet-mahasiswa

#### **Abstract**

*This observational study with a cross-sectional design analyzed the effect of injury management knowledge levels on injury incidence among 108 Undikma Physical Education student athletes selected via purposive sampling. Using a Guttman scale questionnaire and injury history, the data were analyzed using descriptive statistics, the Chi-square test, the t-test, and multivariate logistic regression. Descriptive results showed a very high injury incidence rate of 90.7% (mostly minor injuries), with an average knowledge score of  $19.2 \pm 2.8$  on a 25-point scale. Bivariate analysis detected significant associations between educational history ( $p=0.048$ ) and knowledge scores ( $p=0.002$ ) and injury incidence. Furthermore, the final logistic regression model confirmed that educational history (OR=3.330; 95% CI: 1.026–10.803) and higher knowledge scores (OR=0.750; 95% CI: 0.610–0.922) acted as significant independent protective factors in reducing the risk of injury. Based on these findings, it is concluded that good understanding and exposure to effective education minimize the incidence of injuries among student-athletes; therefore, the implementation of a comprehensive and easily accessible injury management education program is a crucial recommendation that must be realized immediately.*

**Keywords:** knowledge, incidence, injury, student-athletes

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## INTRODUCTION

Sports injuries are one of the most common consequences of sports and physical exercise, defined as damage to body tissue due to trauma or mechanical stress during sports activities. These injuries can be acute injuries that occur suddenly, such as sprains, fractures, or ligament injuries, or chronic injuries that develop slowly due to overuse (Cai et al., 2019). The impact of sports injuries on athletes is significant, not only causing physical dysfunction and decreased performance, but also potentially causing psychological effects such as stress and decreased motivation, which can hinder the rehabilitation process and the continuation of an athlete's career (Haraldsdottir & Watson, 2021). Therefore, proper and prompt treatment of injuries is crucial to minimize these negative effects.

The severity of sports injuries can be categorized based on recovery time and the level of functional impairment, ranging from minor injuries that only require a short recovery time to severe injuries that require intensive medical intervention and a long rest period (Haraldsdottir & Watson, 2021). The prevalence of sports injuries is quite high at various competition levels and ages. Globally, studies show that more than 40% of college athletes have experienced injuries in the past year, with variations in prevalence influenced by the type of sport and level of competition. At the national level, epidemiological data on injuries among student athletes also show a similar trend, with injuries (Naderi & Mohammadi, 2024). The most common injuries occur in the lower limbs, such as the knees and ankles, which are often associated with sports activities involving running and physical contact (Asperti AM, et al (2023).

Knowledge about sports injuries and their management is an important aspect that influences injury occurrence and the recovery process. However, recent research reveals a significant knowledge gap among athletes, coaches, and other sports stakeholders regarding injury prevention and management, particularly in the context of first aid and the prevention of recurrent injuries (Satyawan et al., 2020). This gap is caused by a lack of formal education and access to adequate information, which has the potential to increase the risk of injury and prolong recovery time. For example, a study among university athletes found that despite high awareness of injury risks, participation in injury prevention programs was still low, indicating a gap between knowledge and practice (Gompels et al., 2024).

This study aims to empirically examine the effect of injury management knowledge on injury incidence among student athletes, who are a vulnerable group but receive relatively little attention. Previous studies have emphasized the importance of education and training in injury management as effective strategies for reducing injury incidence and accelerating rehabilitation (Azizzadeh et al., 2023). However, research specifically linking the level of knowledge of injury management with the incidence of injury in the student athlete population is still limited.

Therefore, this study is expected to provide evidence-based recommendations for developing more effective educational programs and injury prevention interventions to support athlete development in university settings.

## METHOD

The type of research used in this study is observational research. Observational research is a type of research conducted by observing and recording phenomena or behaviors in natural conditions without intervening or manipulating the research variables. The design of this study is quantitative in the form of cross-sectional research. The cross-sectional research design is described as follows:

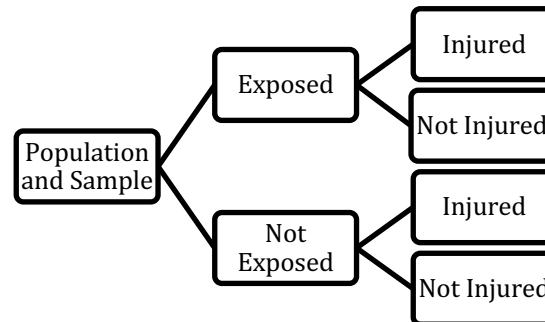


**Figure 1.** Cross-Sectional Research Design

The population in this study consists of students from the Physical Education Study Program, Faculty of Sport Sciences and Public Health, Undikma. The sampling technique used in this research is purposive sampling. The inclusion criteria are students who are athletes and have been actively competing for the past 2 years and have completed 4 semesters of study. The exclusion criteria are students who are not athletes, students who are athletes but have not been actively competing fully in the past 2 years, and students who are not actively attending classes or without official leave dispensation. The research process from initial preparation to completion is 6 months, as some students are participating in several tournaments and thus are given dispensation. The research location will be conducted in the Trisya building classrooms, FIKKM, Undikma.

This research was conducted through three systematic stages, beginning with a thorough preparation phase, including the administration of permit arrangements at the Physical Education Study Program Undikma as well as the preparation of samples and supporting facilities. The data collection process was carried out by providing technical explanations to respondents, followed by collecting data on athlete identity, sports participation profile over the past two years, as well as measuring the level of knowledge and injury history through questionnaires.

After data collection, the next stage was data processing which included verification, statistical analysis, and systematic data presentation. This entire series of activities concluded with the preparation of a research report as a basis for publication in accredited national journals. With this programmed planning, the objectivity and validity of research results regarding the injury conditions of student athletes can be scientifically accounted for. The data collection technique in this study was a survey technique through questionnaires. The data collection technique in this research was in the form of questionnaires. Questionnaires were used to collect data from variables, namely the level of knowledge of sports injury management and the history of sports injury incidents, using the Guttman scale. The scoring technique assigns the highest score of 1 and the lowest score of 0 using the Guttman scale, with answers that are consistent and definitive (Thoifah, 2015).

The answers from the questionnaire are in the form of "Yes" or "No" responses. For positive statements, a "Yes" answer is given a score of (1) and a "No" answer is given a score of

(0), while for negative statements, a "Yes" answer is given a score of (0), and a "No" answer is given a score of (1). Furthermore, the injury management knowledge level scores were categorized into 5 categories according to their criteria: 1) very good, with a score of 81-100, 2) good, with a score of 61-80, 3) sufficient, with a score of 41-60, 4) poor, with a score of 21-40, and 5) very poor, with a score of 0-20 (Thoifah, 2015).

This research instrument uses two main tools to collect data from student athlete respondents. First, the level of knowledge of sports injury management was measured using a close-ended questionnaire consisting of 25 question items with "YES" or "NO" answer choices. This instrument has been tested for validity and reliability through previous research by Prayoga (2024). Second, to identify injury incidents, respondents were asked to provide information regarding their injury history experienced over the past two years, both in training and competition contexts. This approach ensures that the data obtained is specific and relevant to actual field conditions. Using these standardized instruments, the research results are expected to have a high level of accuracy in describing the knowledge profile and injury experience of athletes.

This observational research uses descriptive analysis in the form of mean  $\pm$  Standard Deviation (SD) and frequency distribution to describe the level of knowledge and injury history of athletes. The Chi-Square ( $X^2$ ) test was applied to examine the distribution of athlete characteristics based on injury incidents, while continuous variables were analyzed using independent t-test or Mann-Whitney according to data normality. Risk factor analysis was conducted through logistic regression testing with Odds Ratio (OR) parameters and a 95% confidence interval. Variables with  $p$ -value  $< 0.2$  in bivariate analysis were included in the initial multivariate model using the stepwise method until reaching the final model with significance of  $p < 0.05$ . Age and gender parameters were retained in the final model due to their clinical significance to injury risk. All statistical procedures were processed accurately using SPSS software version 27.0.

## **RESULTS**

Specifically, Table 1 presents the demographic profile and injury history of respondents, which was dominated by males numbering 95 people (88.0%), with the mean age of subjects at  $20.7 \pm 1.5$  years ranging from 18 to 25 years. The data shows a very high prevalence of sports injuries among respondents, where 98 individuals (90.7%) reported having experienced injuries during activities. Based on severity classification, most injuries were mild at 77 cases (78.6%), while moderate and severe injury categories reached 29.6% and 6.1%, respectively. Regarding educational background, most respondents (81.5%) had obtained formal information about sports injury management. Nevertheless, evaluation of knowledge levels showed a mean score of  $19.2 \pm 2.8$  from a maximum scale of 25, with knowledge frequency distribution dominated by the moderate category with 68 people (63.0%).

Only a small portion of respondents had a high level of knowledge (25.9%), while another 11.1% were still in the low category. This profile indicates that although access to education is quite extensive, the depth of respondents' understanding regarding injury management still requires further strengthening. Overall, these characteristics provide a comprehensive picture of the physical vulnerability and cognitive capacity of subjects in facing sports injury risks. These baseline data findings become a crucial foundation for analyzing relationships between variables in subsequent research stages.

**Table 1.** Demographic Characteristics and Injury History of Respondents

| Characteristics                                       | Category          | Frequency (n)  | Percentage (%) |
|-------------------------------------------------------|-------------------|----------------|----------------|
| Gender                                                | Male              | 95             | 88.0           |
|                                                       | Female            | 13             | 12.0           |
| Age (years)                                           | Mean $\pm$ SD     | 20.7 $\pm$ 1.5 |                |
|                                                       | Min – Max         | 18 – 25        |                |
| Injury History                                        | Ever Experienced  | 98             | 90.7           |
|                                                       | Never Experienced | 10             | 9.3            |
| Injury Severity (n=98)                                | Mild              | 77             | 78.6           |
|                                                       | Moderate          | 25             | 29.6           |
|                                                       | Severe            | 6              | 6.1            |
| History of Injury Management Education                | Ever Received     | 88             | 81.5           |
|                                                       | Never Received    | 20             | 18.5           |
| Sports Injury Management Knowledge Level (Score 0-25) | Mean $\pm$ SD     | 19.2 $\pm$ 2.8 |                |
|                                                       | Min – Max         | 14 – 24        |                |
| Knowledge Level Category                              | Low (<15)         | 12             | 11.1           |
|                                                       | Moderate (15-20)  | 68             | 63.0           |
|                                                       | High (>20)        | 28             | 25.9           |

#### Bivariat Analysis

Statistical analysis using the Chi-Square test was conducted to evaluate the relationship between student athlete characteristics, including gender and educational history, on the prevalence of sports injuries. Based on the data in Table 2, most respondents, both male (89.6%) and female (92.3%), had a history of experiencing injuries, where test results showed no significant relationship between gender and injury incidents ( $p = 0.721 > 0.05$ ). Conversely, the educational history variable showed a statistically significant correlation with sports injury incidents with a  $p$ -value = 0.048 ( $p < 0.05$ ). Athletes who had received education showed a higher percentage of injury history (93.2%) compared to those who had never received education (80.0%), which indicates that theoretical knowledge alone does not necessarily reduce injury risk in the field. This finding confirms that educational factors have a stronger association compared to demographic factors in the context of the research subjects' injury history. Overall, these data provide an objective picture of the frequency distribution and statistical significance of factors affecting the physical safety of student athletes during activities.

**Table 2.** Relationship Between Student Athlete Characteristics and Sports Injury History (Chi-Square Test)

| Characteristics     | Injury History | Chi-Square ( $\chi^2$ ) | df | p-value |
|---------------------|----------------|-------------------------|----|---------|
|                     | Ever (n=98)    | Never (n=10)            |    |         |
| Gender              |                |                         |    |         |
| Male                | 86 (89.6%)     | 9 (10.4%)               | 1  | 0.721   |
| Female              | 12 (92.3%)     | 1 (7.7%)                |    |         |
| Educational History |                |                         |    |         |
| Ever Received       | 82 (93.2%)     | 6 (6.8%)                | 1  | 0.048*  |
| Never Received      | 16 (80.0%)     | 4 (20.0%)               |    |         |

\*Significant at  $\alpha=0.05$

Statistical analysis using the independent t-test was conducted to evaluate differences in mean age variables and knowledge scores based on sports injury history among respondents. Test results in Table 3 show that there was no significant age difference between the group that had experienced injuries ( $20.8 \pm 1.4$  years) and the group that had never experienced injuries ( $20.1 \pm 1.8$  years) with  $p$ -value = 0.214. Conversely, a very significant difference was found in the knowledge score variable between the two groups ( $p = 0.002$ ). Respondents who had never experienced injuries had a higher mean knowledge score ( $20.5 \pm 2.0$ ) compared to respondents who had experienced injuries ( $18.5 \pm 2.5$ ). This indicates that the level of cognitive understanding regarding sports risk management strongly correlates with lower injury incidence in the field. Empirically, these results confirm that the knowledge factor is a more crucial determinant compared to the age factor in mitigating injury risk among student athletes. Therefore, improving sports safety literacy becomes a clear urgency to optimize individual physical protection during activities.

**Table 3.** Differences in Age and Knowledge Score Based on Sports Injury History  
(Independent t-test)

| Age (years)     | Injury History | Mean $\pm$ SD  | t-value | df  | p-value |
|-----------------|----------------|----------------|---------|-----|---------|
| Age (years)     | Ever           | $20.8 \pm 1.4$ | 1.25    | 106 | 0.214   |
|                 | Never          | $20.1 \pm 1.8$ |         |     |         |
| Knowledge Score | Ever           | $18.5 \pm 2.5$ | -3.10   | 106 | 0.002*  |
|                 | Never          | $20.5 \pm 2.0$ |         |     |         |

#### Multivariate Analysis (Logistic Regression)

Based on bivariate analysis, variables with  $p$ -value  $< 0.2$  were Injury Management Education History ( $p=0.048$ ) and Knowledge Score ( $p=0.002$ ). The Age variable ( $p=0.214$ ) and Gender ( $p=0.721$ ) did not meet the  $p < 0.2$  criteria for inclusion in the multivariate model. However, in accordance with the research protocol, Age and Gender will always be included in the final model because they have important clinical roles.

**Table 4.** Multivariate Logistic Regression Test Results for Factors Associated with Sports Injury Incidents

| Independent Variable             | B      | S.E.  | Wald | df | p-value | Exp(B)<br>(OR) | 95% CI for OR  |
|----------------------------------|--------|-------|------|----|---------|----------------|----------------|
| Age (years)                      | -0.125 | 0.098 | 1.63 | 1  | 0.202   | 0.882          | Lower<br>0.729 |
| Gender (ref: Female)             | -0.342 | 0.680 | 0.25 | 1  | 0.617   | 0.710          | 0.187          |
| Educational History (ref: Never) | 1.203  | 0.601 | 3.99 | 1  | 0.046*  | 3.330          | 1.026          |
| Knowledge Score                  | -0.287 | 0.105 | 7.49 | 1  | 0.006*  | 0.750          | 0.610          |
| Constant                         | 1.876  | 2.301 | 0.66 | 1  | 0.416   | 6.526          |                |

## DISCUSSION

The research results reveal empirical facts that the prevalence of sports injuries among student athletes is at a very high level, reaching 90.7%. Most reported incidents were classified as mild injuries with a percentage of 78.6%. This phenomenon aligns with various previous literature that confirms the existence of significant inherent risks in competitive sports participation at the university level. This high incidence rate provides a strong indication that

the student sports environment requires more attention in safety management aspects. Although data shows that most respondents (81.5%) have been exposed to injury management education, the injury incidence rate still shows a high trend.

This raises academic discourse that the variable "having received education" in quantity does not necessarily guarantee effectiveness in reducing injury risk in the field. This condition signals that the depth of material and educational delivery methods may be more crucial than mere information exposure. Further evaluation is needed regarding how the substance of this education is internalized into prevention practices by athletes. Through bivariate analysis, a statistically significant relationship was found between injury management education history and sports injury incidents ( $p = 0.048$ ). Athletes with an educational history tend to show a lower probability of experiencing injuries compared to those who did not receive education.

This finding confirms that educational intervention is a fundamental element in risk mitigation strategies in the sports environment. This relationship provides a theoretical foundation for institutions to formulate a more integrated physical health curriculum for students. In line with the education variable, injury management knowledge scores also showed very significant differences between groups that had and had never experienced injuries ( $p = 0.002$ ). Athletes with better cognitive knowledge capacity consistently showed a tendency to avoid sports injuries. This strengthens the hypothesis that knowledge is not merely theoretical understanding but functions as a preventive instrument that influences athlete behavior during training. This health literacy level becomes a crucial differentiating factor in maintaining individual physical integrity.

Unlike cognitive factors, basic demographic variables such as gender and age did not show significant relationships with injury incidents at the bivariate analysis stage. This finding indicates that injury risk in the student population is universal and transcends gender or certain age level boundaries. In the context of this research, vulnerability to injury is more influenced by modifiable factors than static biological characteristics. Therefore, the focus of prevention programs should be directed toward increasing individual competence in managing physical risks. At the multivariate logistic regression analysis stage, the influence of educational history and knowledge scores remained proven as significant predictors even though age and gender variables had been controlled.

Statistical findings show that athletes with formal educational history have a 3.33 times higher chance of avoiding injury compared to their peers ( $OR = 3.330$ ; 95% CI: 1.026 - 10.803). This data confirms the position of education as a very strong independent protective factor in the student sports ecosystem. The strength of this influence provides a strong basis for the urgency of continuous training programs at the university level. Furthermore, the multivariate model confirms that every one-unit increase in knowledge score correlates with a 25% decrease in injury risk ( $OR = 0.750$ ; 95% CI: 0.610 - 0.922). This linear relationship proves that strengthening cognitive capacity gradually provides increasingly greater protective impact for athletes. In other words, deep mastery of injury management material functions as a shield against physical accidents in the field. This strengthens the position that knowledge is an independent asset in supporting the sustainability of student athletic careers. Effectively designed education should ideally equip athletes with competence to recognize early risks and implement precise preventive actions.

The capacity to respond to injuries appropriately also plays an important role in minimizing broader negative impacts on long-term performance. Although basic demographics are not significant, the dominance of education and knowledge factors in this research model provides clear policy direction for stakeholders. Top priority must be placed on providing credible and applicable information resources for all students. Despite making important contributions, this research has certain limitations, including the use of self-report data that is

vulnerable to memory bias or social subjectivity. The absence of specific data regarding types of sports and daily training intensity also limits the exploration of risk factors more deeply. However, overall, this study successfully provides solid empirical evidence regarding the vital role of education and knowledge in mitigating injury risk. These findings are expected to be a catalyst for developing injury prevention strategies based on strengthening athletes' intellectual capacity.

## CONCLUSION

This study demonstrates that the level of knowledge regarding injury management has a significant negative effect on the incidence of injury among student athletes. Although more than 90% of respondents had experienced an injury (mostly minor), athletes with a better understanding were found to have a significantly lower incidence of injury. Educational background and high knowledge scores act as independent protective factors capable of substantially reducing the risk of injury. However, the current high prevalence of injuries suggests that existing educational programs still require in-depth evaluation regarding the quality and effectiveness of their delivery. Therefore, comprehensively improving the quality of injury management education is a crucial step toward optimizing safety and performance for student-athletes on campus.

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