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Prevalence of joint hypermobility syndrome amongst dental students of the Medical University of Lublin

Abstract

Introduction. The joint hypermobility syndrome is a connective tissue disorder affecting the entire organism. The symptoms include laxity of joint-stabilizing capsules and ligaments, excessive joint mobility and other accompanying symptoms. Some symptoms manifest in the oral cavity, which is of importance to dentists.

Aim. The authors attempted to determine the prevalence of joint hypermobility syndrome in the population studied.

Material and methods. The questionnaire study was conducted amongst students of the Faculty of Medicine with Dentistry Division, Medical University of Lublin. The study population consisted of 321 individuals, including 283 Polish students and 37 students of south-eastern nationalities (Saudi Arabia, Taiwan).

Results and conclusions. The prevalence of constitutional hypermobility amongst dental students is comparable to that reported in literature. Constitutional hypermobility is more common in students of south-eastern nationalities than in Polish students.

Keywords: joint instability, joint laxity, dentistry.

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INTRODUCTION

The joint hypermobility syndrome (JHS), also called the benign joint hypermobility syndrome, first described by Kirk, Ansel and Bywaters [1], is a genetically inherited connective tissue disorder that manifests in the connective tissue-containing organs. The characteristic symptoms of JHS affect the musculoskeletal system and include laxity of joint-stabilizing capsules and ligaments, excessive mobility of joints predisposing to arthralgia, soft tissue injuries, and joint instability [2]. The syndrome is diagnosed using the modified Beighton scale consisting of five tests (Table 1).

Each positive manoeuvre scores 1 point; a score of 4 points or more indicates joint hypermobility in adults.

TABLE 1. Modified Beighton scale.

		Right side	Left side
1	Passive hyperextension of the fifth finger $\geq 90^\circ$	1	1
2	Passive apposition of the thumb to the flexor aspect of the forearm	1	1
3	Passive hyperextension of the elbow	1	1
4	Passive hyperextension of the knee	1	1
5	Active forward flexion of the trunk with the knees fully extended and the palms of hands resting flat on the floor	1	

The Brighton scale was used to determine the most common major and minor diagnostic criteria (Table 2).

TABLE 2. Brighton criteria.

Major	
1	Score $\geq 4/9$ (current or past)
2	Arthralgia in 4 or more joints lasting for more than 3 months
Minor	
1	Score = 1, 2 or 3/9 (0, 1, 2, 3 in individuals > 50 years of age)
2	Arthralgia in one to three joints (≥ 3 months) or back pain (≥ 3 months), spondylosis, spondylolysis/spondylolisthesis
3	History of dislocation, subluxation in more than one joint or on more than one occasion
4	Rheumatism of soft tissues, ≥ 3 lesions (e.g. epicondylitis, tenosynovitis, bursitis)
5	Marfanoid habitus, arachnodactyly (positive Steinberg sign/wrist sign)
6	Skin abnormalities – striae, hyperextensibility, thin skin, papyraceous scars
7	Ocular signs: eyelid drooping, myopia, antimongoloid slant
8	Lower limb varices, hernia, uterine or rectal prolapse
The joint hypermobility syndrome is diagnosed in the presence of two or more major, one major and two minor or four minor criteria. Two minor criteria are sufficient when a first-degree relative has been diagnosed with JHS	

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The joint hypermobility syndrome is diagnosed in the presence of two or more major criteria, or one major and two minor criteria. Two minor criteria suffice to diagnose JHS if a first-degree relative has been diagnosed with it [3]. JHS is of interest to dentists as it can affect the development of functional disorders of the masticatory system, which was confirmed by De Coster et al. and Kavuncu et al. [4,5].

AIM

The aim of the present study was to determine the joint hypermobility syndrome in the population studied.

MATERIAL AND METHODS

The questionnaire study was conducted amongst dental students of the Medical University of Lublin. The study encompassed 319 students, including 227 (71.2%) females and 92 (28.8%) males. The mean age of respondents was 22.6 ± 2.3 years. The majority of respondents were Polish students – 283 (88.7%), followed by Taiwanese students – 31 (9.7%) and Arab students – 5 (1.6%); 275 (86.2%) respondents were Caucasian, 34 (10.7%) Asian and 10 (3.1%) were classified as „the other race” due to a small number. The study population included 42 (10.7%) first-year students, 39 (12.2%) second-year, 73 – third-year, 73 fourth-year and 92 (28.8%) fifth-year students. The modified Beighton score was used to diagnose the joint hypermobility syndrome (Table 3).

TABLE 3. Characteristics of the study population n=319.

females	227 (71.2%)
males	92 (28.8%)
age in years	22.6 ± 2.3
Polish	283 (88.7%)
Taiwanese	31 (9.7%)
Arabian	5 (1.6%)
Caucasian	275 (86.2%)
Asian	34 (10.7%)
another race	10 (3.1%)
first-year	42 (10.7%)
second-year	39 (12.2%)
third-year	73 (22.9%)
fourth-year	73 (22.9%)
fifth-year	92 (28.8%)

RESULTS AND DISCUSSION

Our findings revealed that the percentages of male and female students with joint problems were not statistically significantly different. In contrast, Al-Rawi et al. performing their study among 1774 students aged 20-24 years using the Beighton score found that the incidence rate of joint hypermobility was higher in women (38.5%) than in men (25.4%) [6]. Similar results were reported by Scher et al. (the incidence rate quotient for women – 0.15 whereas for men – 0.04)[7].

The mean age of individuals with hyperextension of the left knee was 23.4 ± 2.7 years while of those without this problem was – 22.5 ± 2.3 years; the differences observed were statistically significant ($t=2.14$; $df=317$; $p=0.03$). Similar differences were also found for the right knee. The mean age of students who could rest their palms on the floor during forward flexion of the trunk with knees fully extended was 22.2 ± 2.1 years and in those who could not perform the manoeuvre was 23.1 ± 2.5 years; the differences were statistically significant ($t=3.67$; $df=317$; $p=0.0003$).

Scores for passive apposition of both the left and right thumb to the forearm were statistically significantly different in groups of Polish, Taiwanese and Arab students. The percentages of respondents capable of performing that manoeuvre were 23.3%; 61.3%; 80.0% ($\chi^2=26.88$; $df=2$; $p=0.001$) for the left thumb and 23.7%; 58.1; 80.0% ($\chi^2=20.8$; $df=2$; $p=0.003$) for the right thumb, respectively.

Hyperextension of the metacarpophalangeal joint beyond $>90^\circ$ in the left and right hand was not found in Arab students; its incidences in Taiwanese and Polish students were 35.5% and 10.6% for the left joint and 29.0% and 11.0% for the right joint ($\chi^2=16.3$; $p=0.003$ for the left joint and $\chi^2=9.1$; $p=0.01$ for the right joint).

Moreover, statistically significant differences in percentages of students with left knee hyperextension were observed. The percentages found were 9.2% of Polish students ($n=26$) and 25.8% of Taiwanese respondents ($n=8$); the differences were statistically significant ($\chi^2=7.4$; $p=0.02$).

Furthermore, statistically significant differences were observed in percentages of students of various races with passive apposition of the left and right thumb. The incidence of the above problem was significantly higher in the Asian and “other” race (Black, American Indian/Eskimo) groups compared to Caucasian students. The percentages were 55.9%; 70.0%; 22/9% for the left thumb ($\chi^2=22.8$; $df=2$; $p=0.0001$) and 52.9%; 70.0%; 23.3% for the right thumb, respectively ($\chi^2=20.1$; $df=2$; $p=0.0004$).

Joint hypermobility was statistically significantly correlated with:

- Age.

The univariate analysis of variance ANOVA showed that the age of students statistically significantly affected the extent of joint hypermobility ($F=3.37$; $df=2$; $p=0.04$). The mean age of students without joint hypermobility was 22.6 ± 2.4 years; medium hypermobility was observed in 60 respondents whose mean age was 22.2 ± 2.4 years while severe hypermobility was found in 32 individuals whose mean age was 23.5 ± 2.2 years. Statistically significant differences were observed between the mean ages of students with severe versus medium hypermobility (the Scheffe’s test). (Table 4) (Figure 1) Czaprowski studied the incidence of joint hypermobility syndrome amongst 155 Caucasian girls with idiopathic scoliosis (aged 9-18 years) using the Beighton score; the control group consisted of 201 healthy girls. The incidence of joint hypermobility syndrome was significantly lower ($P=0.01$) in girls with idiopathic scoliosis aged 16-18 years compared to younger individuals (9-15) [8]. According to Kwon et al. studying the group of healthy young Korean girls (6-12 years of age) and the group of women (25-50 years), joint hypermobility syndrome was present in 50%

of individuals (335/750) and was more common in girls (58.9%, 238/404) than in women (36.5%, 97/266). The extent of joint hypermobility (the Beighton score ≥ 4) was inversely correlated with age ($p < 0.05$) and significantly higher in girls than in women ($R = -0.165$ ($p = 0.001$) for girls, -0.143 ($p = 0.029$) for women)[9]. The literature data indicate that the incidence of joint hypermobility syndrome and Beighton scores decrease with age [10]. Our divergent findings can suggest that age differences in the study population were too small and resulted in the higher mean age of students with severe joint hypermobility syndrome compared to the mean age of those without the syndrome.

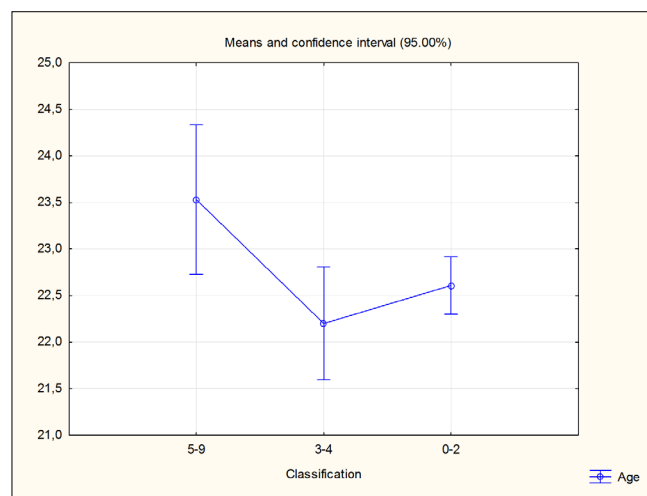


FIGURE 1. Mean ages of students in individual categories of joint hypermobility.

TABLE 4. Relationship between hypermobility and age (the Scheffe's test).

Classification	Scheffe's test; variable(questionnaire results) statistically significant at $p < 0.05000$		
	Group 1 M=23,531	Group 2 M=22,200	Group 3 M=22,608
Group 1		0,036286	0,116269
Group 2	0,036286		0,4897
Group 3	0,116269	0,4897	

Group 1: 5-9 points in Beighton scale

Group 2: 3-4 points in Beighton scale

Group 3: 0-2 points in Beighton scale

- Nationality of students.

Higher percentages of students without joint hypermobility were observed amongst Polish (74.2%) and Arab individuals (60.0%); medium hypermobility was more common in Arab and Taiwanese students (40.0% and 25.8%, respectively) whereas severe hypermobility was mainly observed in Taiwanese respondents (29.0%). The incidence of severe syndrome in Polish students was 8.1%; no such cases were found in Arab students ($\chi^2 = 15.1$; $df = 4$; $p = 0.004$) (Figure 2).

- Race of students.

The incidence of severe and medium joint hypermobility was statistically significantly higher in Asian students ($\chi^2 = 10.6$; $df = 4$; $p = 0.03$) (Figure 3).

Scher and colleagues conducted their epidemiological study in soldiers; contrary to our findings, they demonstrated

that the incidence rate quotient amongst Caucasian members of the Defense Medical Database was 1.44 compared to 1.34 amongst the remaining members and was higher ($p = 0.0006$) than that in Black members of the above Database [7]. Moreover, according to Klemp et al., the incidences of joint hypermobility syndrome were 6.2 for the Maoris (9.0 for women, 2.2 for men) and 4.0 for the Europeans living in New Zealand (5.6 and 1.9) [11].

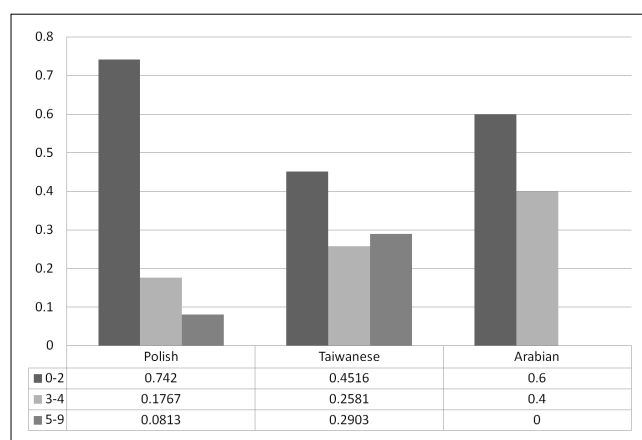


FIGURE 2. The extent of joint hypermobility amongst students of different nationalities.

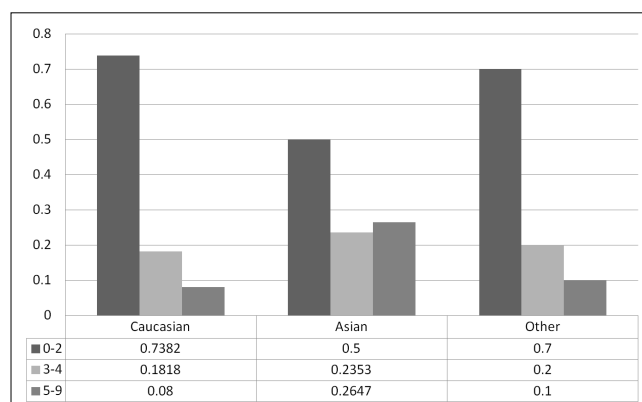


FIGURE 3. The extent of joint hypermobility according to race.

CONCLUSIONS

1. The prevalence of joint hypermobility syndrome in dental students is comparable to that reported in literature.
2. Severe and medium joint hypermobility is statistically significantly more common in Asian students.
3. Percentages of male and female students with joint disorders are not statistically significantly different.
4. Age is the variable significantly affecting the extent of joint hypermobility.

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