学位論文（Thesis）の要約

岡邨　しのぶ

Injuries and disorders among young ice skaters: relationship with generalized joint laxity and tightness.
（中高生アイススケート選手における外傷と障害：関節動揺性とタイトネスとの関連）

指導教員　白倉　賢二　教授
平成 20 年入学
環境病態制御系・リハビリテーション医学

発表予定論文　Injuries and disorders among young ice skaters: relationship with generalized joint laxity and tightness

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著者名　Shinobu Okamura, Naoki Wada, Masayuki Tazawa, Toru Shimizu, Yoko Ibe, Shigeru Usuda, Kenji Shirakura

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【Synopsis of thesis】

Introduction

In recent years, skating at ice rinks has become widespread among average citizens. At the sport level of skating, the activities comprise figure skating and speed skating. In the field of figure skating, 50% of injuries are traumatic, while 50% are due to overuse. Such overuse injuries are more common in single skaters, whereas acute injuries occur more frequently among pair skaters and ice dancers [1].

The ankle is a common site of injury in figure skaters. In short track speed skaters, the two most common injuries occurring on the ice are lacerations from the knee down and ankle fractures. There is also a high incidence of low back pain among both figure and speed skaters [1-3].

However, little is known about skating injuries in young school athletes. Hence, in this study, the incidence of injuries and disorders were investigated among young school athletes, and the relationships between injury and general joint laxity and/or muscle tightness were assessed.

Materials and methods

Subjects

The participants received medical checkups with Gunma Prefecture's Amateur Sports Association for athletes competitive at the National Athletic Meet level.　The

subjects of this study were athletes with an age under 12 or over 18 were excluded. 192 junior and senior athlete skaters enrolled in the medical checkups and the data was acquired retrospectively from the charts. The subjects were inquired about complaints, the subject's present and past treatment history, the athletic event performed and the age at which the participant began skating before the examinations. All athletes also examined the degree of joint laxity and muscle tightness.

Assessments of muscle tightness

Three muscle tightness tests, the finger to the floor test, the straight leg raising test (SLR) and Heel to buttock distance (HBD) test, were performed. In each athlete, at least one positive test was defined as indicating positivity for muscle tightness.

Assessments of joint laxity

The degree of joint laxity was assessed at five joints. The simultaneous presence of joint laxity in three or more joints bilaterally was defined as generalized joint laxity.

Results

The patient demographic data is shown in Table 1.

The rates of each type and site of injury sustained while skating are shown in Figure 1. The highest rate of incidence is spinal injuries (11.9%). There was also a high incidence of lower extremity injuries in both the figure and speed skating groups, including injuries to the ankle (9.3%) and knee (8.3%) (Figure 1).

The number and site distribution of each type of injury sustain while skating are shown in Table 2.

There was a difference in the right SLR angle observed between the figure and speed skaters in this study.

Among the speed skaters, the rates of right and left knee joint laxity, SLR tightness were significantly different between the group which demonstrated enthesitis of the knee and the subjects who did not ($p < 0.05$, $p < 0.05$ and $p < 0.05$, respectively).

The athletes with at least one positive results among the three tightness tests (FFD, SLR and HBD) exhibited a significantly increased incidence of ankle ligament injury ($p < 0.01$). HBD tightness was also found to be associated with ankle ligament injury ($p < 0.05$).

Among the male athletes, the rate of low back pain was related to general joint laxity ($p < 0.05$) and at least one positive test result for muscle tightness ($p = 0.01$).

Discussion

Several previous reports have found muscle tightness and joint laxity to be risk factors for various sports injuries and disorders [4].

Previous reports have demonstrated that ligamentous and/or meniscal injuries of the knee joint are uncommon in skaters [1] [2] and our data matched those of previous reports.

One of the reasons for the difference in the right SLR angle between the figure and speed skaters is thought to be the fact that the speed skaters are only required to skate in a counterclockwise direction.

Muscle tightness itself is considered to be a risk factor for low back pain among ice skaters. Feldman et al. reported that the risk factors associated with the development of low back pain include a high, tight quadriceps femoris muscle and tight hamstrings [4]. The muscle strength, posture of skating, overuse and basic diseases are thought to be associated with the low back pain of the skating athletes, while the tightness of the hamstrings and quadriceps femoris may be related to the low back pain in male skaters.

Our data indicated that muscle tightness is associated with ankle ligament injuries. Our hypothesis is that muscle tightness in the thigh restricts the latitude of the lower legs, thereby increasing the susceptibility to ankle sprains, particularly while landing during off-ice training. The kinetic chain function might be another reason for the association of ankle sprain with muscle tightness in skating athletes.

One of the limitation of the study was that the analysis employed a cross-sectional design, and the objectives were limited to junior athletes. During this period, there is a brittleness of the connection sites of tendons to bones because of the rapid growth of their height, the tenderness of the muscles, the changes in exercise efficiency and the alignment of their frames. Because these factors are considered to be a trigger of skating disorders, both frequent medical checkups and feedback on their information are necessary to help athletes reduce their risk of injury.

In order to prevent sports injuries and disorders during the growth phase among athlete skaters, enhancing muscle coordination, rather than encouraging the attenuation of lower extremity muscle tightness, may be useful.

Conclusion

The incidence of injuries and disorders among young athletes engaged in figure and speed skating were herein summarized, and the associations between injury and muscle tightness and/or joint laxity were analyzed in this study.

The rates of low back pain and lower extremity injury were high, and the presence of muscle tightness was found to be associated with low back pain among male athlete skaters, with enthesitis of the knee frequently observed among speed skaters and with ankle ligament injuries often encountered among both types of skaters.

References

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Table 1. The patient demographic data

	Total (n=192)	Figure skating (n=33)	Speed skating (n=159)	*p*-value
Age (years)	15.4±1.8 (12-18)	14.6±1.8 (12-18)	15.5±1.7 (12-18)	p < 0.01[a]
Female (%)	52.1	87.9	44.7	p < 0.001[b]
Skating history (years)	4.4±1.6 (0-10)	3.6±1.5 (0-6)	4.5±1.6 (1-10)	p < 0.01[a]

Mean ± SD (range), a Mann–Whitney U test, b Pearson's chi-square test

Figure 1. Incidence of injuries and disorders among the skaters

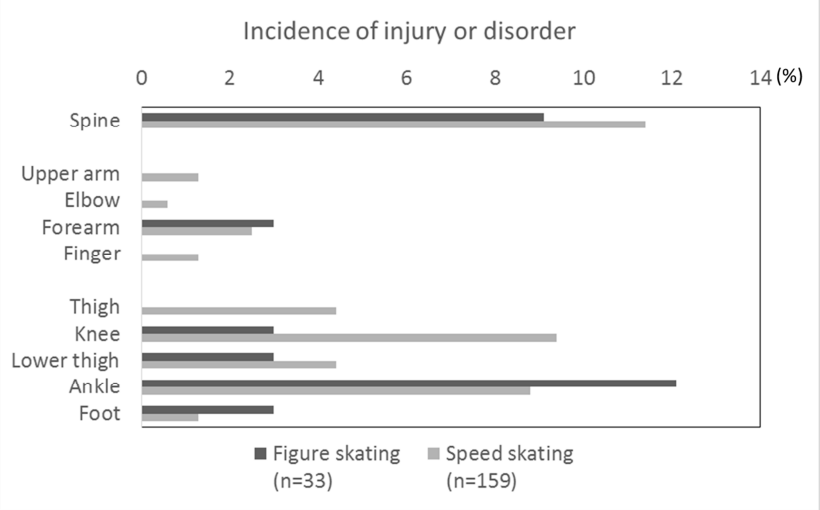

Table 2. The incidence of injuries and disorders among the skaters

	Total (n=192)	Figure skating (n=33)	Speed skating (n=159)	Site of injury or disorder: Spine	Upper arm	Elbow	Fore arm	Finger	Thigh	Knee	Lower thigh	Ankle	Foot
Fracture	19	2	17	2	2	1	5	2	3		1	2	1
Muscular injury	4		4						2		2		
Ligament injury	18	4	14							3		15	
Meniscus injury	2		2							2			
Enthesitis	11	1	10						1	10			
Tenosynovitis	1		1										1
Periostitis	8	1	7						1		6		1
Bursitis	1		1									1	
Low back pain	19	3	16	19									
Lumbar disc herniation	1		1										
Spondylolysis	4	2	2										