

EFFECTS OF HYPERMOBILITY ON SCHOBER TEST AND CHEST EXPANSION SCORES

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ABSTRACT

Aims: Hypermobility is a condition which increases the joint mobility range. Beighton method is used in diagnosis of hypermobility. Schober test and chest expansion measurement are frequently used to evaluate mobility of spine and expansion ability of chest in ankylosing spondylitis volunteers. In this study, it is aimed to investigate the impact of hypermobility on Schober test and chest expansion.

Methods: The data of 300 healthy volunteers aged between 18 and 32 was collected. Beighton score, chest expansion and Schober score of all volunteers were measured and statistically analyzed using SPSS. Student's t-test was performed to compare both groups. As for descriptive statistics, mean \pm standard deviation and numbers were used.

Results: One hundred twenty-two cases having Beighton score of 4 and above included in hypermobility group while 178 cases under 4 served as control group without hypermobility. No significant relation in terms of chest expansion and Schober score was found out between groups. There was a slight positive correlation between Beighton score and Schober score in whole group. In male population, both test scores had a correlation with Beighton score while only chest expansion had correlation in female population.

Conclusion: Although Beighton score seemed to have no effect on Schober or chest expansion scores in between group comparisons, correlation analysis revealed that hypermobility may affect the scores, especially in males.

Keywords: Young adult, joint instability, ankylosing spondylitis

INTRODUCTION

Hypermobility is a frequently encountered condition which is characterized by hyperelasticity of soft tissues that increases the joint mobility range as a consequence. The prevalence of joint hypermobility is 20-26% in the overall population (1, 2). 6-57% of females and 2-35% of male population have hypermobility (3).

Schober test is a method to evaluate the lumbar mobility while chest expansion is a method to evaluate the thoracic wall mobility (4). Both of these measurement methods are frequently used to evaluate mobility of spine and expansion ability of chest in ankylosing spondylitis volunteers.

Ankylosing spondylitis decreases the tissue elasticity especially of the bone tissue, whereas hypermobility

increases it. Therefore, it may be rational to keep in mind that standards of these tests might change due to the differences in the ability of soft tissues to expand.

The aim of this study is to determine whether there is a difference in Schober test and chest expansion scores between hypermobile and non-hypermobile healthy people.

MATERIAL AND METHODS

This study was approved by Trakya University Faculty of Medicine Scientific Researches Ethics Committee. The post hoc power of this study was calculated as 0.94 based on the lowest correlation coefficient ($r=0.202$) with an alpha of 5% level and $n=307$. 307 healthy people aged between 18 and 32 participated in

this study between 24th of July and 16th of October 2017. Their data was collected in Trakya University Physical Medicine and Rehabilitation Department. Demographic data including age, BMI, sex was collected first. Then Beighton score, chest expansion and Schober scores were measured and evaluated.

Table 1: Criteria of Beighton score (5)

The ability to:	Right	Left
Dorsiflex the 5th metacarpal joint to > 90°	1	1
Oppose the thumb to the volar aspect of the ipsilateral forearm	1	1
Hyperextend the elbow to > 10°	1	1
Hyperextend the knee to > 10°	1	1
Place hands flat on the floor without bending the knees	1	
TOTAL	9	

Beighton score is a method to quantify hypermobility. Nine criteria which are shown in Table 1 are used and if the score is 4 and more out of 9, the volunteer is accepted as hypermobile (5).

Measuring the chest expansion is an anthropometric method used to evaluate chest wall mobility and if the measurement is <5 cm, it is used for the diagnosis of ankylosing spondylitis (6). The examiner measures chest expansion at the maximum inspiration and maximum expiration at the 6th rib level and notes the gap in centimeters.

Schober score is an anthropometric method used to assess ability of lumbar flexion (7). To measure Schober Test, participant stands erected and examiner determine L4-5 level of spine by drawing a horizontal line across crista iliaca. Then, examiner marks 10 cm above the midpoint. While the volunteer is in maximal lumbar flexion, examiner measures the distance between the two spots in centimeters. If the difference is less than 5 cm, it might be a sign of ankylosing spondylitis.

Student's t-test was performed to compare both groups regarding the findings obtained from the measurements. As for descriptive statistics, mean \pm standard deviation numbers and percentages were used. Spearman correlation test was used to determine correlations.

RESULTS

This study was conducted among 307 participants and 7 participants dropped out due to missing data. Therefore, 300 participants were analyzed in the study. 142 (47.3%) of the participants were male and 158 (52.7%) were female. The maximum age of the participants was 32 and minimum 18. The mean age was 21.07 ± 2.53 .

One hundred twenty-two cases were included in hypermobility group while 178 cases served as control group without hypermobility according to Beighton scoring. The mean age of control group was 21.09 ± 2.46 and hypermobility group was 21.03 ± 2.66 . Control group and hypermobility group were not statistically different regarding BMI and age ($p > 0.05$) (Table 2).

Table 2: Comparison of two groups in terms of demography and study parameters

	Hypermobility Group	Control Group	P Value
Age	21.03 ± 2.66	21.09 ± 2.46	$P > 0.05$
Sex (n)	Female: 80	Female: 78	—
	Male: 42	Male: 100	
BMI	22.5079 ± 3.52	22.7142 ± 3.39	$P > 0.05$
Schober Test	6.221 ± 2.49	5.812 ± 2.66	$P > 0.05$
Chest Expansion	5.46 ± 1.94	5.18 ± 2.15	$P > 0.05$

No significant relation in terms of chest expansion and Schober score was found out between groups ($p > 0.05$) (Table 2). There was a slight positive correlation between Beighton score and Schober score in the whole group ($r = 0.118$, $p = 0.04$). In male population both test scores had a positive correlation with Beighton score ($r = 0.20$, $p < 0.05$) ($r = 0.23$, $p < 0.01$) while only chest expansion had correlation with Beighton score in female population ($r = 0.229$, $p < 0.05$) (Table 3).

Table 3: Correlation of Schober test and chest expansion scores with Beighton score

	Beighton score		
Schober score	Female:	$P > 0.05$	$r: -0.028$
	Male:	$P < 0.01$	$r: 0.231$
Chest expansion	Female:	$P < 0.05$	$r: 0.229$
	Male:	$P < 0.05$	$r: 0.202$

DISCUSSION

It is known that joint hypermobility has an important prevalence. Leslie et al. (1) reported that prevalence

of joint hypermobility as 26.2% overall and in this study, 36.7% of female volunteers and 13.7% male volunteers had joint hypermobility. In another study Oddy C et al. (2) reported that prevalence of joint hypermobility is 20%. A review by Remvig et al. (3) reported that prevalence of joint hypermobility for women was 6-57% and for men was 2-35%. In our limited study, prevalence of joint hypermobility was 40.6% overall and while 50.6% of women had joint hypermobility, only 29.5% of men did. This study revealed that hypermobility is a significantly frequent situation which affects especially female population as shown similarly in the previous studies.

Ankylosing spondylitis a disease which limits spinal and chest wall mobility and the tests which are used in the diagnosis of this disease were included. However, being hypermobile may theoretically affect the measurement outcomes so called normal. This may confound the discriminative ability between normal and pathological during the interpretation of the results.

In our study, the relation of these measurement methods with hypermobility according to Beighton scores was investigated in 300 healthy volunteers. Even though there was difference in the expected direction between groups, the difference did not reach to a statistically significant value.

On the other hand, there was a slight positive correlation between Beighton score and Schober score in whole group. In male population, both test scores had a correlation with Beighton score while only chest expansion correlated with Beighton score in female population. Therefore, if more volunteers had been included in the study, the mean difference between groups might have been statistically significant.

Further studies which have different cut-off values for discriminating normal and pathologic of elasticity measures in hypermobility or non-hypermobility volunteers, are needed to completely reveal the situation.

As a conclusion, although Beighton score seemed to have no effect on Schober or chest expansion scores in between group comparisons, correlation analysis revealed that hypermobility may affect the scores, especially in males. Further studies which have different cut-off values for discriminating normal and pathologic of elasticity measures in hypermobility or non-hypermobility volunteers, are needed to completely understand the situation.

Ethics Committee Approval: This study was approved by Scientific Researches Committee of Trakya University School of Medicine.

Informed Consent: Verbal informed consent was obtained from the participants of this study.

Conflict of Interest: The authors declared no conflict of interest.

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