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Functional Movement Screening: An Early Detection of The Student Injury Risk in Sport Class

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Abstract

Sport class is one of the solutions taken by regional schools to improve achievements in sports. The process of recruiting sport class students has mostly conducted by using the talent scouting test method which consists of physical test and skill test. However, the implementation of sport injury detection test using Functional Movement Screening (FMS) is still insignificant. The purpose of this study was to identify the student risk of injury in sport class by using the FMS test. The research used ex-post-facto method. The research samples were 32 students of class VIII in the sport class at Baturaden Public Junior High School 1 (20 males and 12 females) aged 14 years in average. The research instrument used was the Functional Movement Screening (FMS) test with the validity and reliability of 0.81. Data processing and analysis employed the Criterion-Referenced Evaluation (PAP) with the help of Ms. Excel. The results showed that 56.25% of sport class students at were identified at risk of sports injuries. The results also showed an imbalance of strength between the right and left body muscles. The study concludes that the use of Functional Movement Screening (FMS) test is important to minimize the high likelihood of injury of the students in sport class.

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INTRODUCTION

Sport class becomes one of the efforts taken by schools to train the students with a sport talent. Sport class is arranged to facilitate the students who have potentials in sport that are relevant to their talents and interests (Khodari, 2017; Kumalasari, 2019; Utami & Kafrawi, 2014; Wijayanti, 2018). Through sport classes, initiated from junior high school to senior high school levels, the schools aim to improve the competitiveness not only in the academic field but also in the sport field through the involvement in competitions or student multi events. Students who involve in a sport class have a special aim, for instance to be able to compete and to achieve achievements in student competitions in regional, national, or international level (Habibie, 2016; Mahendra, 2017; Sofyan Hanif, 2015)

The existence of sport classes is important to the continuity of the competitive sport training in a region. The arrangement of staged sport class could help sport stakeholders, such as Sport Service, The National Sport Committee of Indonesia (KONI), Provincial Administration (PENGPROV), and Regional Administration (PENGKAB), to regenerate the athletes of a specific sport branch. The sport class training model is expected to be the alternative in the process of competitive sport training, besides training clubs, to find out talented athletes (Mahendra, 2017). The sport training process for students can be conducted successfully if the selection process is conducted suitably.

Talent is an important aspect in sport achievement (Syafei et al., 2020), thus the sport class admission test mainly emphasizes talent scouting test and skill test. Besides sport talents, the recruitment of the sport class students should pay attention to the physical, technical, moral, and emotional aspects of the students (Mahendra, 2017; Masputri et al., 2016).

Physical factor is one of the essential criteria to be concerned in the student recruitment test of the sport class, both from anthropometry and the physical performance of the students. The anthropometry test and physical performance test of sport class student candidates become the tests regularly conducted by the school in finding out the students with an anthropometry talent and a good physical condition. The result of previous research showed that anthropometry and physical performance support the motor skill performance in student training (Misfajar & Sulistyorini, 2019; Ratno & Nidyatama, 2019). In physical aspect, anthropometry aspect is not the only aspect that should be considered, but also the risk of injury level that might occur to the students.

Numerous research related to the sport class management, test and measurement of physical performance and skills of the student candidates of sport class, and the evaluation of learning process of the sport class in schools in Indonesia have been conducted. However, the study related to the early detection of the probability of injury on sport class students is still limited. One of schools that has conducted a sport class training is Baturaden Junior High School 1 in Banyumas Districts.

Baturaden Junior High School 1 has been conducting the sport class program for the last three years, started from 2017-2019. In that period, the recruitment pattern of the student candidates was conducted by administering talent scouting on sport consisting of physical performance and specific sport skills. The admission test identifying or early detecting the risk of injury of sport class students has never been conducted, thus there was no any detection of the accepted students besides holding a good physical

performance and excellent sport skills, also a low risk of injury.

Early detection of sport injury of sport class students is important to be conducted to find out the injury risk potential on certain parts of body that might prevent physical and skill developments of the athletes. Sport injury is one of factors causing the decrease of performance of the athletes (Mitchell et al., 2016; Zein & Sudarko, 2020). The result of previous research shows that the prevalence of sport injury on the athletes is high due to the lack of detection, thus disturbing the athletes' performance (Alonso et al., 2015; Dines et al., 2015; Junaidi, 2017; Khairunnisa & Pitriani, 2019). According to the data, an identification test of sport injury on sport class students is necessary. The analysis of the potential of the sport injury could be conducted by using Functional Movement Screening (FMS) (Pristianto et al., 2018; Warren et al., 2018).

Functional Movement Screening is a physical observation used to measure movement pattern dynamically and stably (AKA et al., 2019; Dorrel et al., 2018; Kraus et al., 2014; Tabatabaei et al., 2018). Furthermore, FMS is a measurement tool used to measure the functional movement of organs that could predict the general musculoskeletal condition and injury (Cook et al., 2014; Teyhen et al., 2012). Functional Movement Screening is conducted by doing various movements on joints and muscles in various parts of body, begins form upper body, middle body, and lower body. The movements performed will indicate the performance level of joint and muscle movements, thus the risk of injury can be detected.

By considering the important role of FMS in detecting the injury risk, FMS becomes a crucial procedure in the recruitment process of the student candidates of sport classes. This research aimed at finding out the level of sport injury probability through an early detection using the Functional Movemnet Screening on the sport class students of Baturaden Junior High School 1, Banyumas district.

METHODS

This research used ex-post facto method as the researcher did not conduct any intervention on the samples to detect the sport injury.

Participants

The population and samples in this study were all students of Baturaden Junior High School 1 grade VIII at the special sport class consisting of 32 students. The respondents consisted of 20 male students and 12 female students aged 14 years in average.

Sampling Procedures

The decision of the number of samples used a total sampling technique by taking all of the population to be the samples of the study. The sampling procedure with total sampling technique was conducted by identifying the risk of injury of all students in a special sport class at Baturaden Junior High School 1 grade VIII.

Materials and Apparatus

Tabel 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

The research instrument used was Functional Movement Screning (FMS) with validity and reliability test score 0,81. FMS test contains 7 types of movements. If the samples gained total score less than

14, the risk of injury of the sample is high (Abraham et al., 2015; Bonazza et al., 2017; Cook & Burton, 2010; Marques et al., 2017; Teyhen et al., 2012). The type of FMS test can be seen in the Table 1.

Procedures

In the test and measurement of Functional Movement Screening (FMS), the samples did each movement of FMS consecutively; the score was then given according to the scoring system of FMS (An et al., 2012; Cook & Burton, 2010) as presented in Table 2.

Table 2. FMS Test Score Criteria

No	Criteria	Score
1	The movement is performed perfectly	3
2	The movement is not performed perfectly	2
3	Cannot perform the movement	1
4	Pain occurs when performing the movement	0

Data Analysis

The analysis of data was conducted by using Criterion-Referenced Test to measure the criteria of joint and muscle movements by using the Functional Movement Screening test. The results of the Functional Movemenrt Screening (FMS) measurement were then analyzed by using Ms. Excel. Therefore, the number of students belonged to the safe from injury category or the students belonged to at injury risk category were depicted .

RESULT

The results of the research related to the risk of injury of the sport class students by using the Functional Movement Screening (FMS) method can be seen in Table 3. According to Table 3, 14 of 32 sport class students at Baturaden Junior High School 1 who had followed the Functional Movement Screening (FMS) were in the safe from risk of injury category, while 18 of them belonged to the students with the risk of injury. The data of risk of injury percentage of the sport class students of Baturaden Junior High School 1 can be seen in Figure 2.

Table 3. Data of Risk of Injury of Sport Class Students

No.	Criteria	Total
1	Safe from risk of injury	14
2	At a risk of injury	18

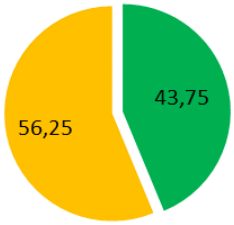

Figure 2. The Percentage of the Injury Risk Level of the Sport Class Students

Figure 2 shows the percentage of the level of injury risk of the sport class students at Baturaden Junior High School 1. The figure depicts that 43,75% students were safe from injury risk and 56,25% of them had injury risk. The data shows that most of the students in sport class of Baturaden Junior High School 1 were identified having a moderately high risk of injury.

Besides showing the injury risk potential, FMS test also shows the results of the comparison between the strength of right and left body muscles. The comparison results of the body muscle strength of the sport class students of Baturaden Junior High School 1 are presented in Figure 3. Figure 3 describes that in In Line Lunge, Hurdle Step, Active Straight Leg Raise, Shoulder Mobility, and Rotary Stability movements, the

strength of the right body muscles is dominant compared to the left body muscles. This result shows that, there had not been a strength balance between right body muscles and left body muscles of the majority of sport class students of Baturaden Junior High School 1.

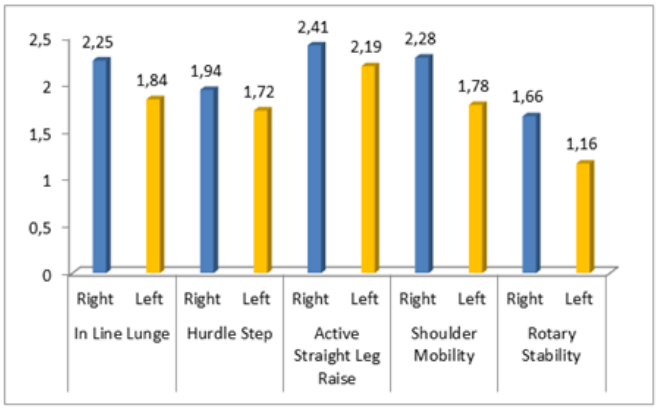

Figure 3. Comparison of Right and Left Body Muscle Strengths of the Sport Class Students

Data related to the injury risk of male sport class students of Baturaden Junior High School 1, gained from Functional Movement Screening (FMS), are presented in Table 4.

Table 4. Data of Injury Risk of Male Sport Class Students

No.	Criteria	Total
1	Safe from Injury Risk	9
2	At an Injury Risk	11

Table 4 shows the results of the Functional Movement Screening (FMS) test of the male sport class students of Baturaden Junior High School 1. The table shows that 9 students were in the safe from injury risk, while 11 students were at an injury risk. The injury risk percentages of the male sport class students of Baturaden Junior High School 1 can be seen in Figure 4.

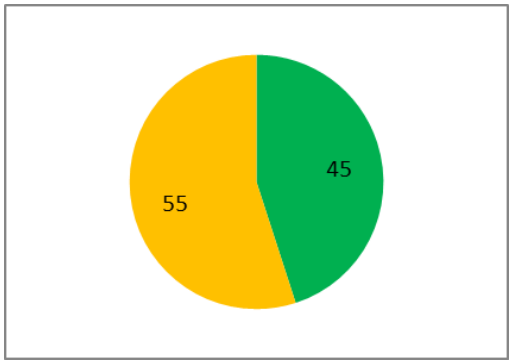

Figure 4. Percentage of Injury Risk of Male Sport Class Students

Figure 4 shows the percentage of injury risk of male sport class students of Baturaden Junior High School 1. The figure shows that 45% of the students were safe from injury risks, while 55% students belonged to at an injury risk category. The data show that most of male sport class students had a risk of injury.

Data related to the injury risk of female sport class students of Baturaden Junior High School 1 measured by using Functional Movement Screening (FMS) are presented in Table 5.

Table 5. Data of Injury Risk of Female Sport Class students

No.	Criteria	Total
1	Safe from Injury	5
2	At a Risk of Injury	7

Table 5 shows the results of the Functional Movement Screening (FMS) of the female sport class students of Baturaden Junior High School 1. The results show that 5 students were in the safe from injury risk, while 7 students were in at an injury risk category. The percentages of injury risk of the female sport class

students of Baturaden Junior High School 1 are presented in Figure 5.

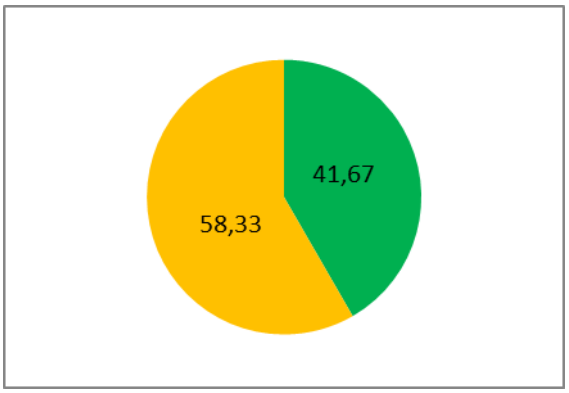

Figure 5. Injury Risk Percentages of Female Sport Class Students

Figure 5 shows the percentage of injury risk of female sport class students of Baturaden Junior High School 1. The data show that 41,67% of the students were safe from injury risk, while 58,33% of them were at injury risk category. The data shows that most of female sport class students of Baturaden Junior High School 1 were identified to have a moderately high injury risk.

DISCUSSION

The Functional Movement Screening (FMS) test was conducted to measure the level of body balance, strength and endurance of muscles, and range of motion (ROM). By using the FMS test, the potential of injury risk of the students can be identified. The result of the study shows that most of the students of sport class were indicated vulnerable to injury during training and competition.

The high risk of injury occurs due to the most of the students were not able to perform various movements perfectly, thus the gained score was not maximum. The results of previous research show that a small number of samples could perform movement in FMS test well and perfectly (Abraham et al., 2015; Lester et al., 2017; Teyhen et al., 2012). The movements in FMS test have complex movement criteria and new to the sport class students of Baturaden Junior High School 1, thus the success level of the performance was low.

This research confirms that the sport class students of Baturaden Junior High School 1 were identified vulnerable to injury. It is indicated from the relatively low results of FMS test taken by sport class students grade VIII. The result of the similar research also shows that junior teenager athletes are vulnerable to sport injury due to the lack of early detection (Boguszewski et al., 2015; Khairunnisa & Pitriani, 2019; Mitchell et al., 2016).

The high injury risk of the sport class students of Baturaden Junior High School 1 can be influenced by the imbalance strength of right and left body muscles. The result of research shows that the muscle condition of the sport class students of Baturaden Junior High School 1 was dominated by the right body mucles based on the result of FMS test. The imbalance strength of right and left body muscles could obstruct the athletes performance due to their vulnerability to injury (Meliscki et al., 2017; Suchomel et al., 2016; Zuša et al., 2015). The preventive solution that can be taken is giving a training program with adjusted loads on the right and left muscles, thus there is no strength difference between the two muscles.

Important notes for the stakeholders or the schools conducting a sport class program according to the research are: First, identification test of injury risk is a crucial step before accepting the athletes, so that the chosen athletes have a low risk of injury potential. With the low potential of injury risk, the probability of accepting athletes with a high performance is possible.

Secondly, students with a sport talent and

potential should be given a staged training program started from the multilateral stage to specification stage. The multilateral movement training stage or Fundamental Movement Skills is crucial to give various movement experiences to the students, thus students indirectly strengthen the muscle function naturally through various physical activities. Hence, the risk of injury decreases. Various multilateral physical activities and sports help children to grow and develop their muscles and bones normally (Budi et al., 2019; Manna, 2014). A good development of bone and muscle could help children doing various movements better and minimizing injuries.

Third, the multilateral movement training supported by the sport injury detection test using the Functional Movement Screening (FMS), physical test, and sport branch technique test could help schools administering a sport class program to gather athlete candidates with a good physical condition and movement skills that eventually would improve the sport achievement. Fourth, the implementation of sport class athlete training program should consider and adjust the growth level of the students.

Specifically, this research focused on one type of injury detection test, namely FMS test, on the junior high school students. Physically, the samples in this research were still in the growth and developmental stage, thus the results have to be compared with the result of the study involving samples with different ages.

CONCLUSION

According to the results and discussion, it concludes that sport class students of Baturaden Junior High School 1 were identified having a relatively high risk of injury. Besides, the imbalance strength of the right and left body muscles was identified, where the right body muscles were better than the left body muscles. The high risk of injury and the imbalance of muscle strength of most of the sport class students of Baturaden Junior High School 1 could obstruct the process of sport training.

RECOMMENDATION

It is crucial to use the alternative identification test besides FMS test to support the research related to sport injury risk. In further research, a more variation in sample can be involved, for instance the senior high school students, college students, and professional athletes that have reached the physiological and psychological maturations. It is important to conduct FMS on athletes of various sport branches, whether from game sport, martial arts sport, or accuration sport.

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