Abstract

Introduction: Many female runners limit their nutritional intake to maintain or achieve a specific body weight or goal. Calorie restriction and dieting may cause weight loss, which will inevitably reach a plateau after prolonged low energy intake. Some athletes will decrease energy intake even further to continue to lose weight and "this behaviour will lead to a downward spiral of caloric restriction, losing weight, and plateauing followed by another cycle — all of which will ultimately result in LEA and likely in the development of an eating disorder" (Wasserfurth et al., 2020, p. 5). Long-term energy availability (EA) can affect bone health negatively, putting these athletes at a higher risk of osteoporosis, incidence, and prolonged recovery from stress fractures, affecting participation and delaying their return to sport. Relative energy deficiency syndrome (RED-S) is well known in female athletes in various sports. RED-S includes and is not limited to, impairments of metabolic rate, menstrual function, bone health, immunity, protein synthesis and cardiovascular health. Although more common in females, RED-S occurs in both males and females. Low energy availability (LEA) is a big factor of RED-S, which is caused by insufficient nutritional intake. An appropriate diet would consist of an adequate intake of macro-and micronutrients that will match an athlete's needs accordingly. Energy balance is achieved when energy intake matches total energy expenditure, therefore energy balance = dietary intake – exercise expenditure.

Aim of study: The aim of the study included determining nutritional habits, current nutritional status, energy balance, associations between nutrition and energy status, and risk of RED-S of female endurance runners in Johannesburg, South Africa.

Study design and methodology: The study design was quantitative, descriptive, and exploratory. The study population comprised 27 female endurance runners, including recreational and elite runners, residing in Johannesburg, South Africa. Ethical clearance was obtained from the University of Witwatersrand's Medical Human Research Ethics Committee. Outcome measures included two questionnaires and venous blood sampling to test ferritin, magnesium, vitamin D and calcium. The data from the questionnaires were analysed along with the venous blood sample results. Statistical analysis was performed using Microsoft Excel, SPSS version 28.0 and the REDCap system version 11.4.3. Each participant was scored with the LEAF-Q scoring key system (risk for low energy availability).

Results: Eleven participants were at risk for the female athletic triad, which is also a risk for RED-S. Twenty-two (81%) out of 27 participants were under-eating or eating with a large daily calorie deficit. Ten runners (37%) had a sFer level (iron marker) of below 35 ng/mL and one participant as low as 9 ng/mL, indicating iron deficiency with anaemia. Vitamin D levels were normal in all but one participant, magnesium levels were in range for all participants, and seven out of 27 (26%) participants had low calcium levels.

Conclusion: The results showed that in our study most female runners do not balance their energy intake with energy expenditure, which leads to LEA and may cause a decrease in performance, which could have other health consequences. Numerous female athletes are still not well informed of RED-S and the risks associated with it, as many are unaware that they are at risk for RED-S. Dietary recommendations, education about RED-S and recommendations for minimising the risk of RED-S for female runners are put forward.