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Self-reported bio-psycho-social factors partially distinguish patellar tendinopathy from other knee problems and explain severity in jumping athletes: A case-control study

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Purpose: Patellar tendinopathy (PT) is poorly understood, and recent research has focused on physical examination and imaging, with the absence of statistical models considering combinations of various risk factors potentially obscuring understanding of how jumping athletes with PT (JPTs) present, progress and differ from athletes with other knee problems. We also lack a clear understanding of why some athletes present with worse severity than others. Therefore, we aimed to inform clinical profiling of JPTs by determining what combinations of self-reported factors distinguish PT from those with other knee problems, and explain the variance of PT severity and sporting availability.

Methods: A previously validated, reliable online questionnaire battery yielded data from an international sample of elite and non-elite jumping athletes recruited via social media, private practice, sporting teams and the UK National Health Service. We considered clinical diagnosis (having PT vs having other knee problems) as the dependent variable for the regression model that distinguishes JPTs from those with other knee problems. Severity and sporting impact were defined by the VISA-P and competition availability. A range of self-reported bio-psycho-social, demographic and sports specific factors were collected to inform multi- variable regression models constructed using a forward manual approach.

Results: 132 athletes with PT (30.7±8.9 years; 80 males; VISA-P = 61.6±16.0) and 89 athletes with other knee problems (31.8±9.9 years; 47 males; VISA-P = 62.9±21.2) were included. Univariate regression analyses showed 22 variables individually distinguished PT from other knee problems, while ±26 and ±28 variables were individually associated with sporting impact and severity, respectively. A model comprising seven factors distinguished PT from other knee problems; hours trained in the last week (OR = 1.10, 95%CI = 1.03–1.17), sport type (OR for court base jumping sports = 2.31, 95%CI = 1.24– 4.32), injured side (OR for bilateral = 2.28, 95%CI = 1.09– 4.77), pain onset (OR for gradual = 1.97, 95%CI = 1.07– 3.60), morning pain (OR for yes = 1.89, 95%CI = 1.01– 3.53), condition acceptability (OR for yes = 0.39, 95%CI = 0.21– 0.73) and swelling (OR for yes = 0.37, 95%CI = 0.18– 0.74). Sports specific function (OR = 1.02, 95%CI = 1.01– 1.04) and player level (OR for professional = 4.11, 95%CI = 1.90–8.87) explained sporting availability. 44% of PT severity variance was explained by quality of life ($\beta = 0.32, p < 0.001$), sports specific function ($\beta = 0.38, p < 0.001$) and age ($\beta = 0.17, p = 0.02$).

Conclusion(s): Self-reported sports specific, biomedical and psychological factors partially distinguish PT from other knee problems. JPTs play more despite having equal severity to those with other knee problems yet are less satisfied with their condition. Availability is mainly explained by sports specific factors, while psychosocial factors impact on severity. These should not be taken to be causal relationships but adding sports specific and bio-psycho-social assessments into clinical assessment of PT is indicated for athlete monitoring, treatment planning and condition profiling.

Impact: These findings could complement the more commonly collected physical examination and imaging findings in clinical care and research. The findings are generalizable because of the uniquely large sample size, diverse range of analyzed variables enabling multivariable analysis and relevant international sample of elite and non-elite athletes.

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