

**Interventions/Outcome measures** Demographic data, self-reported questionnaire and clinical oral examination were recorded and collected.

**Result** We recruited 249 athletes with the median age of 20 (range 13–43). Active caries (ICDAS code  $\geq 3$ ) was found in 66.8% athletes with periodontal diseases (BPE code  $\geq 1$ ) in 84.9%. A quarter of those with both diseases were youth athletes. Pericoronitis was also found in 4.7% athletes while 9% have pulpitis, abscess or ulcer (PUFA). Approximately 23.2% of athletes felt their oral health was not good during data collection with 32.5% reported moderate-to-severe impact of oral-related problems on their sports performance over the past 12 months: oral pain (10.5%), difficulty participating in training and competition (11.4%), performance affected (6.4%) and reduction in training volume (6.3%). Chi-square test of independence showed that there is a relationship between both diseases with ethnicity and sports type (individual-team or endurance-strength-mixed). Periodontal diseases were also seen related to age and education level. Approximately 5.5% of the athletes reported never seeing a dentist before.

**Conclusion** High levels of oral diseases were found in Malaysian elite athletes with common self-reported impacts on performance. This study hopes to create oral health awareness among Malaysian athletes and authorities so that it will be proportionately integrated into athlete health programmes in the future.

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#### THE INFLUENCE OF SUBCLINICAL HYPOTHYROIDISM ON PHYSICAL PERFORMANCE OF ELITE ATHLETES

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**Background** Currently, there is no consensus on the frequency of subclinical hypothyroidism in athletes and its effect on exercise tolerance.

**Objective** The purpose of the study was to explore the prevalence of subclinical hypothyroidism in elite athletes and to identify its impact on physical performance indicators.

**Main Outcome Measurements** A retrospective analysis of data from a random sample of outpatient records of 1000 elite athletes aged 15 to 36 years who underwent medical screening, including clinical, laboratory and instrumental examinations.

**Results** According to the results of a laboratory study, subclinical hypothyroidism was detected in 95 (9.5%) athletes in the sample. In athletes with subclinical hypothyroidism, the average thyroid stimulating hormone (TSH) level was  $5.53 \pm 0.24$  mME/l, while in unaffected athletes it was  $1.89 \pm 0.31$  mME/l ( $p < 0.01$ ). The level of free T4 was within normal values and in the group with hypothyroidism was  $12.0 \pm 0.48$  pM/l, whereas in unaffected athletes  $17.2 \pm 1.13$  pM/l ( $p < 0.05$ ).

When analyzing bicycle ergometry data, a significant correlation was found between hypothyroidism and heart rate at 1st, 3rd and 5th minutes of recovery after the test ( $p < 0.001$ ), and with diastolic blood pressure at the 3rd minute of recovery ( $p < 0.001$ ). A significant positive correlation was also found between TSH level and the same set of recovery

indicators ( $p < 0.0001$ ). There was also a significant negative relationship between the level of TSH and the intensity of the training regime ( $p < 0.005$ ) and with sports proficiency grade ( $p < 0.0001$ ).

We did not find any significant effect of TSH and hypothyroidism on exercise tolerance and aerobic reserve.

**Conclusions** The study showed a high prevalence of subclinical hypothyroidism in elite athletes, affecting 9.5% of the sample. The presence of subclinical hypothyroidism significantly contributed to a slower recovery of parameters of the cardiovascular system after at bicycle ergometer test, without affecting exercise tolerance.

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#### THE EFFECT OF SLEEP ON THE PREVALENCE OF SPORTS INJURIES IN ATHLETES

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**Background** Many sports athletes are injured every year. Sleep quality and quantity play an important role in this.

**Objectives** A systematic review was carried out on the correlation between sleep and the prevalence of sports injuries.

**Design** Systematic review

**Methods** Screening of articles in PubMed, Web of Science, Cinahl and Cochrane Library on the keywords 'Sleep', 'Circadian rhythm', 'Insomnia', 'Jetlag', '(Elite) athletes', '(Sports) injuries' and 'Rehabilitation' published between January 1, 2010 and December 3, 2020. Systematic review made after assessment of the articles for methodological quality.

**Results** In general, athletes do not meet the total sleep time recommended by the American Academy of Sleep Medicine (AASM) and the National Sleep Foundation. One of the reasons for an increased risk of sports injuries is sleep deprivation. Sometimes sleep extension is needed to partially repair this by scheduling a short nap of about 30 minutes in the morning or early afternoon. In addition to sleep quantity, poor sleep quality also plays a role in the risk of sports injuries. Both, sleep quantity and quality, are negatively affected by air travel over different time zones, which is further enhanced by a heavy training schedule.

**Conclusion** Poor sleep quantity and/or quality have a negative effect on the prevalence of sports injuries. Sleep deprivation adversely affects sports-related parameters including physiological biomarkers related to injuries. In addition to sleep quality and quantity, training modalities, injury history, sleep disorders, gender, well-being and health are also associated with injury risks. Further research is needed to clarify the correlation between sleep and injury risk and to formulate practical recommendations.

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#### THE IMPACT OF SLEEP ON THE RECOVERY OF SPORT INJURIES

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**Background** Sleep is important to elite athletes as it plays a key role in repair of cellular damage. In recent years, there has been increasing interest in the role of sleep in athletes.

**Objectives** The aim of this study is to give a systematic overview of what is known about the impact of sleep on sport injuries and injury recovery. The following questions will be addressed: 1. What is the prevalence of sleep disturbances in athletes? 2. What is the impact of sleep on injury risk? 3. What is the relationship between sleep and recovery after training and/or injury? 4. What is the influence of sleep and nutrition on recovery?

**Design** Systematic review

**Methods** Screening of PubMed, Web of Science, Cinahl and Cochrane Library on the keywords 'athletic injuries', 'football', 'soccer', 'sleep deprivation', 'fatigue', 'circadian rhythm', 'insomnia', 'rehabilitation', 'recovery', 'prevention' between January 1, 2002 and November 14, 2020; systematic review after assessment for methodological quality.

**Results** There is strong evidence that athletes in general are at high risk for a poor sleep duration and quality. In contrast to the expectations, most athletes (>85%) are mid-range to morning types and tend to pursue and excel in sports that match their chronotype.

Reduced sleep (<8h) is related with 1.7 more risk of having an injury and a negative effect on recovery after training. There is an increased proinflammatory state, which affects a person's resistance to a simple infectious disease, and may affect an athlete's training capacity and potential.

Sleep is also associated with recovery from injuries. Studies found that sleep affected concussion recovery time and an increased risk of a re-injury during rehabilitation.

**Conclusion** The importance of sleep remains a main issue in competitive sporters. Training and competition schedules should take sleep into account in order to avoid injuries and prolonged rehabilitation after injury.

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#### THE ASSOCIATION BETWEEN COVID-19 AND MUSCLE STRAIN INJURY OCCURRENCE IN ELITE SOCCER PLAYERS: A PROSPECTIVE STUDY

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**Background** Because of the high injury rate currently seen in soccer players and the exceptional pandemic circumstances, the question arises to what extent this reported increase in injury incidence is associated with COVID-19.

**Objectives** The aim of this study was to investigate the association between COVID-19 and muscle strain injury occurrence in elite athletes.

**Design** A prospective cohort study

**Setting** During the first half of the 2020–2021 season, injury data was collected by using the UEFA injury card. Assessment of SARS-CoV-2 infection was performed by means of a polymerase chain reaction (PCR) test before each official game.

**Patients (or Participants)** Three Belgian professional male soccer teams (84 players in total) participated.

**Interventions (or Assessment of Risk Factors)** Regression analysis was performed to identify the risk of developing a muscle strain injury after SARS-CoV-2 infection.

**Main Outcome Measurements** Muscle strain injury, COVID-19 diagnosis, quarantine duration.

**Results** Eighteen players developed a muscle strain injury during the study period (June 2020–January 2021), of which 11 players were diagnosed with COVID-19. Regression analysis showed a significant association between SARS-CoV-2 infection and the development of muscle strain injuries ( $p=0.010$ ). The athletes that developed a muscle strain injury after COVID-19 diagnosis were all injured within the first month ( $15.71 \pm 11.74$  days) after sports resumption and showed a longer quarantine duration ( $14.57 \pm 6.50$  days) compared to the SARS-CoV-2 infected players that did not develop a muscle strain injury ( $11.18 \pm 5.25$  days).

**Conclusion** This study demonstrated a five-time higher risk to develop a muscle strain injury after a SARS-CoV-2 infection in elite soccer players. Although this should be examined further, it seems possible that short-term detraining effects due to quarantine are associated with a higher risk of muscle strain injury and could possibly be related to lower physical readiness and higher rates of fatigue.

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#### SAFETY AND RISK AWARENESS FOR HEALTH AND WELLBEING EVALUATION IN ELITE RUGBY: A QUANTITATIVE SURVEY DEVELOPMENT

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**Background** Despite the physical, competitive nature of elite athletes and unique features of sport culture, no Occupational Safety and Health (OSH) related measurement instruments exist in sport.

**Objective** As a part of a wider project focusing on health and safety awareness in elite sport, the purpose of this study was to develop a survey instrument for the evaluation of risk and safety awareness among elite rugby players.

**Design** Based on an established conceptual framework incorporating OSH theories, the survey was developed by adopting questions from existing validated questionnaires through an iterative process, with the feedback from a multidisciplinary team of experts and pilot test.

**Setting** Elite division rugby (union) team in Ireland

**Participants** Players from an elite rugby team in Ireland ( $n=50$ ) participated the advanced pilot test.

**Assessment of Risk Factors** The key themes include current health outlook, tackle behaviour, awareness of risk acceptance, reasons for risk-taking, and safety consideration for other players.

**Main Outcome Measurements** The data were imported to SPSS for analysis of survey reliability and validity, such as the adoption of the Kaiser-Meyer-Olkin (KMO) measure.