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Stress fractures, menstrual irregularities and Low Energy Availability in Italian élite track and field athletes

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## INTRODUCTION:

Élite athletes, due to the intense mental and physical demand, may experience injuries and hormonal dysfunction, including overuse injuries and menstrual disorders. Both these factors are influenced by Low Energy Availability (LEA), so this study aims to determine the relationship between menstrual irregularities, stress fractures and LEA in Italian élite track and field athletes.

## METHODS:

The study included 149 high level (national, European, world and Olympic) female track and field athletes specialized in sprints, jumps, hurdles, combined events, middle and long distance. They were asked to answer a questionnaire about stress fractures (SF), a questionnaire to identify presence of LEA (LEAF-Q) [1] and consequentially to be at higher risk of developing the Triad and 66 of them also filled a food diary.

## RESULTS:

The 50.3% of the total sample had at least one SF and the 45% of the total sample has or had menstrual irregularities. Specific disciplines have a significant impact on SF number ( $p=0.012$ ), with middle- and long-distance runners resulting more exposed to SF (62.5% of them had at least one SF), even if sprinters and hurdlers had also high percentages of SF (respectively 50% and 43.2%). Athletes who had at least one SF had higher probability than not injured athletes of having menstrual irregularities ( $\chi^2=8.42$   $p=.015$ ). It was found a significant negative correlation between age of menarche and lowest BMI ( $r=-.315$   $p=.008$ ), a positive correlation between LEAF-Q scoring and age at menarche ( $r=.314$   $p=.001$ ) and between number of SF and age of menarche ( $r=.37$ ;  $p<.001$ ) and LEAF-Q scoring ( $r=.33$ ;  $p<.001$ ). Analyzing the food diary of the athletes, by reference to ISSN exercise and sport recommendation guidelines[2], we observed that 27.7% was under the recommended amount of protein, the 12.1% was under the recommended amount of fats, the 84.8% was under the recommendation of carbohydrates and last the 84.8% of the athletes was considered under the estimated range of caloric needs (40-70kcal/kg/day).

## CONCLUSION:

The results of the present study underline that menstrual irregularities and bone stress injuries are common problems in élite athletes; early intervention and injury prevention can be achieved by implementing management strategies. Nutritional factors play also a significant role in the risk of developing SF and the Triad, moreover, it was unexpected that carbohydrates had the biggest impact on the falling to reach the recommended energy intake. These data underline that even among élite athletes is necessary more awareness of the importance of nutrition intervention to support trainings, performances and to avoid injuries.

[1]=A. Melin et al. "The LEAF questionnaire: a screening tool for the identification of female athletes at risk for the female athlete triad," pp. 540–545, 2014, doi:10.1136/bjsports-2013-093240

[2]=Kerksick et al. ISSN exercise & sports nutrition review update: research & recommendations. J Int Soc Sports Nutr 15, 38 (2018). <https://doi.org/10.1186>

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