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| ***Functional Movement Screening*: Deteksi Dini Risiko Cedera**  **Pada Siswa Kelas Olahraga**  **Muhamad Syafei1\*, Didik Rilastiyo Budi1, Arfin Deri Listiandi1, Rifqi Festiawan1, Kusnandar1, Panuwun Joko Nurcahyo1, Mesa Rahmi Stephani2,Wildan Qohhar3**  1Departemen of Physical Education, Faculty of Health Science, Jenderal Soedirman University, Indonesia  2Departemen PGSD FPOK Universitas Pendidikan Indonesia, Indonesia  3Departemen of Physical Educatioan, Healt and Recreation, STKIP Situs Banten, Indonesia | | | | |
| **Info Artikel**  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  *Article History :*  *Received July 2019*  *Revised August 2019*  *Accepted August 2019*  *Available online September 2019*   \_\_\_\_\_\_\_\_\_\_\_\_\_  *Keywords:*  *Sports Class, Functional Movement Screening, Injury Risk* | | **Abstrak**  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  Kelas olahraga menjadi salah satu cara yang dapat dilakukan oleh berbagai sekolah di daerah untuk dapat meningkatkan prestasi di bidang olahraga. Proses perekrutan siswa kelas olahraga telahbanyak menggunakan metode tes pemanduan bakat yang terdiri dari tes fisik dan keterampilan, akan tetapi pelaksanaan tes deteksi cedera olahraga dengan menggunakan *Functional Movement Screening* (FMS) masih minim dilakukan. Tujuan dari penelitian ini yaitu untuk mengidentifikasi risiko cedera pada siswa kelas olahraga dengan menggunakan tes FMS. Jenis penelitian menggunakan metode *ex-postfacto*. Sampel penelitian yaitu siswa kelas VIII pada kelas olahraga SMPN 1 Baturaden dengan jumlah 32 anak (20 Putra dan 12 Putri). Instrumen penelitian yang digunakan yaitu tes *Functional Movement Screening* (FMS) dengan validitas dan reliabilitas 0,81. Pengolahan dan analisis data menggunakan Penilaian Acuan Patokan (PAN) dengan bantuan ms. Excel. Hasil penelitian menunjukan banwa 56,25% siswa kelas olahraga di SMPN 1 Baturadan teridentifikasi beresiko mengalami cedera olahraga karena hasil tes FMS menunjukan ketidak seimbangan kekuatan antara otot tubuh bagian kanan dan kiri. Rekomendasi dari penelitian ini yaitu berikan program pengenalan gerak multilateral dan *Fundamental Movement Skills* pada anak, serta terapkan metode tes deteksi cedera olahraga menggunakan FMS selain tes fisik dan teknik pada siswa kelas olahraga.  **Abstract**  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  *Sports classes are one way that various schools in the region can improve performance in the field of sports. The process of recruiting sports class students has mostly used the talent scouting test method which consists of physical and skill tests, but the implementation of sports injury detection tests using Functional Movement Screening (FMS) is still minimal. The purpose of this study is to identify the risk of injury in sports class students using the FMS test. This type of research uses the ex-postfacto method. The sample of the research was students of class VIII in the sports class of SMPN 1 Baturaden with a total of 32 children (20 male and 12 female). The research instrument used was the Functional Movement Screening (FMS) test with validity and reliability of 0.81. Data processing and analysis using Benchmark Reference (PAN) with the help of ms. Excel. The results showed that 56.25% of sports class students at SMPN 1 Baturadan were identified as being at risk of experiencing sports injuries because the FMS test results showed an imbalance of strength between right and left body muscles. The recommendations of this study are to provide multilateral motion recognition programs and Fundamental Movement Skills to children, and to apply sports injury detection test methods using FMS in addition to physical and technical tests on students in sports classes.* | | |
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## INTRODUCTION

The school seeks to improve competitiveness and achievement in academic and non-academic fields. one of the non-academic fields that is favored is sports which is facilitated through student competitions or multi-event events. In order to achieve achievements in the non-academic field of sports, the school provides special sports classes. Sports classes are formed from junior high school to high school level. Sports classes are formed to facilitate students who have potential in the field of sports according to their talents and interests (Khodari, 2017; Kumalasari, 2019; Utami & Kafrawi, 2014; Wijayanti, 2018). Students in sports classes have a specific goal of competing and achieving in various student championships at the regional, national and international levels (Habibie, 2016; Mahendra, 2017; Sofyan Hanif, 2015).

The existence of a sports class is important for the sustainability of fostering sports achievements in an area. The formation of a tiered sports class can help the stakeholder of Sports Department, such as KONI, PENGDA and PENGKAB sports branches in the availability of athlete regeneration. Sports class coaching model is expected to be an alternative in the process of fostering sports achievements in addition to fostering club pathways to obtain talented athletes (Mahendra, 2017). The process of coaching sports at the student level can run well if the selection process for sports class admissions is carried out properly. Talent is an important aspect in achieving sports achievement, therefore the implementation of the admission test for special sports class needs to be carried out by prioritizing the scouting tests of sports talent and sports skills possessed by prospective students (Syafei et al., 2020). In addition to sports talent, the recruitment of sports class students also must put an attention to the physical, technical, mental, moral and emotional aspects of prospective sports class students (Mahendra, 2017; Masputri et al., 2016).

Physical factors are important criteria to be considered in the test for prospective students, both in terms of anthropometry and the physical condition of prospective students in sports class. Anthropometric tests and physical abilities tests for prospective students in sports classes are forms of tests that are always carried out by schools in obtaining students with good anthropometric and physical talent. The results of previous studies indicate that aspects of anthropometry and physical support in the appearance of motor skills in scouting children's talents (Misfajar & Sulistyorini, 2019; Ratno & Nidyatama, 2019). On the physical aspect, not only the form of anthropometry is considered, but also the level of risk of injury that may occur in children.

In Banyumas Regency not every school has a special sports class program. One of the schools that has developed a special sports class is SMPN 1 Baturaden. SMPN 1 Baturaden has conducted a sports class program within the last three years starting from 2017-2019. During this period, the pattern of recruiting prospective sports class students was carried out with a sports talent scouting method that included physical aspects and sports branching skills. Selection of students in sports classes with an early detection test of injury risk in sports class students has never been done before, so the level of injury risk has not been detected in prospective students. It has not been detected whether students who are accepted to the sports class in addition to having good physical and skill levels of sports, also have a low risk of injury.

Research on the management of sports class management, tests and measurements of physical aspects and skills of prospective students in sports classes, and evaluations of the implementation of sports class learning processes have been carried out, but studies on early detection tests of the possibility of injury to sports class students are still very minimal. Early detection of sports injuries in sports class students is very important to be done to find out the parts of the body that are at risk of injury. avoidance of the risk of injury is crucial because it impedes the physical development and skills of athletes. Sports injuries are one of the factors that can cause a decrease in performance in athletes (Mitchell et al., 2016; Zein & Sudarko, 2020).

The results of previous studies indicate that the prevalence of sports injuries in athletes shows a high enough number because it is not detected properly so that it interferes with athlete performance (Alonso et al., 2015; Dines et al., 2015; Junaidi, 2017; Khairunnisa & Pitriani, 2019). Based on the results of previous research studies, injuryidentification tests become an important process in recruiting prospective sports class students. Analysis of the potential for sports injuries can be done using Functional Movement Screening (FMS).

Functional Movement Screening is a physical examination used to measure movement patterns in a stable and dynamic manner (AKA et al., 2019; Dorrel et al., 2018; Kraus et al., 2014; Tabatabaei et al., 2018). Furthermore, FMS is a measuring tool used to measure functional movements of body organs that can predict general musculosklectal conditions and injuries (Cook et al., 2014; Teyhen et al., 2012). The Functional Movement Screening process is carried out by performing various movements in the joints and muscles in various parts of the body, starting from the upper, middle and lower body parts. The movements performed will indicate the level of ability to move joints and muscles so that the risk of injury can be determined based on these movements. (Pristianto et al., 2018; Warren et al., 2018).

FMS plays an important role in mapping potential risks to avoid the possibility of adverse injury. Knowledge of the potential for injury in sports students or athletes becomes an important reference to improve performance and achievement.

The purpose of this study to determine the level of the sports injuries risk in the sport class students of SMPN 1 Baturaden, Banyumas Regency using Functional Movement Screening. The results of this study are crucial as a reference for sports development strategies for schools to improve the performance and performance of sports students by minimizing the risk of injury.

## METHODS

#### This research uses ex-postfacto method. Researchers did not intervene in the research sample in detecting the occurrence of sports injuries

#### **Participants**

#### Participants in this study were students of class VIII in the special sports class at SMP N 1 Baturaden. Participants were 32 students consisting of 20 male students and 12 female students.

#### **Sampling Procedures**

#### Determination of the samples number using a total sampling technique by taking the entire population to become a research sample.

#### **Materials and Apparatus**

#### The research instrument was a Functional Movement Screning (FMS) test with the validity and reliability of the test of 0.81, if the sample gets a total score of less than 14 then it shows a high risk of injury (Abraham et al., 2015; Bonazza et al., 2017; Cook & Burton, 2010; Marques et al., 2017; Teyhen et al., 2012). The types of FMS tests are as shown in Table 1 below

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Table 1.

*Functional Movement Screening Test*

|  |  |
| --- | --- |
| **No.** | **Type of FMS Test** |
| 1 | Overhead Squat |
| 2 | In Line Lunge |
| 3 | Hurdle Step |
| 4 | Active Straight Leg Raise |
| 5 | Shoulder Mobility |
| 6 | Trunk Stability Pushup |
| 7 | Rotary Stability |

#### **Procedures**

The process of testing and measuring the Functional Movement Screening (FMS) is carried out by means of the participant performing each FMS movement sequentially then judging by the provisions of the FMS score as shown in Figure 1 below:

Figure 1. FMS Score Criteria (Cook, 2010, Mo-An et al, 2012)

#### **Design or Data Analysis**

## Data analysis used Benchmark Reference (PAP) to measure joint and muscle motion criteria using the Functional Movement Screening test. Functional Movement Screening (FMS) measurement results are then analyzed using the Microsoft Excel application to find out the number of children who are included in the category of “Low Risk of Injury” or “High Risk of Injury”.

## RESULT

#### The overall results of measurements regarding the risk of injury in students of SMP N 1 Baturaden by using the Functional Movement Screening (FMS) method can be seen in Table 2 below:

#### Table 2.

#### Injury Risk Data for Sports Class Students

|  |  |  |
| --- | --- | --- |
| **No.** | **Criteria** | **Total** |
| 1 | Low Risk of Injury | 14 |
| 2 | High Risk of Injury | 18 |

#### Based on the results of measurements in sports class students of SMPN 1 Baturaden using Functional Movement Screening (FMS) showed that 14 students were in the "Low Risk of Injury" category while 18 students were included in the "High Risk of Injury" category. Data on the percentage of injury risk for students of SMPN 1 Batuaden sports class can be seen in Figure 2 below.

#### **Figure 2. Percentage of Injury Risk Level**

#### **in Sports Class Students**

Based on Figure 2 above, the percentage of injury risk level in students of SMPN 1 Baturaden sports class is 43.75% of students identified as “Low Risk of Injury” and 56.25% of students have identified has high level of “High Risk of Injury”. The data shows that most of the sports class students at SMPN 1 Baturaden identified a high level of injury risk.

The comparison data of the right body muscle strength with the left body muscle based on the Functional Movement Screening (FMS) test in the students of SMPN 1 Baturaden sports class is shown in Figure 3 below

#### 

Figure 3. Comparison of Right and Left Muscle Strength in Sports Class Students

Based on Figure 3 above shows that in the In Line Lunge, Hurdle Step, Active Straight Leg Raise, Shoulder Mobility, and Rotary Stability movements, the strength of the right body muscles is more dominant than the left body muscles. These results indicate that there has not been a balance of strength between the right and left muscles in the majority of students in sports classes at SMPN 1 Baturaden.

Data on the risk of injury in male students of sports class at SMPN 1 Baturaden by using Functional Movement Screening (FMS) seen as table 3 below.

Table 3.

Injury Risk Data for Male Students

in Sports Classes

|  |  |  |
| --- | --- | --- |
| **No.** | **Criteria** | **Total** |
| 1 | Low Risk of Injury | 9 |
| 2 | High Risk of Injury | 11 |

Functional Movement Sceening (FMS) test results for male students of SMPN 1 Baturaden sports class showed 9 students were in the “Low Risk of Injury” category while 11 students were included in the “High Risk of Injury” category. Data on the percentage of injury risk in male students of SMPN 1 Batuaden sports class can be seen in Figure 4 below.

Figure 4. Percentage of Injury Risk Level in Male Students in Sports Class

Figure 4. above shows that the percentage of the level of risk of injury in male students of SMPN 1 Baturaden sports class consists of 45% of students in the "Low Risk of In Jury" category and 55% of students are in the "High Risk of Injury" category. The results of these measurements indicate that the majority of male students of sports classes at SMPN 1 Baturaden have identified a high level of injury risk.

Data on the risk of injury to female students of sports classes at SMPN 1 Baturaden by using Functional Movement Screening (FMS) can be seen in table 4 below.

Table 4.

Data on Injury Risk for Female Students

in Sports Class

|  |  |  |
| --- | --- | --- |
| **No.** | **Criteria** | **Total** |
| 1 | Low Risk of Injury | 5 |
| 2 | High Risk of Injury | 7 |

The measurement results using Functional Movement Screening (FMS) on female students of SMPN 1 Baturaden sports class showed that 5 students were in the "Low Risk of Injury" category and 7 students were in the "High Risk of Injury" category. Data on the percentage of injury risk in female students of SMPN 1 Baturaden sports class can be seen in Figure 5 below.

Figure 5. Percentage of Injury Risk Level in Female Schoolgirls in Sports Classes

Figure 5 shows that the percentage of injury risk level in female students of SMPN 1 Baturaden sports class is 41.67% in the "Low Risk of Injury" category and 58.33% is in the "High Risk of Injury" category. These data indicate that the majority of female students of sports classes at SMPN 1 Baturaden have identified a high level of injury risk.

## DISCUSSION

## Functional Movement Screening (FMS) tests are performed to measure the level of body balance, muscle strength and endurance, and joint ability (ROM). Functional Movement Screening (FMS) test is used to determine the body condition of students in sports classes, whether in prime condition or identified prone to injury. The results showed that most of the sports class students at SMPN 1 Baturaden were detected has high vulnerability rating to injury during training or competition.

## The high risk of injury occurs because most students are unable to perform various movements perfectly according to the correct movement technique. The results of previous studies show that only a small portion of the sample can make movements on the FMS test properly and perfectly (Abraham et al., 2015; Lester et al., 2017; Teyhen et al., 2012). The movements in the FMS test have complex movement criteria and are relatively new for students of the SMPN 1 Baturaden sports class, so that the success rate of doing the movements is low.

## This study also confirms that students of SMPN 1 Baturaden sports class are prone to injury following the results of FMS tests conducted by eighth grade students in sports class showing relatively low average values. The results of previous studies indicate that junior and adolescent athletes are prone to sports injuries because they are not detected early (Boguszewski et al., 2015; Khairunnisa & Pitriani, 2019; Mitchell et al., 2016).

## Based on the results of research on sports class students at SMPN 1 Baturaden, the recommendations given are: First, it is important to carry out an injury identification test on the reception of athletes or sports class students. Selection of prospective students or athletes by considering of the level of injury vulnerability with a low risk of injury.

## Second, it is important to adjust the weight training program between the right and left muscles so that there is no significant difference in strength between the two muscles. The high risk of injury in sports class students at SMPN 1 Baturaden can also be affected by the imbalance in the strength of the muscles of the right body with the left. Based on the results of the FMS test on students of SMPN 1 Baturaden sports class, it is known that the condition of the right body muscles is more dominant compared to the left body muscles. An imbalance of strength between the right and left body muscles can reduce athlete performance due to injury susceptibility (Meliscki et al., 2017; Suchomel et al., 2016; Zuša et al., 2015).

## Third, the importance of giving a gradual development program, starting from the multilateral stage to the specifications. The multilateral movement coaching phase or Fundamental Movement Skills is very important to provide a variety of movement experiences to students in sports classes. Indirectly students practice to strengthen muscle function naturally through a variety of physical activities, thus avoiding the high risk of injury. Various physical activities and multilateral sports help children to grow and develop in nature, both bones and muscles (Budi et al., 2019; Manna, 2014). Good bone and muscle development can help children to perform various movements better and minimize injury.

## Provision of multilateral movement patterns supported by sports injury detection tests using Functional Movement Screening (FMS), physical tests and sports branching techniques can help schools with sports class program to be able to obtain prospective athletes with good physical condition and movement skills, so as to avoid the risk of sports injuries at the advance stages of athlete development.

## CONCLUSION

## Based on the results and discussion, it can be concluded that the sports class students at SMPN 1 Baturaden were identified as having a high risk of injury based on the results of the Functional Movement Screening (FMS) test. In addition, the results also obtained that the ability of the muscles of the right and left body does not have a balance of strength, with the right muscle showing better ability compared to the left side of the body muscle. The high risk of injury and strengthened by the imbalance of muscle strength possessed by the majority of sports class students at SMPN 1 Baturaden can hamper the process of fostering achievements through various student level events.

## The recommendations of this research are, the importance of conducting sports injury identification tests in the selection test for prospective students in sports class besides providing physical and technical tests. Thus, students who are accepted are students who are physically good, skilled and avoid the risk of sports injuries. In addition, the application of athletic training programs for sports class must also consider the level of growth and development of students.

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