

学位論文の要旨

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学位論文名 Is Being a Regular Player with Fewer Teammates
Associated with Musculoskeletal Pain in Youth Team Sports?
A Cross-Sectional Study

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論文内容の要旨

INTRODUCTION

The prevalence rate of musculoskeletal pain (MSP) in adolescents in the general population ranges from 4% to 40%. In school-aged youth, the point prevalence of lower back pain is 10.2% and the lifetime prevalence is 28.8%. MSP in youth is associated with functional disability, lower quality of life, and future risk of MSP for adulthood. Therefore, prevention of MSP in adolescents is important for health throughout the life span.

Participation in sports among adolescents has physical, psychological, and social health benefits. However, one of the negative effects of participation in organized sports is an increased risk of musculoskeletal problems. Previous reviews have shown that extrinsic risk factors of sports-related MSP and injuries include the type of sport, competitive level, intensity of physical training, acute spinal trauma, over-training, insufficient recovery between activities, and greater exposure to injury. Furthermore, a recent longitudinal study showed that an increase in time (hours/week) playing organized sports is linearly associated with a risk of MSP in adolescents.

Previous studies on extrinsic risk factors did not focus on management of team members (e.g., regular or non-regular players, and number of players) for reducing sports-related MSP. Regular players with limited numbers of teammates may have a heavier physical burden because of a longer duration of playing time compared with non-regular players with sufficient numbers of teammates.

Therefore, this study aimed to investigate the association of playing status (regular or non-regular players) and team status (fewer or more teammates) with MSP (overall, upper limbs, lower back, and lower limbs) in youth team sports.

MATERIALS AND METHODS

Self-administered questionnaires were distributed to all students (2,271 students in 2008

and 2,211 students in 2009) of all junior high schools and high schools in Unnan City, Shimane, Japan, and returned through schools. The total response rate was 82.1% (3,680 responses from two surveys in 2008 and 2009). Because third (final) year junior high school and high school students ($n = 607$) in 2008 needed to focus on academic work for the end of the academic year, they were excluded from the study. Additionally, students pursuing individual sports ($n = 331$), those pursuing no sports ($n = 630$), those with invalid responses (missing data) on the type of sport or playing status ($n = 223$), and repeated responses from the same students between 2008 and 2009 ($n = 1257$) were excluded, the lattermost to avoid overlap. As a result, 632 eligible responses were analyzed for the present study. The study protocol was approved by the Ethics Committee of the Physical Education and Medicine Research Center UNNAN.

Self-administered questionnaires included questions on sex, age, weight and height (used for calculating body mass index as kg/m^2), organized sports activity (hours on weekdays and the weekend), sleep time (time in and out of bed), and screen time (TV viewing and game playing time on weekdays and the weekend). For students who participated in an organized sports activity, questions regarding the nature of the sport in which they were registered (e.g., baseball or basketball) and whether they were regular players (Do you currently participate in competitions as a regular player or represent your team? [yes/no]) were also asked. In this study, organized sports activity was defined as sports activities that occurred after school programs on weekdays and/or weekends or activities that were organized by sports clubs.

To estimate the opportunity to actively participate in organized sports competitions and games, and the possible physical burden among regular players with fewer teammates, a teammate quantity index (TQI) was calculated as follows: $\text{TQI} = [\text{number of teammates in their grade}] / [\text{required number of players for the sport}]$. The required numbers of players for each sport were assigned as follows: baseball and softball = 9; basketball = 5; soccer = 11; and volleyball = 6. A higher TQI indicates more teammates in the same grade in their team with consideration for each sport. TQI was dichotomized as high or low, using the median value (1.3) as the cutoff.

MSP was assessed using a questionnaire and defined by the frequency and the part of the body area that was painful. To be considered for this analysis, the pain should be present at least once a week in at least one part of the body.

We analyzed the prevalence of pain in students with different playing status (regular or non-regular player) and team status (lower TQI or higher TQI). We defined the joint categories of playing status and team status as 1) non-regular players with a high TQI, 2) non-regular players with a low TQI, 3) regular players with a high TQI, and 4) regular players with a low TQI. We examined the association of these categories with the prevalence of pain,

using Poisson regression. Location-specific (upper limb, lower back, and lower limb) pain analyses were also performed. Poisson regression was used to calculate prevalence ratios, which are more easily interpreted than odds ratios. Adjustments were made by sex, age, body mass index, sleep length, screen time, and school.

RESULTS AND DISCUSSION

A total of 272 (44.3%) players had MSP in any location. The most prevalent location of pain was the lower limbs (181 cases, 29.4%), followed by the upper limbs (90 cases, 14.5%) and lower back (77 cases, 12.4%). When grouped according to playing status or team status, 140 (47.0%) regular and 130 (41.7%) non-regular players had MSP, whereas 142 (47.0%) players with lower TQI and 127 (41.8%) players with higher TQI had MSP. In the multivariable analysis, regular players with lower TQI had a higher prevalence of lower back pain compared with non-regular players with higher TQI (21.3% vs. 8.3%; adjusted prevalence ratio = 2.08 [1.07–4.02]). Although the associations with pain overall and other locations were not significant, the prevalence of pain was highest in regular players with lower TQI for all pain outcomes.

Adding to previous studies that show risk factors for sports-related MSP and injuries, our study found a novel joint association of regular-player status and fewer teammates with lower back pain. Regular players are considered to have a longer playing time and heavier physical burden in sports competitions and team training compared with non-regular players. A recent study reported a linear association between time (hours/week) in playing organized sports and the risk of MSP in adolescents. In another study, the number of competitions per 100 days in team sports was positively associated with sports injuries. Regular players are considered to play for a longer duration of time, and thus they may have a higher risk of MSP. Additionally, rotation and interchange of teammates in team sports competitions and games are important for reducing the physical burden. Teams with fewer members may not be able to rotate players frequently compared with teams with more members. Therefore, regular players with fewer teammates may not rest enough for a full recovery and have a higher risk of accumulating fatigue in the musculoskeletal system. This situation then leads to a higher risk of MSP.

CONCLUSION

This cross-sectional study of adolescents playing team sports shows that regular players with fewer teammates have a two times higher prevalence of lower back pain compared with non-regular players with more teammates. Although there are no significant associations of MSP with pain overall and other locations, the prevalence of MSP is highest in regular players with fewer teammates for all pain outcomes. The individual physical burden may be higher in players actively participating in sports with fewer teammates.