

## Soccer players' perceptions on injury risk and prevention strategies

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### Abstract:

In injury prevention practice, high emphasis has been directed to the implementation and maintenance of evidence-based injury prevention measures into training routines. Despite scientific backing, compliance to injury prevention exercise programs has been observed to be suboptimal in many teams. Thus, understanding the soccer players' beliefs, knowledge, attitude, and behaviors toward injury prevention exercise programs may unlock some insight toward better player education and compliance of injury prevention approaches implemented in their teams. In this study, we aim to gather preliminary data on Malaysian elite soccer players' perceptions on injury risk and mechanisms, its means of prevention, and their current practice in prevention of injuries during training and matches. Active players from four elite soccer and amateur leagues (Super League, Premier League, President's Cup, and Youth Cup) in Malaysia were invited to participate. Forty-five (n = 45) male elite players returned their responses. The most perceived risk factors for injury are muscle impairments and fatigue (91.1%), followed by coordination (88.9%), physical condition (84.4%), and previous injury (77.8%). As per our findings, over 50% of respondents feel adequately informed about injury prevention. However, as a practice, players seem to employ a combination of injury prevention measures that may or may not be supported by comprehensive, evidence-based literature. The findings suggest that there may be conflicting information among the players with regard to the efficacy of one injury prevention practice in comparison to the other. This may be regarded as a call for injury risk and prevention education among players, as well as increase the promotion of evidence-based injury prevention programs in Malaysian professional soccer.

**Key Words:** Soccer, Perceptions, Injury risk, Injury prevention.

### Introduction

Soccer is a sport plagued with injuries. Common parameters that seem to have notable influence on injury prevalence are age, sex, previous injury, and competition levels (Arnason et al., 2004; Faude et al., 2005; Herrero et al., 2014; Söderman et al., 2001; Yu et al., 2005). In a prospective cohort study, Arnason et al. (2004) found that older players are at higher risk of injury in general, and previous injury was identified as a risk factor to injury, with odds ratios ranging from 4.6 to 11.6 across different lower limb injuries. Meanwhile, in a study by Yu et al. (2005), biomechanical differences were noted in terms of landing kinematics between male and female soccer players, which may put female players at a higher risk of injury compared to their male counterparts. It became apparent that a higher competition level tends to draw greater incidences of injury, as proven by Dvorak et al. (2011) and Junge and Dvořák (2015) where injury risk during the FIFA World Cup exceeded those reported by Hawkins and Fuller (1999) for national leagues seasons (40 versus 28 injuries per 1000 hours). Other risk factors of soccer injuries may be internal in nature, such as a previous history of injury (Arnason et al., 2004), instability (de Noronha et al., 2006; Greig & McNaughton, 2014), fatigue (Alentorn-Geli et al., 2009), and increased range of motion (de Noronha et al., 2006; Söderman et al., 2001). With over 25 billion euros of revenue in the European region alone (Statista, 2022), injuries in soccer may be considered a threat to the soccer market worldwide.

Soccer injuries may be costly to both the team and the injured player. Time lost due to injury may span up to over 3–4 weeks, depending on the severity of the injury (Herrero et al., 2014), which, in turn, could impair both the player and the team's functions during play (Carey et al., 2006). Complications from injuries may include a number of adversities such as early onset of osteoarthritis, decreased activity levels, and a compromised psychological well-being (Freedman et al., 1998; Yu & Garrett, 2007). In lieu of such setbacks, the promotion of prevention strategies developed by researchers such as the *Knaekontroll* and the FIFA11+ across coaches, practitioners, and players have been met with underwhelming acceptance and compliance (O'Brien & Finch, 2016; O'Brien & Finch, 2017), especially among the elite and youth soccer players (Zech & Wellmann,

2017). Players' acceptance and compliance toward injury prevention strategies were observed to have a linear association to injury risk, as Soligard et al. (2010) reported.

In view of the situation, Zech and Wellmann (2017) insisted that there is a need to increase acceptance and improve players' attitude and compliance with scientifically proven injury prevention strategies. In fact, Van Tiggelen et al. (2008) have proposed that to modify players' beliefs and attitude toward injury prevention strategies, a baseline survey of their current knowledge, attitude, and practice of injury prevention is needed. Unfortunately, data on players' beliefs and practice of injury prevention remains to be limited. Zech and Wellmann (2017) reported players' perceptions on injury risk and prevention of one soccer club in the German *Bundesliga*, wherein it was determined that over 90% of the respondents admitted to stretching as their way to prevent any injury, while Liporaci et al. (2021) concluded that the perceptions of professional male soccer players were only partially consistent with scientific evidence. The data presented by Zech and Wellmann (2017) and Liporaci et al. (2021) may, in part, represent the German and Brazilian soccer league population; however, the proportions of the populations may not completely paint a picture of the worldwide situation. For example, the proportion of people of color and ethnic minority soccer players in the British Premier League make up to a third of the players in the league (Fraser, 2017). In contrast, their proportions make up most of their respective populations in their regional soccer leagues and organizations (i.e., J-League, Asian Football Confederation). Thus, there is a need to replicate these surveys in different regions across the globe. In Malaysia, the current knowledge, attitude, and practice of injury risk and prevention among elite soccer players are yet to be explored.

Therefore, in this study, we aim to gather preliminary data on Malaysian elite soccer players' perceptions on injury risk and mechanisms, its means of prevention, and their current practice in prevention of injuries during training and matches.

**Materials and methods**

*Participants*

Active players from four elite soccer leagues (Super League, Premier League, President's Cup, and Youth Cup) in Malaysia were invited to participate. No exclusion criteria were defined regarding the players' playing position, injury status, or level of performance.

*Web-based Survey*

Players responded anonymously during mid-season break as the survey was distributed online via the Google Forms (Google, California, USA) platform. The survey was preceded by a statement on the title page providing information such as the study's purpose and the confidentiality of the players' responses. A response submission was regarded as a declaration of informed consent by the athletes. The survey was adopted from Zech and Wellmann (2017), which examined the players' history of injury, their perceptions of injury risk factors, and their beliefs and current practice for injury prevention during practice sessions or matches. The survey consisted of three main sections as follows: (a) players' characteristics, (b) players' injury history, and (c) players' perceptions on injury risk factors, injury prevention education and strategies, and their current practice for injury prevention.

*Data Collection and Statistical Analysis*

Demographic data was evaluated using descriptive statistics. Scale data were reported as mean ± standard deviation, whereas nominal or ordinal data were presented as the percentages of yes answers (%). Players' perceptions on the importance of injury prevention were recorded using a 5-point Likert scale (1 - I do not care, 2 - not important, 3 - somewhat important, 4 - important, and 5 - very important). Inferential statistics were assessed using Pearson's chi-square test using SPSS version 26.0 for Windows (IBM, Chicago, Illinois, USA) to determine whether the players' injury rates, perceptions on injury risk factors, and prevention strategies were evenly distributed between leagues or between the players with and without a history of injury. Alpha was set at .05 for all analyses.

**Results**

Forty-five (n = 45) male elite players returned their responses. All responses were included in the analysis. Players' age, height, and body mass were significantly different across the four leagues (p < .05). A detailed description of the players' characteristics for each league can be found in Table 1.

**Table 1 Players' characteristics for professional and youth teams of one football club and p-values for differences between teams.**

	Super League	Premier League	President's Cup	Youth Cup	Team Differences (p-value)
n	16	3	16	10	
Mean age	23.9 ± 4.5	19.7 ± 2.1	20.8 ± 1.3	18.4 ± 0.9	< 0.001
Mean height	175.9 ± 4.6	171.3 ± 5.0	171.3 ± 6.4	167.2 ± 8.5	0.013
Mean body mass	70.6 ± 6.4	60.0 ± 3.6	64.5 ± 6.0	61.4 ± 9.7	0.007
Previous injury	24	7	18	21	0.405
Mean injuries per player	1.5 ± 1.3	2.3 ± 1.5	1.1 ± 0.7	2.1 ± 1.3	0.118

*History of Injuries*

Over half of the respondents (53.3%) admitted having sustained a previous lower limb injury. Players had a mean of roughly one to two injuries per player in each league. More respondents in the President’s Cup who suffered ankle injuries declared to have had a history of previous injury than in other leagues ( $p = 0.021$ ). The ankle was determined to be the region most commonly injured, followed by the knees, thighs, groin, and hips. No significant league differences were detected in the severity of injuries, nature of the injury, as well as for injuries in other regions of the lower limb ( $p > 0.05$ ).

**Table 2** Percentage of injured players and Pearson’s chi-square test p-values for differences between teams.

	n	Ankle			Knee			Thigh			Hip			Groin				
		Total yes	With history of previous injury (%/yes)	Noncontact (%/yes)	Time Loss > 28 days (%/yes)	Total yes	With history of previous injury (%/yes)	Noncontact (%/yes)	Time Loss > 28 days (%/yes)	Total yes	With history of previous injury (%/yes)	Noncontact (%/yes)	Time Loss > 28 days (%/yes)	Total yes	With history of previous injury (%/yes)	Noncontact (%/yes)	Time loss > 28 days (%/yes)	
SL	16	11	18.2	45.5	5	20	40	60	4	25	75	0	0	4	25	100	0	0
PL	3	2	0	50	2	50	0	0	2	50	0	0	0	1	0	100	0	0
PC		7	85.7	14.3	4	25	50	75	3	66.7	66.7	1	0	3	33.3	66.7	0	0
YC	10	8	37.5	25	4	50	75	75	4	25	50	33.3	66.7	2	50	50	50	50
All	45	28	39.3	32.1	15	33.3	46.7	60	13	38.5	53.8	4	25	10	30	80	10	10
LD p-value		0.279	0.021	0.699	0.550	0.735	0.321	0.369	0.326	0.630	0.108	0.056	0.505	0.135	0.832	0.439	0.318	0.318

SL = Super League; PL = Premier League; PC = President’s Cup; YC = Youth Cup; LD = league differences

*Perceptions on the Risk Factors of Injury*

The majority of respondents believe that muscle impairments and fatigue (91.1 %), followed by coordination (88.9%), physical condition (84.4%), and previous injury (77.8%) are risk factors to injury. More players without previous injury believe that muscle impairments may be a risk factor for injury; moreover, physical condition seems to have a similar trend (muscle impairments:  $p = 0.050$ ; physical condition:  $p = 0.062$ ). The respondents’ league participation does not appear to have any influence on the distribution of their beliefs regarding the injury risk factors ( $p > 0.05$ ; Table 3).

**Table 3** Players’ perceptions on the potential risk factors for injuries (% yes answers) and Pearson’s chi-square test p-values for differences in “yes” answers between teams as well as players with and without previous injuries.

	n	Super League	Premier League	President's Cup	Youth Cup	All	League differences (p-value)	With previous injury	Without previous injury	Previous injury differences (p-value)
		16	3	16	10	45		24	21	
<b>Intrinsic factors</b>										
Physical condition		75	100	87.5	90	84.4	0.575	75	95.2	0.062
Coordination		87.5	100	87.5	90	88.9	0.930	91.7	85.7	0.526
Muscle impairments		87.5	100	93.8	90	91.1	0.872	83.3	100	0.050
Fatigue		87.5	100	93.8	90	91.1	0.872	91.7	90.5	0.889
Diet		68.8	66.7	62.5	60	64.4	0.969	70.8	57.1	0.338
Previous injury		75	100	75	80	77.8	0.794	70.8	85.7	0.231
Attentiveness		56.3	33.3	50	70	55.6	0.649	50	61.9	0.423
<b>Extrinsic factors</b>										
Contact		81.3	100	62.5	80	75.6	0.413	66.7	85.7	0.138
Equipment/environment		43.8	33.3	50	50	46.7	0.943	50	42.9	0.632
Climate		43.8	0	43.8	40	40	0.534	45.8	33.3	0.393

*Injury Prevention Strategies*

Respondents mostly believe that injury prevention is very important regardless of their league participation or previous injury status (Table 4). Just over half of the respondents assert that they feel adequately informed about injury prevention (55.6%; Table 5). Stretching was the most employed injury prevention strategy among the respondents (88.9%), followed by specific warm-up exercises (82.2%) and specific strength exercises (55.6%). Roughly a fifth of the respondents use taping (22.2%) and shoe insoles (20%) to prevent injury. Compliance toward specific warm-up exercises was noted to vary significantly across leagues ( $p = 0.045$ ). Other differences in league participation and previous injury status did not present any discrepancies in the distributions ( $p > .05$ ).

**Table 4 Importance of injury prevention (% yes answers).**

	n	I do not care	Not important	Somewhat important	Important	Very important
Super League	16	0	0	6.3	6.3	87.5
Premier League	3	0	0	0	0	100
President's Cup	16	0	0	6.3	12.5	81.3
Youth Cup	10	0	0	0	0	100
All	45	0	0	4.4	6.7	88.9
League differences (p-value)				0.835		
With previous injury	24	0	0	4.2	12.5	83.3
Without previous injury	21	0	0	4.8	0	95.2
Previous injury differences (p-value)				0.245		

**Table 5 Self-reported prevention strategies for injury prevention during football practice and/or competition (% yes answers).**

	Super League	Premier League	President's Cup	Youth Cup	All	League differences (p-value)	With previous injury	Without previous injury	Previous injury differences (p-value)
n	16	3	16	10	45		24	21	
Do You Feel Adequately Informed About Injury Prevention?	31.3	66.7	62.5	80	55.6	0.082	58.3	52.4	0.688
Injury Prevention Practice									
Stretching	81.3	100	93.8	90	88.9	0.633	87.5	90.5	0.751
Specific Warm-up Exercises	75	100	100	60	82.2	0.045	83.3	81	0.835
Specific Strength Exercises	56.3	66.7	62.5	40	55.6	0.695	58.3	52.4	0.699
Bracing	6.3	0	18.8	10	11.1	0.633	16.7	4.8	0.205
Taping	12.5	0	31.3	30	22.2	0.418	25	19	0.632
Shoe Insoles	12.5	0	37.5	10	20	0.172	25	14.3	0.370
Face Masks	0	0	6.3	10	4.4	0.630	8.3	0	0.176
Medical Corsets	12.5	33.3	18.8	10	15.6	0.754	16.7	14.3	0.826

## Discussion

In this study, we aimed to record injury rates of elite soccer players in Malaysia and their perceptions and practices for injury prevention. As per our findings, more than half of the respondents admitted having previous history of injuries, totaling a range between one and two injuries per player. The Super League had the highest number of injuries. This observation somewhat resembles the pattern observed by Zech and Wellmann (2017), where players in the higher level teams had a greater history of injury compared to the lower level competitions. They attributed this observation to the probability that the higher league players have participated longer than the younger counterparts, as proposed by Hawkins and Fuller (1999). Similarly, the higher injury incidence in the Super League manifests some degree of agreement with Junge and Dvořák (2015), who noted higher incidences of injury in higher profile competitions.

### *Lower Limb Injuries among Elite Soccer Players*

Roughly two-thirds of the respondents have experienced ankle injury, making it the most common injury location, followed by the knees, the thigh, and the groin regions. This was consistent with the observation by Zech and Wellmann (2017) among a team of German soccer players. The Super Leagues seem to record more ankle injuries than the other leagues. Most players who suffered ankle injuries in the President's Cup were found to have a previous history of lower limb injury, and the distribution was disproportionate when compared to the other leagues. This could reflect an underestimation of the true incidence of sports injuries resulting from the retrospective survey design employed in this study (Bjørneboe et al., 2011; Junge & Dvorak, 2000). A quarter of the ankle injuries reported were severe, requiring more than 28 days of absence from training and matches. This may have adverse effects to both the team's performance and the player's career as in a study by Rhodes et al.

(2020), wherein athletes demonstrated increases in stability indices (more unstable) after a period of absence from training, suggesting a detraining effect. Moreover, Huurnink et al. (2014) implied that a previous injury preceding a severe ankle injury is associated with impaired balance ability. Consequently, combination of ankle injury and an absence from training could lead to a brutally compromised balance ability, forking into a myriad of other injury possibilities, especially following the onset of fatigue during matches (Greig & McNaughton, 2014; Greig & Walker-Johnson, 2007; Shultz et al., 2013; Shultz et al., 2015).

Hamid et al. (2014) noted that the most common injury site in a national street soccer league was the ankle, closely followed by the knee. This finding was similar to the current study's findings, probably due to the demands on the lower extremity for ball control, changes of direction, and repeated acceleration and decelerations in soccer (Hamid et al., 2014). In a report by Herrero et al. (2014), knee injuries were the most common injured region among Spanish amateur soccer players. A similar finding was reported by Wahab et al. (2015) among Malaysian elite athletes. However, this current study contradicted their findings. Several discrepancies between the studies' characteristics may have contributed to the contradiction, such as the level of participation in soccer (elite versus amateur) and the number of recorded injuries (70 versus 15,243 (Herrero et al., 2014); versus 2787 (Wahab et al., 2015)).

#### *Perceived Risk Factors for Injuries*

Fatigue and muscle impairments were tied as the most perceived risk factors (91.1%) for injury, followed by coordination, physical condition, and previous history of injury. Fatigue has been proposed and examined for its role in injury incidences as more injuries have been observed to occur in later stages of match play (Ekstrand et al., 2011; Hawkins et al., 2001). Fatigue has been found to result in physiological changes (Shultz et al., 2013; Shultz et al., 2015) and biomechanical compensations during dynamic tasks (Greig, 2009; Hamdan, Ismail, et al., 2018; Hamdan, Mohd Noh, et al., 2018; Rabelo & Lucareli, 2018; Raja Azidin et al., 2015; Sanna & O'Connor, 2008). Meanwhile, in an investigation by Söderman et al. (2001) and in reviews by Freckleton and Pizzari (2013) and Whittaker et al. (2015), muscular impairments, or imbalances, were found to be credible indicators for risk of injuries in the lower limbs (i.e., knees, thigh, and groin). These perceptions by the respondents appear to be sound and in line with existing evidence and literature. Recently, a study by Di Paolo et al. (2021) proved that poor coordination can lead to altered, asymmetric lower limb biomechanics, while well-coordinated players display more protective strategies when executing dynamic movements in sports. Respondents without previous history of injuries tend to agree that physical condition and muscular impairments may be risk factors for injury more than those who have previous history of injuries. This could indicate a gap in understanding injury risk factors among the players.

This study also found that 75% of the respondents believe that contact with another player (i.e., via tackling or collision) is a risk factor for injury; however, previous studies in soccer have indicated that most injuries were noncontact in nature (Hawkins et al., 2001; Herrero et al., 2014). Over three quarters of respondents who have previous history of injuries have determined contact with another player as a risk factor to injury. This was similar to the observation by Zech and Wellmann (2017), who speculated that players with previous history may overestimate the influence of player-to-player contact on the prevalence of injuries in soccer. A noteworthy consideration could be made in lieu of this finding, as O'Brien and Finch (2017) reported that most respondents such as players, coaches, and team physiotherapists claimed that the players themselves bear the ultimate responsibility in preventing injury in soccer. This finding may be justified by the amount of contact injuries players experienced in the ankle, knee, and hip in this study (67.9%, 53.3%, and 75%, respectively). This repetition of findings could also be an indication that players could be more concerned about contact injuries as unlike noncontact injuries that could be predicted via screening assessments, contact injuries in soccer are more unpredictable in nature.

#### *Injury Prevention Practices among Players*

All respondents claimed that injury prevention is somewhat significant; most of them believe that it is very important (88.9%). However, only 55.6% of the respondents declared to being adequately informed on injury prevention. More President's and Youth Cup players reported to feel adequately informed about injury prevention than the Super and Premier League players. This finding could explain the practice of stretching performed before exercises by nearly all respondents (88.9%) as an injury prevention measure during practice sessions or matches. It should be highlighted that the utility of both active and passive stretching has had no scientific evidence in terms of its efficacy in injury prevention (Aaltonen et al., 2007; Thacker et al., 2004). In a review by Thacker et al. (2004), it was concluded that stretching had neither benefits nor detriments in terms of injury prevention. However, Shrier (2004) noted that stretching had detrimental effects on power and force production performances when conducted immediately before exercise, but long-term, regular stretching may reduce the risk of injury. Thus, stretching should perhaps be performed not during warm-up sessions, but rather after exercises, or as a separate session of its own (Shrier, 2004). On the contrary, 82.2% of respondents reportedly perform specific warm-up exercises to prevent injuries during soccer, complying to evidence-based recommendations (Hübscher et al., 2010). This may suggest a need for a more effective promotion of evidence-based injury risk and prevention education among elite soccer players.

Another evidence-based injury prevention strategy is specific strength exercises (Hübscher et al., 2010; Kamper & Moseley, 2011). However, this strategy was employed by an underwhelming 55.6% of the

respondents. Zech and Wellmann (2017) observed a similar pattern, with just about a third of respondents admitting to doing the practice for injury prevention. A matter of cost comes into question when trying to comprehend with such low compliance rates. This was a similar situation in the case of bracing and taping as injury prevention strategies. Despite bracing bearing more evidence of benefits for injury prevention (Zech & Wellmann, 2017), this study observed better compliance for taping than bracing for prophylactic reasons. The requirement of equipment may have critical influence on the compliance toward an injury prevention strategy. To improve the compliance to specific strength exercises as an injury prevention measure, perhaps some modifications should be considered, such as neuromuscular exercises that emphasize bodyweight exercises, to reduce the reliance on equipment and reduce costs of injury prevention, in a similar manner observed in neuromuscular warm-up exercises like the HarmoKnee and the 11+ reviewed by Herman et al. (2012).

### Limitations

One of the limitations of this study is its bias with regard to the assessment of players' actual history of injury due to its retrospective study design. Furthermore, a total of 45 respondents from elite soccer leagues in Malaysia is considerably a small sample size. According to the Malaysian Football League, there are 12 teams competing in the Super and Premier Leagues each, whereas the Football Association of Malaysia (FAM) stated 20 teams compete for President's and Youth Cups each. Each is required a minimum of 18 players as determined by the Club Licensing Regulations (FAM, 2019). Therefore, the potential minimum of 6912 players might not be represented properly in this study (Krejcie & Margan, 1970). Future research may consider exploring a larger sample size to obtain more comprehensive information on the players' beliefs and practices in injury prevention.

### Conclusions

In a nutshell, the perceptions of injury risk factors have been generally consistent across different elite leagues in Malaysia. Players generally believe that injuries may occur from multiple intrinsic and extrinsic factors and that injury prevention is very important. More than half of the respondents feel adequately informed about injury prevention. However, as a practice, players seem to employ a combination of injury prevention measures that may or may not be supported by comprehensive, evidence-based literature. The findings suggest that there may be conflicting information among the players with regard to the efficacy of one injury prevention practice in comparison to the other, and this may be regarded as a call for injury risk and prevention education among players, as well as increasing the promotion of injury prevention programs in Malaysian professional soccer. Furthermore, it can be speculated that costs of certain injury prevention measures could also have some degree of influence toward the compliance to injury prevention strategy. Future studies could explore the efficacies of cost effective approaches or modifications to existing injury prevention strategies to promote better compliance among players as well as expanding the survey to populations outside of the elite-level organizations as understanding the knowledge, attitudes, and behaviors of novice or amateur players can help researchers identify the severity of the misinformation among soccer players with regard to injury risk and prevention measures through player education, thus improving the chances of the betterment of such injury prevention exercise programs.

**Conflicts of interest** - None.

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