

making them higher risk of shoulder injury. Preventive strategies are frequently used to decrease injuries. However, prior to implementing a preventive program could be effective identify the athletes' beliefs and opinions about injury prevention to increase the engagement.

Objective To describe the perceptions on preventive strategies among overhead recreational athletes.

Design Cross sectional study.

Setting An online semi-structured survey on a group of recreational overhead athletes.

Participants Fifty-one recreational overhead athletes (male=34; female=17; 31.16±10.82 years; mean sport experience=14.3-years) took part in the online survey. Of those participants, 13 were from basketball (25.5%), 11 from handball (21.6%), 16 from tennis (31.4%), and 11 from volleyball (21.6%).

Assessment of Risk Factors An online semi-structured survey was applied, with the following categories: (1) history of injuries, (2) self-reported preventive strategies. Descriptive statistics and qualitative research methods were used to perform a thematic analysis.

Main Outcome Measurements Self-reported injury prevalence; beliefs on preventive strategies; Categories resulting from the thematic analysis, with (1) self-reported preventive strategies, (2) professional support to preventive strategies.

Results Overall, 42 athletes (82.4%) had experienced a sport-injury in the past. For 48 athletes (94.1%) is possible to prevent injuries and the self-reported preventive strategies were: 'muscle strengthening' (n=19), 'muscle stretching' (n=10), 'neuromuscular preventive exercises' (n=7), 'warm-up exercises' (n=6), 'adjustment of movements' (n=5), 'higher cardiovascular resistance' (n=5), 'use of protective equipment' (n=3), 'nutrition management' (n=2), and 'rest' (n=2). Besides, forty athletes self-reported the physiotherapist like the professional to support preventive strategies (n=40), followed by physical educator (n=19), personal trainer (n=16), and coach (n=4).

Conclusions In conclusion, the self-report preventive strategies from overhead athletes are in partial agreement with scientific evidence. This study identified athlete beliefs that could be incorporate in future preventive programs.

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THERE WAS A HIGH INCIDENCE OF MATCH INJURIES AT THE 2019 INTERNATIONAL NETBALL WORLD CUP COMPETITION, MOSTLY IN THE LOWER LIMB AND FOLLOWING CONTACT WITH OTHER PLAYERS

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Background Netball is a fast action game and there is growing interest in the sport. The Netball World Cup (NWC) is an international netball world championship, contested every four

years, with 16 teams qualifying by ranking and play-offs. Research on netball injuries is however limited.

Objective To determine the incidence and severity of injuries during the 2019 NWC.

Design Prospective study, cross sectional analysis.

Setting Netball World Cup 2019 in Liverpool, England.

Patients (or Participants) 192 elite female netball players from all 16 contesting teams at the NWC (average squad size 12 players).

Interventions (or Assessment of Risk Factors) Medical staff of each team recorded all injuries (all- and match injuries; 840 total exposure hours) and training/match days lost during the 10-day tournament.

Main Outcome Measurements Incidence rate (IR) (per 1000 player-hours; 95% CI) and severity (% time-loss ≥1 day) of all injuries and match injuries.

Results 48 independent injuries were recorded (46 during match-play, 2 during training) in 192 players (25%). The IR of match injuries was 54.8 (38.9–70.6). The IR in the lower limb (28.6; 17.1–40.0) was significantly higher (p=0.016) vs. the head (9.5; 2.9–16.1; p=0.016) and upper limb (8.3; 2.2–14.5; p=0.002). In the lower limb, the IR of ankle injuries was significantly higher than knee injuries (p= 0.033). Most injuries (71%) occurred in contact situations with another athlete with 34% occurring during quarter 3 of the game, followed by quarter 1 and 2 (26% each). 28% of all injuries were time-loss injuries. The% injuries, by player position, were: centre (25%), goal keeper (21%) and goal defence (19%).

Conclusions There was a high incidence of injuries in elite netball players, with 1 in 4 players sustaining an injury. There is an urgent need to introduce targeted injury prevention strategies in netball internationally to reduce the risk of injuries during the NWC.

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MORE THAN 80% OF ILLNESSES AT THE 2019 INTERNATIONAL NETBALL WORLD CUP COMPETITION ARE ONLY REPORTED ON MATCH DAY: IS THERE NOT A NEED TO EDUCATE PLAYERS?

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Background The international Netball World Cup (NWC) is contested every four years and 16 teams qualify to participate, based on their world ranking. The risk, nature and severity of illness at the NWC is not known.

Objective To determine the incidence, severity and reporting of illness by players during the NWC in 2019.

Design Prospective study, cross sectional analysis.

Setting Netball World Cup 2019, Liverpool, England.

Patients (or Participants) 192 elite female netball players from all 16 contesting teams at the NWC (average squad size 12 players).

Interventions (or Assessment of Risk Factors) Medical staff of each team recorded all illness (1440 player days) and training/match days lost during the 10-day tournament.

Main Outcome Measurements Incidence rates (IR) (per 1000 player-days; 95% CI) and severity (% time-loss ≥ 1 day) of all illness.

Results In total 11 illnesses were recorded. The overall crude IR of illness was 7.6 (3.1–12.2). Organ systems most affected was the respiratory- (27%), followed by gastrointestinal- (18%) and urogenital tract (18%). More common illness, by specific diagnosis, was acute upper respiratory infection (18%), non-infective gastroenteritis (18%) and dysmenorrhea (18%). Cause of illness was similar for non-infective (5.6; 1.7–9.4) and infective (2.1; 0.3–4.4) illness ($p=0.227$). Time-loss of ≥ 1 day was reported for 9% of all illness. Illness by player position was common in goal keepers (27%), goal defenders (27%), followed by goal shooters (18%). Illness was reported on a match day in 81% cases (match day with a training session=45%; match day without training=36%).

Conclusions There is a moderate incidence of illness during the 2019 NWC, but we note that >80% of players only report illness on match days. We suggest that players be educated to report illness early (at onset of first symptoms), so that treatment can commence before match day. We recommend implementing illness prevention programs prior to and at future international netball tournaments.

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THE RELIABILITY AND ASSOCIATION OF THE REPEATED COPENHAGEN ADDUCTION EXERCISE TO GAELIC FOOTBALL PLAYERS WITH A HISTORY OF GROIN INJURY: A PILOT STUDY

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Background The Copenhagen adduction exercise (CAE) can significantly reduce the risk of developing Groin injuries (GIs) and may be of clinical utility in being used as a test to assess hip-adductor muscle function.

Objective To examine the relationship between hip-adductor muscle function using a modified, repeated version of the CAE with the adductor squeeze test and the function, sport and recreation subscale of the Copenhagen hip and groin outcome score (HAGOS) in male Gaelic football players (GFP) with a history of GIs. A secondary aim was to assess the inter-rater reliability of the CAE.

Design Two stage pilot study. Stage one assessed the inter-rater reliability of the CAE in active male university students. Stage 2 examined the relationship between hip-adductor muscle function using the CAE with the adductor squeeze test and level of function in male GFP with and without a history of GIs.

Setting University clinical skills laboratory and Gaelic football clubs.

Participants Recruitment on a volunteer basis. Thirteen physically active males over 18 with no history of GIs participated in stage one. Sixty-two males (previous GIs $n=30$, no previous GIs $n=32$) over 18 years, currently playing Gaelic

participated in stage two. To be included into the 'injured' group, participants needed to have a history of GIs diagnosed by a physiotherapist which resulted in complete absence from training for at least two weeks. Participants were excluded if they had an acute injury (<2 weeks) or were unable to participate in training sessions.

Main Outcome Measurements Maximum number of repetitions achieved during the CAE, adductor squeeze test and the HAGOS function, sport and recreation subscale.

Results The CAE test demonstrated good inter-rater reliability (ICC: 0.86, 95% CI: 0.61–0.96, $p<0.001$). Injured and uninjured Gaelic footballers did not differ in CAE or adductor squeeze scores ($p>0.05$). Injured players did not differ in CAE scores between their injured and uninjured leg ($p=0.127$). There was a significant correlation between the CAE score on the uninjured leg and the HAGOS ($\rho=0.405$; $p=0.026$) and adductor squeeze ($\rho=0.458$; $p=0.011$).

Conclusions The CAE has good inter-rater reliability. The repeated CAE test was unable to differentiate between injured and uninjured Gaelic football players or between injured and uninjured legs.

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ABSTRACT WITHDRAWN

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CAN A HEAT-AND-MOISTURE EXCHANGER ATTENUATE INFLAMMATORY RESPONSES TO EXERCISE IN SUB-ZERO CONDITIONS?

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Background Heavy endurance training in sub-zero environments increases risk of exercise-induced asthma. Heat-and-moisture exchangers (HME) can prevent exercise-induced bronchoconstriction but it is not known whether they protect against inflammatory responses to exercise in healthy individuals.

Objective To investigate whether use of an HME during exercise in a sub-zero environment affects post-exercise inflammatory responses.

Design Investigator-blind randomised crossover trial.

Setting Environmental chamber at -15°C .

Participants 23 healthy, trained participants aged 18–53 (15 male, 8 female, $\text{VO}_{2\text{peak}}$ 57 ± 6 and 50 ± 4 mL/kg/min; mean \pm SD).

Interventions Two experimental trials with and without HME, consisting of 30-min moderate-intensity running followed by a 4-min maximal running time-trial. Plasma samples were obtained pre- and 1h-post-exercise and analysed for a panel of 10 cytokines using a multiplex immunoassay.

Main Outcome Measurements Plasma cytokine concentrations (GM-CSF, IL-1 β , IL-4, IL-5, IL-6, IL-8, IL-10, IL-13, IL-17E/25, TNF- α). Data were log-transformed then analysed using two-way repeated-measures ANOVA; one participant was an extreme outlier and excluded.