

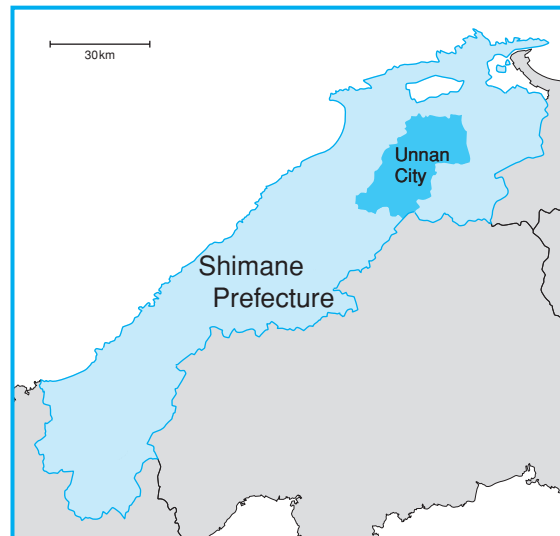
# Current Status and Prevention of Sports Injuries in Japan: From the orthopedic viewpoint

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## Introduction

In recent years we have seen a decline in exercise ability and an increase in the occurrence of lifestyle-related diseases among children in Japan, which are believed to be caused by decreases in daily exercises and insufficient participation in sporting activities. On the other hand, an increase in the incidences of sports-related trauma and injuries among children, possibly due to excessive exercise and participation in sports, has been reported. However, the actual morbidity such as the frequency and type of musculoskeletal disorders, including sports injuries in childhood, remain unclear. As part of the model project for developing and enhancing a musculoskeletal examinations system in school, the Shimane Group of “Japanese Committee of Bone & Joint Decade” carried out the following three surveys: 1) a morbidity survey of musculoskeletal disorders among schoolchildren and students, 2) a status survey of musculoskeletal examinations by school physicians, and 3) a survey of the recognition levels towards musculoskeletal disorders among school nurse teachers (called “Yogo” teachers in Japan), parents, chief teachers of physical education, and sports coaches. This paper describes the current status of sports injuries among children from elementary to high schools and discusses issues related to the prevention of such injuries based on the results of the Shimane Group’s research.



## Current Status of the Morbidity of Musculoskeletal Disorders in Schoolchildren and Students

A survey on the morbidity of musculoskeletal disorders in a total of approximately 14,000 chil-

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dren in all 35 schools (25 elementary, 7 middle, and 3 high schools) in Unnan City (population roughly 45,000), Shimane Prefecture, was conducted from 2005 to 2007, with cooperation from the city government and the Board of Education.<sup>1-3</sup> After the primary screening based on completed questionnaires, selected candidates were examined by orthopedic specialists for the secondary screening to determine the candidates for the tertiary examination.

The results found that the estimated incidence of musculoskeletal disorders as a whole was 7, 6, and 12%, in Fiscal Year (FY) 2005, FY 2006, and FY 2007, respectively. The incidences of musculoskeletal disorders by school category in FY 2005 were 4% for elementary school children, 7% for middle school students, and 26% for high school students. The corresponding rates were 3, 10, and 23% in FY 2006, and 8, 15, and 18% in FY 2007, respectively.

Among various musculoskeletal disorders in FY 2005, sports injuries accounted for 36%, scoliosis for 16%, and low back pain, lower limb deformation, and hip-joint disease for 8% each (in decreasing order). In FY 2006, sports injuries accounted for 47%, scoliosis for 16%, and lower limb deformation for 18%. In FY 2007, on the other hand, scoliosis accounted for 36%, sports injuries for 20%, and upper limb deformation for 13%.

In FY 2005, the combined proportion of scoliosis and sports injuries cases to the total cases of musculoskeletal disorders was 25% in elementary school children, whereas sports injuries alone accounted for 40 to 50% in middle and high school students. Similar trends were observed in FY 2006 and FY 2007, as well. Frequently affected sites included the spinal column, knee, and elbow.

Lastly, a comparison was made between the children who belonged to school extracurricular sports teams and those who did not. Among children in the teams, sports injury was 49% and 11% each for scoliosis and low back pain in FY 2005. On the other hand, the scoliosis accounted for 20%, sports injuries 18%, and lower limb deformation 14% among the other children. Thus, the frequency of sports injuries was significantly higher among children who belonged to extracurricular sports clubs than in those who did not. The results were similar in FY 2006 and FY 2007.

## **Status of Musculoskeletal Examinations by School Physicians**

Through collaboration with School Physicians Division of Shimane Medical Association, a questionnaire was sent to its 358 members. The status of musculoskeletal examinations by school physicians was analyzed, based on responses from 347 school physicians (response rate of 96.9%).

Three-fourths of the school physicians who returned the questionnaire were internists or pediatricians. School physicians were queried as to the implementation methods of observations of the spinal column and extremities during routine health examinations, according to methods described in "School Physician's Guide" edited by Japan Medical Association.

The results showed that more than 60% of the school physicians in this survey routinely examined the spinal column using the recommended method of examination and run the check-items for scoliosis. However, observations of the costal prominence, lumbar prominence, and backward or forward curvature of the thoracic and lumbar vertebrae were less frequent, with 50 to 60%.

Whereas 60% of school physicians inspected children for abnormalities of lower limb morphology, less than 40% examined the limitation in articular motion range and joint relaxation.

These findings suggest that examinations requiring the subject's bodily movements like forward bending or range of motions were not implemented during routine health examination, although items to be evaluated during visual inspections and thoracic examination by auscultation and percussion were usually included. Thus, current musculoskeletal examinations in school are not necessarily adequate. The insufficient examination of musculoskeletal functions is likely because most school physicians are internists or pediatricians who are not familiar with evaluations of musculoskeletal system and that a routine health examination in school have to be completed within a limited time.

## **Recognition Levels of Musculoskeletal Disorders by School Nurse Teachers, Parents, Chief Teachers of Physical Education, and Sports Coaches**

First, I will discuss the survey conducted on the

recognition levels of musculoskeletal disorders by school nurse teachers in Shimane Prefecture, which was carried out in collaboration with Physical Education Division of Shimane Prefectural Education Agency. The results obtained from 417 of the 422 school nurse teachers in the prefecture (response rate: 99%) are described below. The affiliations of these school nurse teachers and their percentages were: kindergarten (4%), elementary school (56%), middle school (24%), high school (12%), and various special education schools (3%).

It was found that 90% of school nurse teachers in the survey knew the technical terms like scoliosis, RICE therapy, baseball elbow, and Osgood disease, suggesting that they had relatively good recognition of the musculoskeletal system and its disorders. In addition, 80% of them were aware of an increase in the occurrence of bone fractures and injuries in schools. However, the actual frequencies of musculoskeletal disorders in their own schools were known to only about 60% of the school nurse teachers overall. In particular, the proportion of the school nurse teachers working in high schools who knew the data of their own school was only 40%.

On the other hand, about 40% of all the school nurse teachers, and over 50% for middle and high schools in particular, could not fully answer a child who came to them for advice about musculoskeletal disorders. Only 10% of the school nurse teachers in the survey consulted a school physician or orthopedist.

About 30% of the surveyed schools had activities concerning the prevention of musculoskeletal disorders. Only 7% of school nurse teachers believed that current screening for musculoskeletal disorders in a routine health examination was adequate, while more than 90% considered it inadequate. The reasons for inadequacy included time constraint for health examination and concerns about school physicians not being orthopedists.

Next, the results of the survey on the recognition levels of musculoskeletal disorders by 409 chief teachers of physical education, 239 sports coaches, and 2,636 parents of children attending elementary, middle, and high schools in Unnan City are described below. Less than 50% in each group knew the terms "musculoskeletal system" and "musculoskeletal disorders." Increases in bone fracture and injuries in schools were

noticed by 70 to 80% of these people, but 30 to 40% of sports coaches and 50% of parents stated that they would let children continue participating in sports even after their children had suffered sports injuries. In addition, 10 to 30% of both sports coaches and parents considered that a sports injury is largely unavoidable for winning. It also became apparent that these three groups of people hoped to have close contact with school physicians in order to obtain information about musculoskeletal disorders (i.e., the actual status, pathological conditions, treatment, and prevention) and to ask about if the need to see a specialist.

## Discussion

The results of the surveys suggest that the incidence of musculoskeletal disorders among children in schools is substantial, at 10 to 20%. In addition to problems of the spinal column and thorax, there were high incidences of sports injuries as well as other diseases and traumas mainly of the lower limbs. It was also found that an adequate system for the early detection of musculoskeletal disorders has not been established. There were also discrepancies in the recognition levels among parents, school nurse teachers, school physicians, orthopedists, and sports coaches. Additionally, systems for mutual communication and cooperation among each other were found to be insufficient.

Therefore, to prevent musculoskeletal disorders among children, including sports injuries, it will be essential to prepare and distribute educational materials that targets parents, schools, and sports coaches. Formulation of the collaboration framework among different groups people involved, as well as the development and improvement of an early detection system of musculoskeletal disorders, are also in need. To this end, it will be desirable to organize and enhance musculoskeletal examination program including preparing appropriate legislation if necessary and to take measures to promote cooperation among schools, medical facilities, and educational training programs.

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