

A Preliminary Study on Injury Risk Factors of Perak Athletes

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Abstract

The objective of this study is to identify the injury risk factors of Perak male and female athletes who participating in contact and non-contact sports, meanwhile to suggest preventive strategies to all the sports personnel. The research design chosen was retrospective descriptive epidemiological study. The data from this study is examined based on intrinsic risk factors (Self Induce and Attire) and extrinsic risk factors (Third Party, Environment and Equipment). The descriptive statistics was utilized to analyze the research variables. The data collected for self status in self induce factor, finding revealed that body composition (51.1%) as highest risk followed by body status to play (41.7%), self-attitude (5.8%) and age difference (1.4%). Whereby, for factor of attire, more injuries occurred due to not wearing appropriate protective gear (47.5%) compared to inappropriate footwear (34.5%) and inappropriate clothing (18.0%). The extrinsic factors of third party that lead to injuries were mostly due to opponent (89.2%), contrary to referee (10.8%) and none from audiences. There was no injury reported due to playing equipment. This study finding revealed that playing surface was reported highest (75.5%) in environment factors followed by weather (24.5%). In the nutshell, injury rates can be reduced by identifying the injury risk factors and thus the life span of high performance athletes will be prolonged.

Keywords: epidemiology; Perak athletes; injury risk factors; intrinsic risk factors; extrinsic risk factors.

1. Introduction

The vital negative impact on an athlete performance on sports is the occurrence of injury [1,2]. Once an athlete injured, no matter how serious the injury was, somehow, it will reduce the performance of an athlete. In directly, this injury occurrence on athlete could defeat the team performance as well. The injury not only affect the physical performance but also the psychological state of injured athlete even though after end of rehabilitation program [3,4]. As sports participation increase continuously, it is important to set a safe environment to athletes. Sport personnel must be able to identify injury risk factors that predispose athletes for injury in every sport setting [5].

Generally, sports injuries are multi risks phenomena with various risk factors interacting at a given time [6]. These risk factors conventionally divided into two main categories; the internal (intrinsic) risk factors and external (extrinsic) risk factors [7,8,9,10]. The internal (intrinsic) risk factors are related to the characteristic features of individual athletes whereas external (extrinsic) risk factors are associated to environmental variables such as the level of play, exercise load, amount and standard of training, position played, equipment used, playing field conditions, playing rules, foul play and so on.

The researchers have concluded in their review that there is some agreement about the extrinsic risk factors for injuries of the lower leg and ankle [11]. So far, the leading determinant of injury risk in sports is the nature of the activity itself. Contact sports i.e soccer facing the greatest risk of ankle sprains. Team sports such as handball, volleyball, and basketball also cause a significant proportion of ankle injuries [12,13]. Environmental conditions, such as terrain, climate and correct equipment, also play a major role in the outcome of an injury [14]. A study of Australian Rules football players revealed that quadriceps strains were relatively more

likely on dryer and harder grounds where ground traction was a greater. Moreover, a previous study found more rectus femoris strains associated with a dry field during pre-season of two consecutive English soccer seasons involving 1200 players [15].

One of the most important and well-established intrinsic risk factors for future injury of the lower extremity is a history of an injury and inadequate rehabilitation [16,17,18]. On the effect of age, risk factor studies have yielded contradictory results. Several studies showed an increased incidence of injury in older athletes [19,20,21] and others found an increased incidence of injury in younger athletes [22,23]. There are several studies which show an association between measure of aerobic fitness and injury [19,24,25,26] More recently, in 2014, a study done by the Norwegian school of sports sciences and concluded that a greater BMI is the only intrinsic factor associated with the a new lower limb injuries in elite female soccer players [27]. Also with regard to the relationship between postural control and injury, there is no consensus. Some studies also found an association between diminished balance and injury [28,29,30]. In a latest study done by Fousekis and colleagues (2011), found a trend toward flexibility asymmetries in those players who sustained an injury [31].

Studies on the etiology of sports injuries are important to create an appropriate prevention strategy to avoid sports injuries. Thus, this study is trying to find out both intrinsic and extrinsic risk factors for the Perak athletes. As a result, expected outcome of this research project is to provide a comprehensible initiative in regards with the risk factors that cause sports injuries. Consequently, this will also provide a yardstick of the risk factors especially for Malaysian athletes.

2. Methodology

2.1. Research Design

The preliminary study is a descriptive study that involved the Perak athletes who participated in contact and non-contact sports. The descriptive study is defined as a study designed to depict the participants in an accurate way or is all about describing people who take part in the study. The purpose of selecting this research design is to verify the risk factors of Perak athletes in review between extrinsic and intrinsic factors. The data collection of this study was collected at Perak Sport State Council in Ipoh, Perak.

2.2. Population and Sampling

All Perak athletes who were injured in the past 12 months and are currently undergo training program in Perak State Sports Council in Ipoh and agreed to volunteer in this study were recruited as subjects. They were asked to answer the questionnaires to state the risk factors of their injury. This study included male and female athletes to conterbalance the results that may appear due to gender differences that may affect the study finding. This study is conducted in State Sport Council, Ipoh, Perak.

2.3. Research Instrument

The self administrated questionnaire regarding injury profile of Perak athletes used in this study consists of three parts i.e Part A Data Demografy, Part B Sport Profile, and Part C, Injury Information. Data demography contains background information such as athlete’s gender, age, weight, height and limb dominance side. While in sport profile included types of sports involved, experience in sports participation and training frequency. Injury information comprises of injured body part, frequency of injury, and risk factors of sports injuries that contributing to injury.

2.4. Data Analysis

This input of questionnaire were assembled for subscale scoring and the researchers were analyzing the data using Statistical Package for Social Sciences 21.0 (SPSS) for Windows. The descriptive statistic was used to analyze demographic data, the mean and percentage were used to analyze the independent variables i.e risk factors of injury on contact dan non-contact sports of Perak male and female athletes. The significance level of this study is predetermined at p=0.05.

3. Results

3.1. Intrinsic Risk Factor of Self Induce

In self induce risk factor; study finding indicated that body composition (51.1%) is the main risk factors in self status followed by body status to play (41.7%), self attitude (5.8%) and age difference (1.4%) among Perak athletes in all sports (Figure 1).

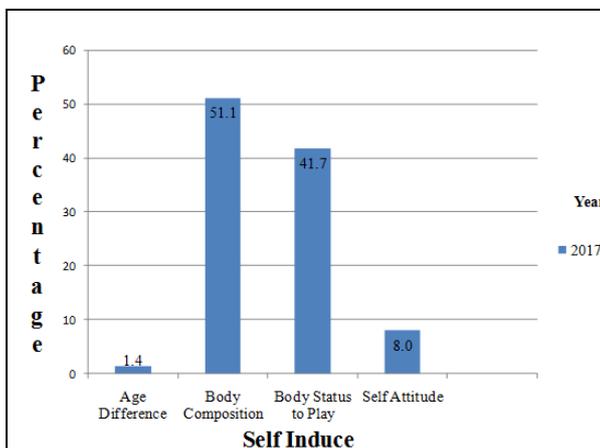


Fig. 1: Percentage distribution of self-induce as risk factor.

3.2. Intrinsic Risk Factor of Attire

In attire factor, not wearing adequate protective gear (47.5%) indicating the highest percentage compared with inappropriate footwear (34.5%) and inappropriate clothing (18.0%) (refer Figure 2).

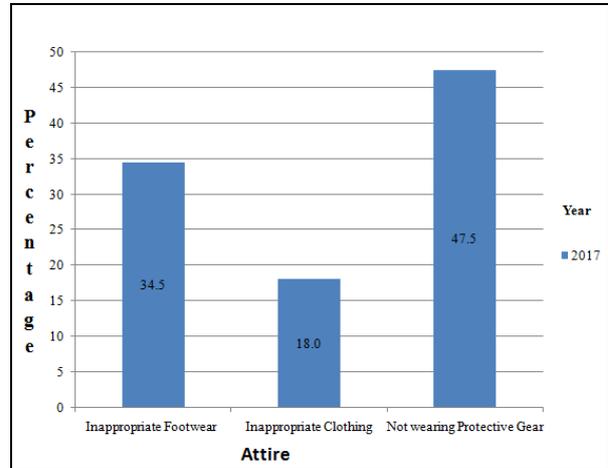


Fig. 2: Percentage distribution of attire as risk factor.

3.3. Extrinsic Risk Factor of Third Party

Regarding the extrinsic risk factor due to third party, Perak athletes’ injuries occurred mainly due to the opponent (89.2%) instead of referee (10.8%) and there were none by audiences (0%) (refer Figure 3).

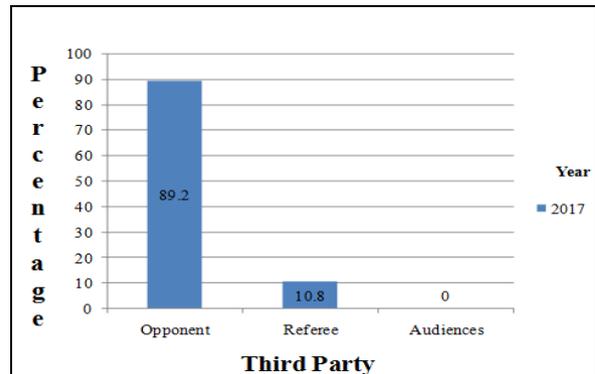


Fig.3. Percentage distribution of third party as risk factor.

3.4. Extrinsic Risk Factor of Environment

The percentage distribution of injury due to the environment among Perak athletes is shown in Figure 4. The result revealed that playing surface (75.5%) was the main risk factor of injuries compared with weather (24.5%).

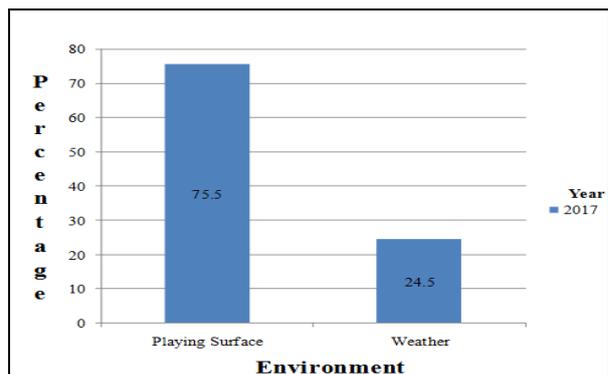


Fig.4. Percentage distribution of environment as risk factor

3.5. Extrinsic Risk Factor of Equipment

None of the injuries is declared due to sporting equipment such as racket, bet, ball, stick ext. as extrinsic risk factor.

4. Discussion

This study finding revealed the Perak athletes do not have ideal body composition. Less ideal body composition causing the Perak athletes are incompetence in high performance sports. With the lack of postural stability, it may result in fall, thus causing injury. Postural stability has been defined as the ability to maintain the body's spatial position and orientation within specific limits of the stability under foot [32]. There are various factors may affect the postural stability such as postural muscle strength, coordination of the body segment movement, somatotypic differences, feet placement and reaction times and thus will not lead to loss of balance [33]. A study mentioned that postural control parameters can predict ankle injury and with decreased directional control were more likely to suffer for ankle injuries [34]. Besides that, higher postural sway values can be a causal factor for injuries especially lower extremities injury [28,29]. For more detail in physiological view, the researchers found that the degenerated of postural stability is an alteration in the neuromuscular control strategy and may lead to the increment of intersegmental joint forces and continuously increase the development of forces involving ligaments, tendons and muscles [11]. In contrast, there was study by Swedish mentioned that female players with lower postural sway in single-legged stance (better balance) had a higher risk of injury [29]. Although it has the confusion about the postural stability can prevent from injury, but the current study's result still able to be supported by most research findings that lack of postural stability can lead to injury. Therefore, balance and coordination training should be suggested to the sport personnel especially coaches in order to reduce the amount of sports injuries. Next, the lack of muscle strength also plays a vital role in contributing the injuries among the Perak athletes. Muscle strength refers to the amount of force a muscle can produce with a single maximal effort in which can helps with body alignment, makes performing everyday actions easier and thus free of injuries. The deterioration of muscle strength makes one prone to injuries. A study found that decreased dorsiflexion muscle strength at 30°/s in men is a risk factor for ankle sprains [34]. The researchers suggested that the subjects cannot perform the dorsiflexion in their ankle accurately when an inversion action occurs. Moreover, study by Mendiguchia and others, reported that seven soccer players suffered quadriceps muscle strain during the season [35]. The result showed that the eccentric strength difference were found between those injured compared to uninjured players. Thus, in order to prevent from injuries, muscle strength training is needed in the training program. For example, kicking performance in soccer is influenced by both knee extension and hip flexion moment [36,37,38,39]. The iliopsoas and rectus femoris muscles are used to generate the hip flexion force. If the iliopsoas muscle is weak, the rectus femoris is needed more to compensate the weakness of iliopsoas and this result in an overload of rectus femoris and thus increase the risk of injury. In the conclusion, a muscle balance is needed to prevent from any muscle injuries.

The limited of range of motion or flexibility were reported by the Perak athletes as one of the injury risk factor. Flexibility is important to allow the joints to improve their range of motion. This enables the joint to easily accommodate the desired joint angle without undue the stress on the tissues around them and thus prevent from injuries. This can be supported by the study from Withrouvw, the researcher revealed that there was statistically significant lower quadriceps flexibility in the injured players [40] while Fousekis also found a trend toward flexibility asymmetries in those players who sustained an injury [31]. According to the

previous study, a higher extension range of motion at the first metatarsophalangeal joint in subjects causes the diminished support at this joint during the gait and consequently causing the ankle sprain [34]. When the subjects landing from the jump, the diminished support of the first metatarsophalangeal joint will make contact with the lateral part of the foot instead of with the hallux and thus prone to suffer for inversion sprains [41]. The same study also found that decreased dorsiflexion range of motion can be considered as a predictive factor of ankle sprains in men [34]. When landing with the knee straight, the dorsiflexion range of motion will decrease which may cause the gastrocnemius muscles to be shortened and place the foot in greater plantarflexion position, and hence increase the risk of getting ankle inversion injury [42]. As a result, flexibility training in preventive programme is required to achieve the optimal levels that targeted to minimize the risk of injuries in any level of sports.

In the other hand, the body size played a important role in causing injuries among the Perak athletes. The study of contact injury in professional rugby players found that greater injury risk in faster and heavier players [43]. The mechanism of playing rugby is they need to collide with the opponent with a faster speed. Consequently, if a player with larger size who need to run with greater speed and it may presumably that the greater ability to tolerate with the large impact force which may lead to injuries. While the study by Bastos, the researcher revealed that taller players had higher rates of sports injury and this supported by other studies [44]. Taller athletes will be more involved in defensive positions which often required them to run at full speed and abrupt changes direction especially the current style of soccer which demands explosive force and intense acceleration and predispose the players to injury [45].

With regards to the next causal variables (body status to play), Perak athletes reported that previous injury may lead to resuffer for the injury. Injured players did not seek for professional treatment to rehabilitate their injury. There were studies found that the rate of ankle reinjury was decreased after rehabilitation and balance training [46,47]. This observation is also in agreement with the finding of Arnason, having a previous hamstring injury, groin injury, and knee joint trauma was associated with a two to three fold increase in risk of an identical injury in the same leg [48]. The study by Dvorak and Kucera also mentioned that the greater the risk or injury happened to the players who suffered from previous injury [49,50]. The improper of rehabilitation in conditioning or proprioception may alter the movement patterns and followed by unrelated injury. For example, the risk of new knee injury especially overuse injury can happened due to previous anterior cruciate ligament injury [51]. In summation, the residual deficit in the previously injured joint or muscle must undergoes the desired rehabilitation program with the aim of reducing the risk of injuries.

Inadequate fitness may lead to symptoms of fatigue such as loss of attention, perception, performance and motivation, thus may lead to musculoskeletal injury. Jones stated that physical fitness as measured by mile run time is associated with injuries for both men and women army trainee [52]. The diminished of cardiorespiratory endurance cause the players felt tired, therefore lead to less accurate protective effect of the musculature on capsuloligamentous structures [34]. Previous studies findings stated that inadequate fitness can lead to injury. Similar finding was found in this study as well.

It is important to have warming up and cooling down session before and after exercise program respectively. Numerous Perak athletes did not undergo proper warming up and cooling down, thus sustain injury. According to McKay, the basketball players who did not stretch during the warming up period were 2.7 times more likely to injured the ankle compared to players who stretched [23]. Brukner and Khan also suggested that there is the relationship between calf muscles tightness and ankle injuries. The tightness of the calf muscles may responsible for ground contact of the feet in the supinated position, with a high risk of an ankle

sprain. The stiffness of the connective tissues can be diminished by stretching and thus increasing the range of motion of a joint and consequently reduce the risk of injury [53].

Athletes with inadequate skill also may contribute for injuries. There study found that youth and lower-skill players tend to suffer for non-contact injuries of the knee [17]. This is due to the overuse, physical overload or inadequate training. Another study by Chomiak, the majority of players who had ACL ruptures with or without other injured knee structure were from the lower-skill group [24].

Perak athletes were found have well developing in mental and emotion control. They are able to play the game with patience and full of confidence. They manage to control their emotion throughout the game no matter what happened in the game. They also showed a high respectful to the referee and opponent. Some of the athletes are lack of confidence when competing the games. When they lack of confidence, they will loss focus during playing and may lead to injury. This is supported by Lyman, he studied that decreased of self-satisfaction became risk factor in pitchers aged 9 to 12 years [54]. This is due to the coaches only concerned about winning the game.

In the self induce risk factor of proper attire, athletes who did not using protective gear ranked the most causal mechanism in contributing injuries among the Perak athletes. Athletes should be adviced to wear adequate protective gear during sporting activities according to the needs of each game. Simultaneously, proper footwear in sports is important to prevent injuries. It is always misconceptions in fitness that one pair of shoes can use for variety of sports. . Basketball players wearing shoes with air cells in the heels were 4.3 times more likely to hurt the ankle than those wearing shoes without air cells [23]. It may because of the air cells located in the heel of basketball shoes decrease the rear foot stability and hence increase the risk of ankle injury. There are few studies shown that the relationship of footwear quality and frequency of injury [55,56]. It mentioned that the frequency and severity of injuries are affected by the frictional characteristic of the surface-shoe combination. For instance, soccer shoes are differ in both the uppers and soles. This is to allow the soles to be flexible around the metatarsophalangeal joints and have the torsional stability, and the minimise the friction resistance.

In the other hand, extrinsic factors such as attacked by third party and environment factor seem to cause injuries among the Perak athletes. The aggressive of opponent is the main causal for injuries. For instance, tackling in rugby is used to stop the player to move forward. Therefore, the player tried to envelope the opponent's leg or body with both arms, thus they were collided together. The impact of collision may damage to the menisci or ligaments of the knee and ankle. Chomiak stated that more injuries occurred in the opponent's half of the field which due to the greater exposure to the body-contact injuries when attacking than defending [24].

Nevertheless, the role of referee in a competition is also important in controlling the frequency of injury. With the improvement of laws of the game is vital to protect the players from dangerous play. The previous study mentioned that the referees punished only two-thirds of the offending players [24]. The changes in the perception of 'fair play' by players, coaches and referees will achieve the aim to reduce the incidence of injuries in football [57]. The bias of the referee may cause the players to play more aggressively during the game in order to show their disagree to the judgement made by the referee.

Lastly, the environment as one of the extrinsic factors that may affect the performance of the athletes. Playing surface seems the common risk factor of injuries. A proper playing surface is critical element in providing the individual to play comfortably is a safe place. For example, the difference of the artificial turf surface and natural grass surface can link to the sustainable injury. There was study on American football players found that the rate of ACL injury on artificial surfaces is 1.39 times higher than the injury rate on grass surface. The study by Ekstrand found that 24% of

injuries were related to the playing surface (hard or slippery surface) and the pitch quality [58].

Since the current research findings revealed that most injury cases happened due to the intrinsic risk factors of body composition and body status to play, the researcher suggests that the coaches and athletes should always be aware of the their level of fitness either the health or motor related fitness. Next, the researcher also suggest the coaches should make sure their athletes are wearing the proper attire according to the game and position playing in the game. Besides that, according to the extrinsic risk factor of third party, the researcher suggest that the players should have good emotion control when facing the aggressiveness or bias of the opponent or referee. While the extrinsic risk factor of environment, the coaches and athletes should always stay hydrated when training and competing under the hot weather and making sure the playing surface are compatible and in perfect condition to train and to compete.

The preventive strategies suggested by the researchers to coaches and athletes are having awareness on risk factors found in this study, thus make sure to control these risk factors so that athletes will not be threaten by injuries.

5. Conclusion

In conclusion, this study findings revealed that body composition, and not wearing adequate protective gear are found to be self induce intrinsic risk factors. Whereas opponents and playing surface were the main extrinsic risk factors cause by third party and environment. The Perak sports personnel, coaches and athletes are adviced to refer to injuries risk factors found in this study in the effort of injury prevention to secure the athletes health status and performance level. Preventive strategies suggested by the researchers are coaches, athletes and sports personnel must monitor and control these risk factors so that the athletes will not be threaten by injuries, thus continue to showcase high performance in all sports.

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