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The prevalence of menstrual disturbances in female endurance athletes: the influence of performance level and comparison of methodologies

Noordhof, D.A.1, Taylor, M.2, De Martin Topranin, V.3, Engseth, T.P.2, Sandbakk, Ø.1,2, Osborne, J.O.2

1> Norwegian University of Science and Technology, 2> UiT The Arctic University of Norway, 3> Nord University

INTRODUCTION:

The prevalence of subtle menstrual disturbances (MD) in exercising women (50%) has been shown to be much higher than in sedentary women (4.2%) (1). However, it is unclear if the prevalence in female athletes is dependent on performance level. Therefore, the primary aim was to investigate the association between performance level and the prevalence of MD in endurance-trained women. A 3-step method, consisting of calendar-based counting, urinary ovulation testing, and serum hormone verification, has been suggested for the identification of subtle MD (2). However, a less invasive and time-consuming method, consisting of calendar-based counting and urinary ovulation testing (i.e., the 2-step method), would be preferable for sports practice. Therefore, the secondary aim was to investigate the degree of agreement between the 2-step and 3-step method for the detection of MD.

METHODS:

In total, 238 unique menstrual cycles (MCs) of 66 menstruating endurance athletes were analyzed. Athletes were classified based on their average weekly training volume and performance metrics as tier 2/trained (n=24), tier 3/highly trained (n=36), or tier 4/elite (n=6) (3). MC status was initially determined using the 2-step method. MCs were classified as either normal, anovulatory, short luteal phase (i.e., a luteal phase <10 days) (1) or oligomenorrheic (MC >35 days) (1). A subsample of 32 female athletes also provided a serum hormone sample 7-9 days after a positive ovulation test for 49 MCs, which was analyzed for an inadequate luteal phase (mid-luteal phase progesterone value <16 nmol L⁻¹) (1,4). The data from this subsample was used to compare the two methodologies. Logistic mixed model analysis was used to investigate the association between performance level and MD prevalence, while the degree of agreement between the two methodologies was evaluated using Cohen's kappa (κ).

RESULTS:

Performance level was associated with the prevalence of MD, with tier 3 athletes being 21.6 (95%CI: 4.6, 101.3) times more likely to present a MD than tier 2 athletes ($p=.002$). No other differences were found between performance levels ($p=.38-.58$). An almost perfect agreement was found between the 2-step and 3-step method ($\kappa=0.95$), with the 3-step method identifying only one extra MC with a MD (13/49), when compared to the 2-step method (12/49).

CONCLUSION:

Tier 3 athletes showed a significantly higher prevalence of MD than tier 2 athletes. The lack of significant differences between tier 2 and tier 3 vs. tier 4 athletes, might be related to the small number of elite athletes included. The almost perfect agreement between the 2-step and 3-step method indicates that practitioners will detect almost all disturbed MCs when their athletes use the more practically feasible 2-step method.

1) De Souza et al. Hum Reprod 2010; 25(2):491-503

2) Schaumburg et al. J Sci Med Sport 2017; 20(11):965-969

3) McKay et al. Int J Sports Physiol Perform 2022;17(2):317-331

4) Elliott-Sale et al. Sports Med 2021; 51(5):843-861

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