

Ski Sickness in Adolescents Skiers

Reza Alizadeh^{1,2}, MD; Vahid Ziaee^{*1,3}, MD; Ziba Aghsaei-Fard¹, MD; Mehrab Hojat², MD

1. Sports Medicine Research Center, Tehran University of Medical Sciences, Tehran, IR Iran
2. AJA University of Medical Sciences, Tehran, IR Iran
3. Growth and Development Research Center, Tehran University of Medical Sciences, Tehran, IR Iran

Received: Jan 22, 2008; Final Revision: May 20, 2009; Accepted: Jun 18, 2009

Abstract

Objective: There is shortage of knowledge about medical problems in adolescent skiers. This study aimed to determine frequency of medical signs and symptoms during or after ski among adolescents skiers.

Methods: This cross sectional study was performed in 12 consecutive weekends in winter 2005 at Dizin ski resort in Iran. All adolescent skiers (<16years) who had entered the resort during this time period were enrolled in the study. A questionnaire including demographics, duration of transport to the resort, wearing glasses and contact lenses for medical and non medical applications, duration and frequency of skiing and development of signs and symptoms of ski sickness during or after skiing was filled for each participant. In addition, association of mentioned variables with medical problems was investigated.

Findings: Of 162 skiers, 111 subjects (68.5%) were males. The mean age of the participants was 14.7±2.1 years. Of them, 127 skiers wore glasses or lens during skiing. Visual disorders including myopia, hyperopia and astigmatism were found in 24 (14.8%) skiers. Our study showed that the frequency of main ski-related signs and symptoms varies from 0 to 10.5%. There was significant association between occurrence of signs and symptoms and presence of visual disorder ($P=0.015$).

Conclusion: Our results showed that development of ski-related signs and symptoms is relatively frequent. These signs and symptoms have association with minor ophthalmologic problems such as myopia or astigmatism.

Iranian Journal of Pediatrics, Volume 19 (Number 4), December 2009, Pages: 409-412

Key Words: Ski sickness; Ski; Visual disorder; Vestibular disorder

Introduction

Ski is a popular sport all over the world. This popularity raises more attention to the

medical aspects of this sport. It has been shown that some skiers suffer from medical symptoms during or after ski especially downhill skiing. Turning motions of skis, the

* Corresponding Author;

Address: No 7, Sports Medicine Research Center, Al-e-Ahmad Freeway, Tehran, IR Iran

E-mail: ziaee@tums.ac.ir

lack of oxygen in higher altitudes and altitude illness including headache, vertigo and acute mountain sickness can result in some symptoms in ski athletes^[1,2,3]. Accordingly a new term was defined by Huesler in 1995^[1] as "ski sickness". He described a sickness in skiers including dizziness with delusional rotatory or pendular sensations and imbalance accompanied by nausea and occasionally vomiting. The clinical and pathophysiologic features of ski sickness are markedly different from those of acute mountain sickness. It is a special form of motion sickness which is produced by unusual and contradictory sensory information between the visual, vestibular and somato-sensory systems^[6]. However, exact definition and diagnostic criteria of ski sickness have not yet been established. Moreover, at present there is shortage of knowledge about medical problems in skiers particularly in adolescent skiers. Thus, in this study we aimed to determine the frequency of non injury-related medical problems in adolescents skiers.

Subjects and Methods

A cross sectional study was performed during 12 consecutive weekends in winter 2005 at Dizin skiing resort. Dizin is the largest ski resort in the Middle East and is situated near Tehran, the capital of Iran. This resort is an international and standard resort in Iran established in 1969.

The highest and lowest points of the field are located respectively 3050 m and 2550 m above the sea. In this period, all adolescent skiers (aged <16 years) including both recreational and professional skiers who entered the Dizin Ski resort were enrolled in the study. The study protocol was approved by the Ethics Committee of Tehran University of Medical Sciences and after explaining the study design and objective for the adolescents and their parents, we obtained their verbal consent. Sample size was calculated based on Ballester and Hausler study^[4] which showed the estimated incidence of 10% for vestibular symptoms in skiers. By considering $\alpha < 0.05$ and power of 80%, the calculated sample size was 160.

A questionnaire including demographics, duration of transport to the resort, wearing glasses and contact lenses for medical and non medical applications, duration and frequency of skiing and development of signs and symptoms during or after skiing was filled for each participant. The questionnaire was filled by trained physicians who took history and performed examination before and after skiing.

The software statistical package for the social sciences (SPSS, version 11.5) was used for statistical analysis. The relation between categorical variables (sex, presence of visual disorder, and wearing glasses for medical and non medical applications) and ski sickness was assessed by chi square. Independent samples *t*-test was used to analyze numerical variables (age, duration and frequency of skiing and duration of transport to the ski resort). *P* values less than 0.05 were considered statistically significant.

Table 1: Frequency of wearing glasses and contact lenses for medical and non-medical applications in adolescents skiers

Type of instrument	Routine wearing	Wearing during ski
Medical Contact lens for medical application	1 (0.6%)	1 (0.6%)
Non-Medical contact lens	2 (1.2%)	0 (0)
Glasses for medical application	15 (9.3%)	7 (4.3%)
Sport glasses	55 (34%)	110 (67.9%)

Findings

During this period, 162 consecutive adolescent skiers entered the study. Among the subjects, there were 111 (68.5 %) males. The mean age of the cases was 14.7 ± 2.1 years. 127 (78.4%) individuals wore glasses (either for medical or non medical application) during skiing (Table 1). None of the participants had hearing assistive devices. Visual disorders were found in 24 (14.8%) cases as follow; myopia (n=10, 41.7%), hyperopia (n=8, 33.3%) and astigmatism (n=6, 25%).

Upper respiratory tract infectious were found in 8 (4.9%) of skiers, one of whom had taken antihistamine agents. Frequency of developed signs and symptoms in skiers is shown in Table 2. As the table shows, nystagmus was the most frequent sign, observed in 17 (10.5%) skiers. Comparison of descriptive variables for symptomatic and non-symptomatic skiers is demonstrated in table 3. There was significant association between presence of visual disorders and development of medical problems.

Table 2: Frequency of developed signs and symptoms in adolescents skiers

Signs and symptoms	Frequency (%)
Nystagmus	17 (10.5)
True vertigo	5 (3.1)
Headache	4 (5.1)
Imbalance	4 (2.5)
Tinnitus	2 (2.5)
Dizziness	2 (1.2)
Nausea	1 (0.6)
Visual disturbance	0 (0)
Vomiting	0 (0)

Discussion

This study aimed to evaluate signs and symptoms in adolescent skiers during skiing. Ski sickness is a new term which has been introduced in recent years. It occurs in

susceptible individuals (especially those with myopia or astigmatism) when visual, vestibular and peripheral sensory information is conflicting. Symptoms are dizziness with rotatory or pendular sensations, nausea and vomiting. Development of these signs and symptoms are related to the inner ear organs which are used to maintain postural balance during skiing^[1]. Previous studies demonstrated that development of these signs and symptoms occurs relatively frequently and is mostly associated with minor ophthalmologic disorders such as myopia or astigmatism and altered somato-sensory input due to wearing ski boots and skis. Our study showed that the frequency of main ski-related signs and symptoms varies from 0 to 10.5%. This ratio in all skiers (adults and adolescents) was 3.6%-16.5% in our previous study^[6]. Our results showed that vomiting and visual disturbances are rare while nystagmus is a common sign. Similar to previous study by Hausler^[1], our results revealed that presence of visual disorders is associated with development of ski sickness. It seems that nystagmus and vertigo are the main criteria for ski sickness, while headache is not a main criterion, because this symptom is also common in mountain sickness. However, there are difficulties in differentiating these sicknesses, because they have similar signs, symptoms and etiology. Other variables such as age, sex, duration of transport to the resort and wearing glasses for medical application were not related to ski sickness. Skiing and sickness had the same frequency.

Regarding the effect of wearing glasses for medical application, our results are in contrast to previous study which showed significant association between wearing glasses for medical application and occurrence of ski sickness in adults^[6]. However, other findings in our study, particularly frequency of developed signs and symptoms, are similar to what have been reported in adult skiers.

Our study shows the importance of ophthalmologic examination in adolescents who have the sickness. Also it seems that frequency of skiing should be considered as an effective factor especially in adolescents who have ski sickness.

Table 3: Comparison of variables in symptomatic and non-symptomatic adolescents skiers

Variables	Symptomatic skiers	non-symptomatic skiers	P-value
Age(mean±SD)/years	14.4±2.7	14.7±2	0.5
Duration of skiing/hours (mean±SD)	1.94±1.5	2.21±1.88	0.3
Frequency of skiing (meant±SD)	3.5±1.8	4.6±3.9	0.09
Transport duration (mean±SD)/hours	2.7±1.3	2.21±1.88	0.4
Sex (male)	22(80.5%)	89(71%)	0.4
Routine wearing glasses for medical application (positive)	5(28.5%)	11(16.1%)	0.1
Wearing glasses for medical application during ski (positive)	4(22.8%)	4(7.5%)	0.2
Visual disorders (positive)	8(38.5%)	16(10.2%)	0.015

The limitation of this study was, like in previous studies, not having the possibility to differentiate some probable overlaps of signs and symptoms of ski sickness and acute mountain sickness.

Conclusion

It seems that ski sickness is independent from motion sickness in spite of their similarity. Nystagmus and vertigo are the main criteria for ski sickness. This study revealed some factors associated with ski sickness however; more studies are required to develop diagnostic criteria and other risk factors of ski sickness in both adults and adolescents.

Acknowledgment

This study was approved and funded by Sports Medicine Research Center and Vice Chancellor for Research of Tehran University of Medical Sciences (grant No. 2006). Authors would like

to thank all skiers who volunteered for this study.

References

1. Hausler R. Ski sickness. *Acta Oto-Laryngologica*. 1995;115(1):1-2.
2. Noe F, Paillard T. Is postural control affected by expertise in alpine skiing? *Br J Sports Med*. 2005;39(11):835-7.
3. Frank BC. Risk of injuries, symptoms of excessive strain and preventive possibilities in cross country skiing. A comparison between classical technique and skating technique. *Sportverletzung Sportschaden*. 1995;9(4):103-8.
4. Ballester M, Hausler R. Ski sickness. *Sci Sports*. 2001;16(5):272-4.
5. Smart LJ, Stoffregen TA, Bardy BG. Visually induced motion sickness predicted by postural instability. *Human Factors*. 2004; 44(3):451-65.
6. Ziaee V, Alizadeh R, Fallah J, et al. Frequency of medical symptoms in Iranian skiers. *Journal of Medical Council of Islamic Republic of Iran*. 2006;24(4):405-11. (Persian)