

Paper #180

High Incidence Rate of Lumbar Spinal Disease among Child and Adolescent Weightlifting Athletes: A Prospective 4-Year Cohort Study

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Summary:

A prospective 4-year cohort study to investigate low back pain and abnormal findings on magnetic resonance imaging (MRI) in child and adolescent weightlifters was conducted. This study showed that abnormal lumbar findings on MRI increased irreversibly and occurred in all cases by the final year regardless of the presence or absence of symptoms.

Abstract:

Introduction

Resistance training, such as weightlifting, in child and adolescent athletes has been considered unsafe, leading to injuries to the musculoskeletal system and growth plate, and to low back pain (LBP). We focused on the lumbar vertebrae, as these are most frequently injured in weightlifting, and prospectively investigated LBP and abnormal lumbar findings in child and adolescent weightlifters.

The purpose of this 4-year cohort study was to assess the incidence and characteristics of LBP and abnormal lumbar findings in child and adolescent weightlifting athletes using medical questionnaires and magnetic resonance imaging (MRI).

Materials And Methods

This prospective 4-year cohort study was conducted between 2014 and 2017. Twelve participants (6 boys and 6 girls) were enrolled. The participants were either children or adolescents without history of lumbar disease or surgery who participated in weightlifting for at least 2 years. The mean age of the participants at the start of this study was 11.4 \pm 2.0 years. Annual medical questionnaires and lumbar examinations using MRI were performed during the 4-year follow-up. The assessment items included a medical questionnaire, which was used to record the practice frequency and presence of LBP each year, and MRI findings.

On MRI, lumbar spondylolysis, disc herniation, and lumbar disc degeneration at all lumbar vertebral levels (L1 to S1) in the sagittal and coronal plane were assessed. Pfirrmann classification was used for the assessment of lumbar disc degeneration. MRI findings were interpreted by two orthopedic surgeons; one was a specialist in spine surgery, and the other was an experienced orthopedic surgeon. Both readers were unaware of the participant's other findings.

Inter-reader and intra-reader agreements were assessed using the κ value.

Results

The participants practiced approximately 2 hours per day for about 5 days per week under the guidance of a team

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coach. At the start of this study, there were no positive findings of LBP, lumbar spondylolysis, or disc herniation on MRI. Lumbar disc degeneration on MRI was observed in only 2 participants. The grade of degeneration was grade 2. During the 4-year study, LBP was confirmed in 5 participants, lumbar spondylolysis in 5, and lumbar disc herniation in 3; 1 of the herniation cases required operative treatment, and lumbar disc degenerations was found in all participants. In lumbar disc degenerations, 8 participants had lumbar disc degeneration in the second year, with 9 in the third year, and 12 (including 5 with grade 3 degeneration) in the final year. Lumbar disc degeneration changes were irreversible. The κ value of inter-reader agreement was 0.53, with 0.78 for intra-reader agreement.

Conclusions

This prospective 4-year cohort study of 12 child and adolescent weightlifters revealed that abnormal lumbar findings occurred in all cases when assessed with MRI, and that the abnormal changes were irreversible. Regardless of the presence or absence of symptoms, resistance training at the competition level is likely to cause irreversible changes in the lumbar vertebrae.