Paper : Sports Medicine and Rehabilitation

The Occurrence of Physical and Psychological Problems Among Japanese College Soccer Players: A Cross-Sectional Observational Study

Naruto Yoshida*, Hideaki Waki*, Yoichi Minakawa*, Shogo Miyazaki* and Masaaki Koido**

*Department of Acupuncture and Moxibustion, Faculty of Health Care, Teikyo Heisei University
2-51-4 Higashiikebukuro, Toshimaku, Tokyo 170-8445 Japan
naruto-y@kch.biglobe.ne.jp
**Faculty of Health and Sports Science, University of Tsukuba
[Received October 9, 2020; Accepted March 16, 2021]

Conditioning for injury prevention in soccer is important because of the high number of injuries. Many previous studies have focused solely on physical problems or solely on psychological problems. In this study, multiple factors were considered to gain a better understanding of the physical and psychological status of athletes. The current injury, current pain, ankle instability, fundamental pattern of movement, catastrophic thoughts of pain, daytime sleepiness, sleep dysfunction, and symptoms of anxiety and depression of Japanese male college soccer players were assessed. Among the 122 collegiate soccer players who completed all questionnaires and measurements, 43% experienced pain, 27% had injuries, 50% had ankle instability, 21% were restricted in their fundamental patterns of movement, 20% had catastrophic thoughts of pain, 48% experienced daytime sleepiness, 20% experienced sleep dysfunction, and 14% experienced symptoms of anxiety and depression. Only 11% of the athletes showed no physical or psychological problems. Eighty-nine percent had either a psychological or physical problem, and almost half of the cohort (48%) experienced both physical and psychological problems. This study demonstrated how difficult it is for athletes to reach their peak condition, as factors other than 'skill' also play a role in conditioning. Assessment of both physical and psychological aspects is needed to understand the conditioning status of athletes.

Keywords: psychological and physical condition, sports medicine, observation (cross-sectional) study, soccer, sports injury

[Football Science Vol.18, 22-30, 2021]

1. Introduction

The prevalence of injury in professional soccer players is well known, with the risk of injury estimated to be 1000 times greater than for those in the manufacturing, construction, and services sectors (Drawer and Fuller, 2002). The risks associated with acute trauma and osteoarthritis in the lower extremities are unacceptably high (Drawer and Fuller, 2002). A 15-year epidemiological follow-up study of Japanese professional soccer players reported 2947 injuries from 3984 matches, with an average injury rate of 21.8 injuries per 1000 hours (Aoki et al., 2012). Several studies (Gouttebarge et al., 2016; Ekstrand et al., 2020) on the occurrence of soccer injuries have suggested the importance of injury prevention in sport. As part of this concept, athlete conditioning is a critical component of injury prevention. According to the Japan Sports Association, conditioning should prepare athletes to perform well by addressing all aspects, including physical, environmental, and psychological factors (Japan Sports Association, 2006).

Injury surveys are used to ascertain physical condition; however, the definition of an injury is often the most significant factor influencing survey outcomes (Bahr, 2009) Although several studies (Engebretsen et al., 2013; Junge et al., 2009; Stubbe et al., 2015) used "medical attention" (injury resulting in a player receiving medical attention) or "time loss" (injury resulting in a player unable to participate in future training or match play) definitions, "any physical complaint" has become the definition of choice (Fuller et al., 2006a, 2006b, 2006c). This latter definition refers to any physical complaint sustained by a player from a match or training,

regardless of the need for medical attention, or time away from sporting activities (Fuller et al., 2006a, 2006b, 2006c). This broad definition (Clarsen and Bahr, 2014) captures physical symptoms, including bodily discomfort (pain, swelling, or limited range of motion) and functional limitations, which are often overlooked by the "medical attention" and "time loss" definitions (Bahr, 2009; Clarsen et al., 2013; Clarsen et al., 2014). Pain is significant as it is often an early symptom of injury and has been recommended as an investigation item by the International Olympic Committee (Bahr, 2009).

Conditioning should not only account for physical factors but also psychological factor assessments. The prevalence of Common Mental Disorders (CMDs) among professional soccer players in Europe was reported as follows: 37% experiencing anxiety and depression, 19% sleep disorders, 14% alcohol dependence, and 12% distress (Gouttebarge et al., 2017). Additionally, the incidences of players with two, three, and four disorders was reported as 13%, 5%, and 3%, respectively. It was estimated that at least 3 of the 25 players on a professional soccer team will experience CMD symptoms in a single season (Gouttebarge et al., 2017). Studies have also indicated that professional soccer players are more likely to develop CMD symptoms after severe injury (Kilic et al., 2018). In another study, soccer players who had depression were 10% more likely to be injured than those with no symptoms (Yang et al., 2014). Hence, pain may reflect both physical and psychological issues. For effective injury prevention, a combination of strategies is required to assess all aspects of an athlete's condition. To the best of our knowledge, no study has examined both physical and psychological aspects.

2. Study objectives

We hypothesized that Japanese collegiate soccer players experiencing pain had psychological and physical issues. Thus, we sought to establish an effective evaluation method for multiple factors affecting athlete condition.

3. Materials and methods

3.1. Ethical considerations

This study was approved by the Institute's Research committee (IRB approval no.: Tai 019-114). The study also followed the principles of the Declaration of Helsinki, and was registered as a clinical trial under the trial registration number: R000046407 UMIN 000040671 on June 6th 2020 by the association between dynamic alignment and injury occurrence in college soccer players. All study participants provided written informed consent and agreed for their data to be anonymously used for publication

3.2. Study setting

This was a cross-sectional observational study. A web-based survey questionnaire and functional movement screen test (Bonazza et al., 2017) comprising measurements were conducted at the University of Tsukuba in March 2020. Measurements were conducted during the pre-season, when the new team was being rebuilt up.

3.3. Study participants

One hundred and sixty (160) Japanese collegiate male soccer players, included in the affiliation list, were briefed and provided with documentary study methods at team meetings. The eligibility criteria included those athletes who had taken part or were planning to take part in soccer training. At the time the questionnaire or other measurements were administered, if it was anticipated if an athlete would retire or leave soccer for more than one year, they were excluded from the study.

3.4. Study variables

We surveyed the following physical factors; the presence of a current injury, current pain, fundamental patterns of movement, and ankle instability. For psychological factors; we investigated catastrophic thoughts of pain, daytime sleepiness, sleep dysfunction, and symptoms of anxiety and depression.

3.5. Data sources and study tools

The following metrics were ascertained; current injury, current pain, ankle instability, fundamental pattern of movement, catastrophic thoughts of pain, daytime sleepiness, sleep dysfunction and symptoms of anxiety and depression. All items, except fundamental pattern of movement, were self-reported in questionnaires.

Following an extensive review of the literature, a self-report injury questionnaire was developed and amended from Tsigilis and Hatzimanouil (2005). The final questionnaire, which was reviewed and modified for soccer, consisted of general information and information related to physical and psychological factors. The former included, age, height, weight, soccer experience, and player position. Players were classified into four positions: Forward (FW), Midfielder (MF), Defender (DF), and goalkeeper (GK). An injury was defined as "a time-loss injury," which occurred during a football match or practice, and prevented participation in all scheduled matches or practices (Fuller et al., 2006a, 2006b). If players reported any injuries, additional information was collected through the questionnaire, including details on whether it was a traumatic or overuse injury, the body region, and injury type. Furthermore, injuries were also defined and classified as follows: traumatic injury; "an injury caused by a specific, identifiable event," and overuse injury; "an injury caused by repeated micro-trauma without a single, identifiable event responsible." Injury definitions were the same as injury classifications, according to the International Olympic Committee injury surveillance system (Junge et al., 2008). For "pain" assessment, participants answered "Yes" if they had pain, regardless of a diagnosed trauma disorder or not. Fundamental patterns of movement were evaluated using a functional movement screen (FMS) (Cook, 2014a, 2014b). FMS test movements were created for screening fundamental movements, and were based on proprioceptive and kinesthetic awareness principles. FMS comprised seven basic movement tests (deep squat, hurdle step, inline lunge, shoulder mobility, trunk stability push-up, rotary stability, and active straight leg raise). FMS also evaluated the basis of sports movements, i.e., mobility, stability, and motor control of each part of the body in a complex manner. Participants were recorded from two directions using two video cameras (Casio EZ-200), one in the sagittal and one in the coronal plane. Each movement was assessed by a researcher certified in FMS Level 1.

The Cumberland Ankle Instability Tool (CAIT) developed by Hiller et al. (2006). Our study used the validated Japanese version of CAIT as a measurement tool for ankle instability (Kunugi et al., 2017). The Pain Catastrophizing Scale (PCS) was used for catastrophic thoughts of pain (Matsuoka and Sakano, 2007; Sullivan et al., 1995), and the Epworth Sleepiness Scale (ESS) for daytime sleepiness (Takegami et al., 2009). Sleep dysfunction was assessed using the Pittsburgh Sleep Quality Index (PSQI) (Doi et al., 1998; Doi et al., 2000), and anxiety and depression symptoms were assessed using the Hospital Anxiety and Depression Scale (HADS) (Zigmond and Snaith, 1983).

3.6. Study bias

To address potential examiner bias, data from other measurements were not disclosed to examiners before the FMS assessment was completed. The study size was determined by the maximum number of data collection possible in the study period.

3.7. Statistical analysis

Descriptive statistics for each variable were presented and a bubble chart created to visualize the distribution of physical and mental status of athletes. In this chart, the number of athletes was represented by circle size, with negative physical factors (numbers) on the X-axis and negative psychological factors (numbers) on the Y-axis. The criteria for judging physical factors as "negative" were the presence of current injuries, presence of current pain, FMS < 14 (adapted from Marques et al., 2017 and Tee et al., 2016), and CAIT < 26 (adapted from Tanen et al., 2014). The criteria for judging psychological factors as "negative" were: PCS (total) ≥ 30 (adapted from Sullivan, 2009), ESS ≥ 11 (adapted from Carter et al., 2020), PSQI ≥ 6 (adapted from Carter et al., 2020), and HADS ≥ 15 (adapted from Fischerauer et al., 2018). The IBM SPSS Statistics 19 package (IBM Corp, Armonk, NY, USA) was used for all statistical analyses.

4. Results

Of the 160 soccer players on the affiliation list, 122 consented and participated, completed all questionnaire, and FMS assessments. Descriptive statistics data for the 122 participants, comprising; average age: 20 years old (95% CI: 20–21 years), average height: 174 cm (95% CI: 173–175 cm), and average weight: 69 kg (95% CI: 68–70 kg) are shown (**Table 1**).

Sports injuries were manifested in 34 (27%) athletes, including 25 (20%) acute trauma and nine (7%) overuse disorders. Pain was identified in 52 (43%) athletes, 26 (21%) athletes had functional movement patterns as indicated by FMS, and 61 (50%) had ankle instability as indicated by CAIT. Clinically high PCS results (PCS

Table 1 Descriptive statistics of the cohort (N=122)

Variables	Shapiro-Wilk test	Descriptive data [a]
general information		
Sex — no.(%)		
Men		122 (100)
Age (year)	$p < 0.05$	20 (20-21)
Height (cm)	$p \geq 0.05$	174 (173-175)
Weight (kg)	$p \geq 0.05$	69 (68-70)
Soccer experience (month)		168 (149-190)
Player position — no.(%)		
1FW		14 (11)
2 MF		56 (46)
3 DF		39 (32)
4 GK		13 (11)
Physical factor		
Traumatic injury — no.(%)		25 (20)
Contact		14 (11)
Non-contact		11(9)
Overuse injury — no.(%)		9 (7)
Presence of pain		52(43)
Fundamental pattern of movement	$p < 0.05$	15 (14-16)
FMS < 14 — no.(%)		26 (21)
Ankle instability：CAIT	$p < 0.05$	26 (23-27)
CAIT< 26 — no.(%)		61 (50)
Psychological factors		
Atastrophic thoughts of pain	$p \geq 0.05$	23 (22-24)
PCS (total) ≥30 — no.(%)		24 (20)
Daytime sleepiness：Epworth Sleepiness Scale (ESS)	$p \geq 0.05$	10 (10-11)
ESS≥11 — no.(%)		59 (48)
Sleep disorder：PSQI	$p < 0.05$	3 (2-4)
PSQI≥6 — no.(%)		24 (20)
Symptoms of anxiety and depression：HADS	$p < 0.05$	9 (7-13)
HADS≥15 — no.(%)		17 (14)

[a] When the Shapiro-Wilk test does not follow a normal distribution ($p<0.05$), it indicates the median (25th percentile - 75th percentile), and when it follows a normal distribution ($p\geq0.05$), it indicates the mean (95% confidence interval).

≥30) were observed in 24 (20%) athletes, 59 (48%) were severe for ESS, 24 (20%) had sleep dysfunction as indicated by PSQI, and 17 (14%) had possible anxiety and depression symptoms according to HADS.

The distribution of psychological and physical conditions across the study is shown (**Figure 1**). Thirteen athletes (11%) had no physical or psychological issues; 30 athletes (25%) had negative physical conditions, and 21 athletes (18%) had negative psychological conditions. Almost half the cohort, i.e., 58 athletes (48%) had both physical and psychological issues.

5. Discussion

Previous studies have exclusively focused on either physical or psychological issues in athletes; however, it was also important to understand the simultaneous effects of both on athlete condition. In our study, 11% of athletes had no physical or psychological issues; 89% had psychological or physical issues, and almost half (48%) experienced both issues simultaneously.

The most common physical factor was current pain, accounting for 43% of athletes, whereas injuries affected 27%. Interestingly, some athletes with no current injury, experienced pain. An injury was defined as "a time-loss injury" which occurred during a football match or practice, and prevented participation in all scheduled matches or practice sessions. Therefore, it was possible that some of these aforementioned pains were caused by trauma or overuse, which were not listed in the injury survey used in this study. Besides, it might include some pains which could not be classified as trauma or overuse even when examined by a doctor. However, it was

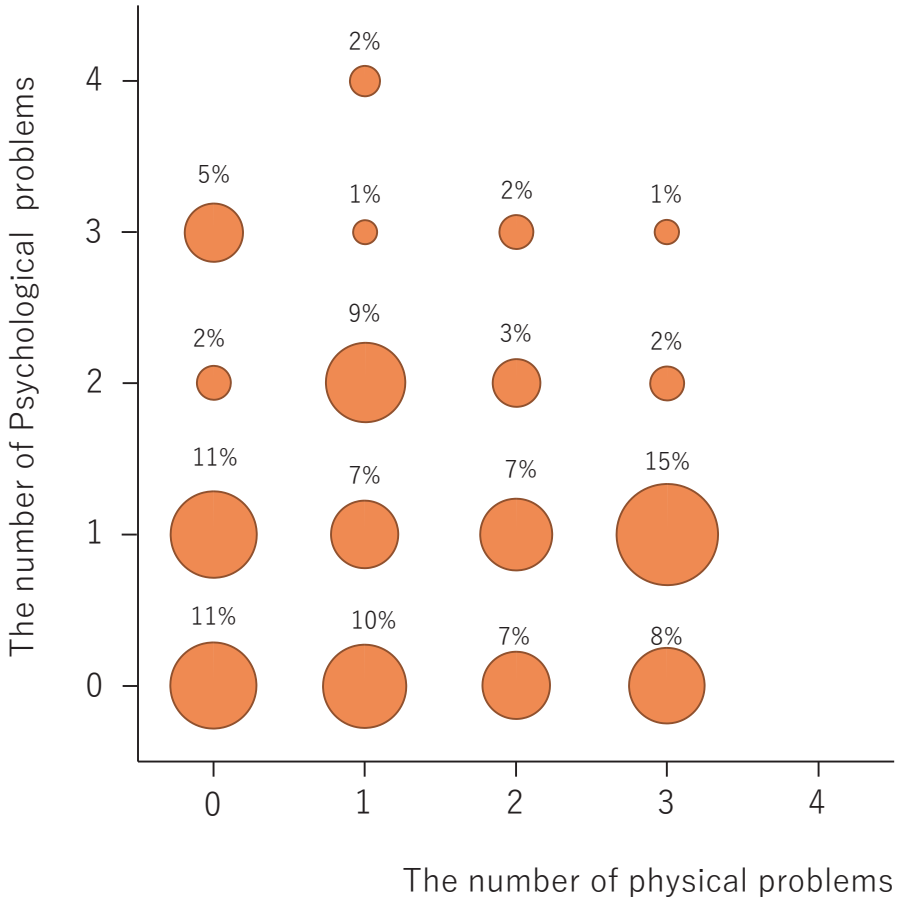

Figure 1 The distribution of physical and psychological conditions; physical issues

1) The presence of a sports injury, 2) Ankle instability (CAIT < 26), 3) The fundamental patterns of movement (FMS < 14), and 4) The presence of current pain.
Psychological issues; 1) Catastrophic thoughts of pain (PCS ≥ 30), 2) daytime sleepiness (ESS ≥ 11), 3) sleep dysfunction (PSQI ≥ 6), and 4) symptoms of anxiety and depression (HADS ≥ 15). Thirteen athletes (11%) had no physical or psychological condition issues, 21 athletes (17%) had a bad physical condition, and 30 athletes (25%) had a bad psychological condition. Approximately half of the cohort, 58 (48%) had both physical and psychological issues.

important to acknowledge there are so many athletes in pain while playing in order to understand their condition. FMS results were negative for 21% of athletes indicating restricted fundamental patterns of movement in these players. This was considerably lower than the 82% incidence reported by Marques et al. (2017), and 34% reported by Tee et al (2016). However, the low incidence reported here should not be equated to low importance; FMS indicates a restricted fundamental pattern of movement which may require correction.

Ankle instability was detected in 41% of participants, which was higher than the 23.4% incidence reported in high school and college athletes (Tanen et al., 2014). Koshino et al. (2020) also reported a lower incidence of ankle instability (CAIT ≤ 25) in 19.8% of athletes from various sports, and in 37.5% of soccer athletes. However, as ankle instability has been associated with anterior cruciate ligament injuries (Kramer et al., 2007), Achilles tendonitis (Backman and Danielson, 2011), and osteoarthritis (Hubbard-Turner et al., 2017), and this issue should be addressed as early as possible.

Catastrophic thoughts of pain affected 20% of participants, which was higher in 291 college athletes reporting an incidence of 14% (Sciascia et al., 2019).

The HADS created by Zigmond et al. (1983) measured anxiety and depression separately, whereas the modified version by Clover et al. (2009) combined the two. Our results indicated symptoms of anxiety and depression in 14% of participants. Fischerauer et al. (2018) reported a similar incidence (17%) in 102 injured athletes. However, our cohort included participants without injuries, which somewhat limited this comparison. Weber et al. (2018) reported that 13.2% (10 ≥ HADS-A ≥ 8), 3.4% (HADS-A ≥ 11), 5.5% (10 ≥ HADS-D ≥ 8), and 2.1% (HADS-D ≥ 11) of athletes had experienced anxiety. Athletes with depressive symptoms had a higher risk of injury, and psychological factors were found to influence physical factors. Psychosocial interventions such as cognitive behavioral therapy (CBT) promoted positive emotional states and increased rehabilitative adherence, both of which facilitated recovery from injury (Gennarelli et al., 2020). Further research is required to determine the most effective psychosocial interventions for specific psychological factors, the ideal periods for intervention, and how best to implement them after a sports injury. However, the first step in solving such issues is to have a clear idea on the incidence of these factors.

Previous studies reported daytime sleepiness in 24.9% (Hoshikawa et al., 2018), 19% (Carter et al., 2020), and 22.5% (Khalladi et al., 2019) of athlete participants, whereas we recorded 48% in our cohort. Sleep dysfunction was previously reported in 24.7% of Japanese athletes (Hoshikawa et al., 2018), 35% of collegiate student athletes (Carter et al., 2020), 68.5% of professional soccer players (Khalladi et al., 2019), and 54% of collegiate soccer athletes (Benjamin et al., 2020), whereas we reported 20%. Since daytime sleepiness and sleep dysfunction are implicated in injury development (Milewski et al., 2014), athletic performances could be improved by sleep education, and CBT and prolonged sleep duration approaches (Bonnar et al., 2018).

In general, “mind,” “skill,” and “body” are necessary attributes to achieve satisfactory athletic performances. In this study, only 11% of the participants were in a good condition of both “mind” and “body.” This study showed how difficult it was for athletes to reach their peak condition, as factors other than “skills” also play a role in conditioning. However, it was clear that assessments, including both physical and psychological aspects, are needed to understand athlete condition. In general, athletes tend to perceive psychological support as weakness, and hence do not seek it. A lack of knowledge of mental health and other factors also play a role (Gulliver et al., 2012). Therefore, to address both physical and psychological needs, appropriate information should be offered to athletes and all in their lives, to acquire an accurate understanding of the nature and importance of mental health, appropriate self-care, and the need for physical and psychological support from family and friends.

6. Study limitations

This was a cross-sectional study, and did not reveal a causal relationship between factors. A prospective study is required to examine such relationships. Participants were Japanese collegiate soccer athletes, with a mean age of 20 ± 1 years, and 164 ± 35 months of playing time. Hence, the same trends may not apply to athletes outside this age group. A study, including a broader age range is therefore warranted. In addition, although this cross-sectional study analyzed the presence or absence of current trauma and overuse disorders, the past histories of athlete trauma and overuse disorders were not analyzed. To address this limitation, we hope to clarify

the influence of past history on current physical and psychological issues through longitudinal studies.

Study measurements were conducted in early March 2020 and those did not coincide with inactivity due to coronavirus disease 2019 (COVID-19), but the infection was spreading and that may have inadvertently affected study results. The conditioning is related to many factors, such as flexibility and muscle strength; therefore, this study may have underestimated the number of participants with issues. Thus, more factors must be considered in physical assessments in further research.

7. Study interpretation

Doctors and trainers must be aware of the physical and mental conditions of their athletes, and adjust treatment and training accordingly. Our multifaceted condition-check study indicated that few athletes have no physical or psychological issues, but the majority had combined physical and/or psychological issues. Effective conditioning requires an appropriate approach to the issues identified here, and the development of formal guidelines to assist all in the process.

8. Study generalizability

Previous studies reported the occurrence of physical or psychological issues in various athletic disciplines, and revealed similar results. Hence, there is a need for a multifaceted condition-check and flexible approach to conditioning, which ought to be extended to collegiate athletes across different sports.

Funding: This work received no funding.

Disclosure statement: The authors report no conflict of interest.

Data set availability: The data are not publicly available due to restrictions on information release that could compromise the privacy of research participants.

References

Aoki, H., O'Hata, N., Kohno, T., Morikawa, T. and Seki, J. (2012). A 15-year prospective epidemiological account of acute traumatic injuries during official professional soccer league matches in Japan. Am. J. Sports Med., 40: 1006-1014.

Backman, L.J. and Danielson, P. (2011). Low range of ankle dorsiflexion predisposes for patellar tendinopathy in junior elite basketball players: A 1-year prospective study. Am. J. Sports Med., 39: 2626-2633.

Bahr, R. (2009). No injuries, but plenty of pain? On the methodology for recording overuse symptoms in sports. Br. J. Sports Med., 43: 966-972.

Benjamin, C.L., Curtis, R.M., Huggins, R.A., Sekiguchi, Y., Jain, R.K., McFadden, B.A. and Casa, D.J. (2020). Sleep dysfunction and mood in collegiate soccer athletes. Sports Health, 12: 234-240.

Bonazza, N.A., Smuin, D., Onks, C.A., Silvis, M.L. and Dhawan, A. (2017). Reliability, validity, and injury predictive value of the functional movement screen: A systematic review and meta-analysis. Am. J. Sports Med., 45: 725-732.

Bonnar, D., Bartel, K., Kakoschke, N. and Lang, C. (2018). Sleep interventions designed to improve athletic performance and recovery: A systematic review of current approaches. Sports Med, 48: 683-703.

Carter, J.R., Gervais, B.M., Adomeit, J.L. and Greenlund, I.M. (2020). Subjective and objective sleep differ in male and female collegiate athletes. Sleep Health.

Clarsen, B. and Bahr, R. (2014). Matching the choice of injury/illness definition to study setting, purpose and design: One size does not fit all! Br. J. Sports Med., 48: 510-512.

Clarsen, B., Myklebust, G. and Bahr, R. (2013). Development and validation of a new method for the registration of overuse injuries in sports injury epidemiology: The Oslo Sports Trauma Research Centre (OSTRC) overuse injury questionnaire. Br. J. Sports Med., 47: 495-502.

Clarsen, B., Ronsen, O., Myklebust, G., Florenes, T.W. and Bahr, R. (2014). The Oslo Sports Trauma Research Center questionnaire on health problems: A new approach to prospective monitoring of illness and injury in elite athletes. Br. J. Sports Med., 48: 754-760.

Clover, K., Carter, G. L., Mackinnon, A. and Adams, C. (2009). Is my patient suffering clinically significant emotional distress? Demonstration of a probabilities approach to evaluating algorithms for screening for distress. Support. Care Cancer, 17: 1455.

Cook, G., Burton, L., Hoogenboom, B.J. and Voight, M. (2014a). Functional movement screening: The use of fundamental movements as an assessment of function-part 1. Int. J. Sports Phys. Ther., 9: 396-409.

Cook, G., Burton, L., Hoogenboom, B.J. and Voight, M. (2014b). Functional movement screening: The use of fundamental movements as an assessment of function-part 2. Int. J. Sports Phys. Ther., 9: 549-563.

Doi, Y., Minowa, M., Uchiyama, M. and Okawa, M. (1998). Development of the Japanese version of the Pittsburgh sleep quality index. Japanese Journal of Psychiatry Treatment, 13: 755-763.

Doi, Y., Minowa, M., Uchiyama, M., Okawa, M., Kim, K., Shibui, K. and Kamei, Y. (2000). Psychometric assessment of subjective sleep quality using the Japanese version of the Pittsburgh Sleep Quality Index (PSQI-J) in psychiatric disordered and control subjects. Psychiatry Research, 97: 165-172.

Drawer, S. and Fuller, C. (2002). Evaluating the level of injury in English professional football using a risk based assessment process. Br. J. Sports Med., 36: 446-451.

Ekstrand, J., Spreco, A., Windt, J. and Khan, K. M. (2020). Are elite soccer teams' preseason training sessions associated with fewer in-season injuries? A 15-year analysis from the Union of European Football Associations (UEFA) elite club injury study. Am. J. Sports Med., 48: 723-729.

Engebretsen, L., Soligard, T., Steffen, K., Alonso, J.M., Aubry,

M., Budgett, R., Dvorak, J., Jegathesan, M., Meeuwisse, W.H., Mountjoy, M., Palmer-Green, D., Vanhegan, I. and Renstrom, P.A. (2013). Sports injuries and illnesses during the London Summer Olympic Games 2012. Br. J. Sports Med., 47: 407-414.

Fischerauer, S.F., Talaei-Khoei, M., Bexkens, R., Ring, D.C., Oh, L.S. and Vranceanu, A.-M. (2018). What is the relationship of fear avoidance to physical function and pain intensity in injured athletes? Clin. Orthop. Relat. Res., 476: 754.

Fuller, C.W., Ekstrand, J., Junge, A., Andersen, T.E., Bahr, R., Dvorak, J., Hagglund, M., McCrory, P. and Meeuwisse, W.H. (2006a). Consensus statement on injury definitions and data collection procedures in studies of football (soccer) injuries. Clin. J. Sport Med., 16: 97-106.

Fuller, C.W., Ekstrand, J., Junge, A., Andersen, T.E., Bahr, R., Dvorak, J., Hagglund, M., McCrory, P. and Meeuwisse, W.H. (2006b). Consensus statement on injury definitions and data collection procedures in studies of football (soccer) injuries. Scand. J. Med. Sci. Sports, 16: 83-92.

Fuller, C.W., Ekstrand, J., Junge, A., Andersen, T.E., Bahr, R., Dvorak, J., Hagglund, M., McCrory, P. and Meeuwisse, W.H. (2006c). Consensus statement on injury definitions and data collection procedures in studies of football (soccer) injuries. Br. J. Sports Med., 40: 193-201.

Gennarelli, S.M., Brown, S.M. and Mulcahey, M.K. (2020). Psychosocial interventions help facilitate recovery following musculoskeletal sports injuries: A systematic review. Phys. Sportsmed., 40: 370-377.

Gouttebarge, V., Aoki, H., Verhagen, E.A. and Kerkhoffs, G.M. (2017). A 12-month prospective cohort study of symptoms of common mental disorders among European professional footballers. Clin. J. Sport Med., 27: 487-492.

Gouttebarge, V., Schwab, B.A.H., Vivian, A. and Kerkhoffs, G.M. (2016). Injuries, matches missed and the influence of minimum medical standards in the A-League professional football: A 5-year prospective study. Asian J. Sports Med., 7: e31385.

Gulliver, A., Griffiths, K.M. and Christensen, H. (2012). Barriers and facilitators to mental health help-seeking for young elite athletes: A qualitative study. BMC Psychiatry, 12: 157.

Hiller, C.E., Refshauge, K.M., Bundy, A.C., Herbert, R.D. and Kilbreath, S.L. (2006). The Cumberland ankle instability tool: A report of validity and reliability testing. Arch. Phys. Med. Rehabil., 87: 1235-1241.

Hoshikawa, M., Uchida, S. and Hirano, Y. (2018). A subjective assessment of the prevalence and factors associated with poor sleep quality amongst elite Japanese athletes, Sports Medicine - Open, 4:10.

Hubbard-Turner, T., Wikstrom, E.A., Guderian, S. and Turner, M.J. (2017). Acute ankle sprain in a mouse model: Changes in knee-joint space. Journal of Athletic Training, 52:587-591.

Japan Sports Association. (2006). Athletic trainer text book (6). 1st ed. Tokyo: Japan Sports Association.

Junge, A., Engebretsen, L., Alonso, J.M., Renström, P., Mountjoy, M., Aubry, M. and Dvorak, J. (2008). Injury surveillance in multi-sport events: The International Olympic Committee approach. Br. J. Sports Med., 42: 413-421.

Junge, A., Engebretsen, L., Mountjoy, M.L., Alonso, J.M., Renstrom, P.A., Aubry, M.J. and Dvorak, J. (2009). Sports injuries during the Summer Olympic Games 2008. Am. J. Sports Med., 37: 2165-2172.

Khalladi, K., Farooq, A., Souissi, S., Herrera, C.P., Chamari, K., Taylor, L. and El Massioui, F. (2019). Inter-relationship between sleep quality, insomnia and sleep disorders in professional soccer players. BMJ Open Sport Exerc. Med., 5: e000498.

Kilic, O., Aoki, H., Goedhart, E., Hagglund, M., Kerkhoffs, G., Kuijer, P., Walden, M. and Gouttebarge, V. (2018). Severe musculoskeletal time-loss injuries and symptoms of common mental disorders in professional soccer: A longitudinal analysis of 12-month follow-up data. Knee Surg. Sports Traumatol. Arthrosc., 26: 946-954.

Koshino, Y., Samukawa, M., Murata, H., Osuka, S., Kasahara, S., Yamanaka, M. and Tohyama, H. (2020). Prevalence and characteristics of chronic ankle instability and copers identified by the criteria for research and clinical practice in collegiate athletes. Phys. Ther. Sport, 45: 23-29.

Kramer, L., Denegar, C., Buckley, W.E. and Hertel, J. (2007). Factors associated with anterior cruciate ligament injury: History in female athletes. J. Sports Med. Phys. Fitness, 47: 446.

Kunugi, S., Masunari, A., Noh, B., Mori, T., Yoshida, N. and Miyakawa, S. (2017). Cross-cultural adaptation, reliability, and validity of the Japanese version of the Cumberland ankle instability tool. Disabil. Rehabil., 39: 50-58.

Marques, V.B., Medeiros, T.M., de Souza Stigger, F., Nakamura, F.Y. and Baroni, B.M. (2017). The Functional Movement Screen (Fms) in elite young Soccer Players between 14 and 20 Years: Composite Score, Individual-Test Scores and Asymmetries. Int. J. Sports Phys. Ther., 12: 977-985.

Matsuoka, H. and Sakano, Y. (2007). Assessment of cognitive aspect of pain: Development, reliability, and validation of Japanese version of pain catastrophizing scale. Jpn. J. Psychosom. Med., 47: 95-102.

Milewski, M.D., Skaggs, D.L., Bishop, G.A., Pace, J.L., Ibrahim, D.A., Wren, T.A.L. and Barzdukas, A. (2014). Chronic lack of sleep is associated with increased sports injuries in adolescent athletes. J. Pediatr. Orthop., 34: 129-133.

Sciascia, A., Waldecker, J. and Jacobs, C. (2019). Pain catastrophizing in college athletes. J. Sport Rehabil., 23: 1-6.

Stubbe, J.H., van Beijsterveldt, A.M., van der Knaap, S., Stege, J., Verhagen, E.A., van Mechelen, W. and Backx, F.J. (2015). Injuries in professional male soccer players in the Netherlands: A prospective cohort study. J. Athl. Train., 50: 211-216.

Sullivan, M. J.L., Bishop, S.R. and Pivik, J. (1995). The pain catastrophizing scale: Development and validation. Psychological Assessment, 7: 524-532.

Takegami, M., Suzukamo, Y., Wakita, T., Noguchi, H., Chin, K., Kadotani, H., Inoue, Y., Oka, Y., Nakamura, T., Green, J., Johns, M.W. and Fukuhara, S. (2009). Development of a Japanese version of the Epworth Sleepiness Scale (JESS) based on Item Response Theory. Sleep Medicine, 10: 556-565.

Tanen, L., Docherty, C.L., Van Der Pol, B., Simon, J. and Schrader, J. (2014). Prevalence of chronic ankle instability in high school and division I athletes. Foot Ankle Spec., 7: 37-44.

Tee, J.C., Klingbiel, J.F., Collins, R., Lambert, M.I. and Coopoo, Y. (2016). Preseason functional movement screen component tests predict severe contact injuries in professional rugby union players. J. Strength Cond. Res., 30: 3194-3203.

Tsigilis, N. and Hatzimanouil, D. (2005). Injuries in handball: Examination of the risk factors. Eur. J. Sport Sci., 5: 137-142.

Weber, S., Puta, C., Lesinski, M., Gabriel, B., Steidten, T., Bar, K. J., Herbsleb, M., Granacher, U. and Gabriel, H.H.W. (2018). Symptoms of anxiety and depression in young athletes using the hospital anxiety and depression scale. Front. Physiol., 9:

182.
Yang, J.Z., Cheng, G., Zhang, Y., Covassin, T., Heiden, E.O. and Peek-Asa, C. (2014). Influence of symptoms of depression and anxiety on injury hazard among collegiate American football players. Res. Sports Med., 22: 147-160.
Zigmond, A.S. and Snaith, R.P. (1983). The hospital anxiety and depression scale. Acta Psychiatr. Scand., 67: 361-370.

Name:
Naruto Yoshida

Affiliation:
Department of Acupuncture and Moxibustion, Faculty of Health Care, Teikyo Heisei University

Address:
2-51-4 Higashiikebukuro, Toshimaku, Tokyo 170-8445 Japan

Brief Biographical History:
2017- , Associate Professor, Teikyo Heisei University
2013- 2017, Lecturer, Teikyo Heisei University
2009- 2013, Assistant professor, Teikyo Heisei University

Main Works:
- Yoshida, N., Kunugi, S., Konno, T., Masunari, A., Nishida, S., Koumura, T., Kobayashi, N., Miyakawa, S. (in press). Differences in muscle activities and kinematics between forefoot strike and rearfoot strike in the lower imb during 180° turns. International Journal of Sports Physical Therapy.
- Yoshida, N., Takashima, N., Miyakawa, Y., Waki, H., Yamamoto, J., Kobayashi, N. (2019). Effect of change in height and stability of feet on muscle activity during side bridge. Japanese Journal of Athletic Training, 4(2): 147-153.
- Yoshida, N., Okuma, Y., Miyazaki, S. (2016). Effect of acupuncture stimulation on muscle fatigue during the M-test and Functional Movement Screen. Japanese Acupuncture and Moxibustion, 12(1): 24-31.
- Yoshida, N., Kunugi, S., Mashimo, S., Okuma, Y., Masunari, A., Miyazaki, S., Hisajima, T., Miyakawa, S. (2016). Effect of forefoot strike on lower extremity muscle activity and knee joint angle during cutting in female team handball players. Sports Medicine Open, 2(32).

Membership in Learned Societies:
- Japanese Society of Science and Football
- Japan Association of Handball Research
- Japan Society of Acupuncture and Moxibustion
- Japan Society of clinical sports medicine
- Japanese Society of Physical Fitness and Sports Medicine