Medial tibial stress syndrome: a prospective epidemiologic study for intrinsic risk factors with a computerized static and dynamic evaluation (DartTrainer®)

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Introduction: A common overuse injury seen by runners is the medial tibial stress syndrome (MTSS). In order to decrease the risk for this overuse injury, as for many others, it is important to give full attention to prevention and intervention within sports medicine. However, this is only possible when extrinsic and intrinsic risk factors for MTSS are known. The extrinsic risk factors are well established, which is not the case for the intrinsic risk factors. No consensus is reached about which intrinsic risk factors play a role for the development of MTSS. This study was performed to identify the incidence of the MTSS in physical education students, to determine the possible intrinsic risk factors and the possible predictive model for the development of MTSS.

Materials & methods: A risk factor analysis in a prospective manner was set up to study the relationship between MTSS and intrinsic risk factors. At baseline, we performed a static and dynamic evaluation (SDE) of 120 physical education students. The SDE captures static and dynamic anatomic alignments, joint range of motion and muscle flexibility. The Blits® Online Injury Diary was used to fill out all injuries prospectively during a 6-month period, using an electronic flow chart to define the sports injuries. To calculate MTSS incidences, the students completed weekly exposure sheets.

Results: From the 120 students initially participating, 97 (19.0 ± 1.1) completed the study. We observed a MTSS incidence of 3.69/1.000 exposure hours (EH). The majority of students developing MTSS were females (3.71/1.000 EH). We performed statistical analysis for MTSS (a) expressed per 1.000 EH (incidence) and (b) defined as absent or present (occurrence). The Point-biserial coefficient (r_{bis}) showed a significant correlation (r_{bis}=0.45; p<0.05) between a dynamic varus alignment right during squat. Although, with little strength of prediction (R^2 = 0.211). Multiple Linear Regression calculated this alignment to be the best possible predictor for MTSS. X^2-analysis revealed a significant relation (p<0.01) between sex and the occurrence of MTSS. Logistic regression analysis showed that sex was the best possible predictor for the occurrence of MTSS with a 77.2% accuracy (p<0.05). For females, the Pearson correlation showed a significant correlation (r=0.522; p<0.05) between a Q-angle left and the incidence of MTSS and via Multiple Regression Analysis this parameter was found to be the best possible predictor for MTSS in females.

Discussion/Conclusion: We found a high incidence for MTSS. Especially females were more susceptible for the development of MTSS. The only intrinsic risk factor and also the best possible predictor for MTSS as expressed in exposure hours was a dynamic varus alignment right. Our study supported previous results of studies that indicated that sex is a significant intrinsic risk factor for MTSS.

In females, a significant relationship was found between a high Q-angle left and the incidence of MTSS. With a dynamic varus alignment right and a higher Q-angle left we identified two new intrinsic risk factors for MTSS. As well the latter as the former can be useful in prevention and intervention.

References
(1) Cumps E et al., 5th Conference Computer Science in Sports, Cologne, Germany, 2004
(2) Bennett et al., Journal of Orthopaedic and Sports Physical Therapy, 31(9): 504-510 2001

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