Prevalence and Associated Factors Related to Tendon, Bone, and Joint Injuries in Young Female Gymnasts

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Abstract:

Background: Performing gymnastics entails intensive physical activities, including the repetition of extreme movements that apply forces to the lower extremities and spine. Complex and extensive movements, that require strength and flexibility, may expose young gymnasts to exceptionally high loads and strains. When combined with long practice hours and intense physical training from a very young age, such exposure increases concerns for lower-extremity and spinal injuries.

Objective: To evaluate the prevalence of three types of injuries (tendon, joint and bone injuries) and their associated factors, in young female gymnasts.

Methods: A total of 274 competitive female gymnasts, aged 9–16 years were clinically assessed for injuries during training. Examinations were conducted by two experienced physiotherapists for injuries that were further grouped into three types as follows: tendon injuries (e.g., Achilles and patellar tendinopathy), joint injuries (e.g., patellofemoral pain), and bone injuries (e.g., medial tibial stress syndrome, spondylolysis). Participants were also assessed for training impact, anthropometric, bone-properties, muscle-strength, and joint range of motion (ROM).

Results: Injuries were identified in 69.7% of the participants, including 20.1% with one-injury, 18.2% with two, 12.4% with three-injuries, and 19.1% with≥4 injuries.

The prevalence of gymnasts who had *bone injuries* and had reached menarche was significantly higher than those with bone injuries yet had not reached menarche (p=0.038). No such differences were found for gymnasts who had tendon injuries or joint pain (p>0.05). Logistic regression (forward likelihood ratio) showed that greater BMI% (OR=1.015) and lower plantar-flexors strength (OR=0.949) were associated *with tendon injuries*; greater BMI% (OR=1.025), increased age (OR=1.736), menarche (OR=1.925), reduced tibial-strength (OR=0.994) and reduced plantar-flexors (OR=0.930) and hip-