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Evaluation of Hallux Valgus Deformity among Medical Student : A Cross-Sectional Study

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Abstract

Research Article

Hallux valgus (HV) deformity is one of the most prevalent orthopedic foot disorders in the world; It occurs as a result of the lateral deviation of the great toe and medial deviation of metatarsophalangeal joint I (MTP). Many factors such as neuromuscular diseases, familial transition, wrong shoe choice and systemic diseases play a role in HV etiology. The treatmalet and follow-up process of HV, which has negative effects on walking and quality of life when not treated, varies in different populations. The aim of our study is to determine the rate of HV in the young population and to determine the effect of factors such as wrong shoe choice and excess body weight. We conducted measuremalets on 300 students (120 male, 180 female) studying at the Faculty of Medicine of Sakarya University. The average age of the students was found to be 19.87 ± 1.55 (ss). Percentages of students' right foot HV angles; While 94 % mild type HV angle was determined as 6 % moderate type HV angle, severe type HV angle was not found in both sexes. According to the results of the study, it was concluded that that the pain intensity and loss of function related to HV were higher in female depending on the shoe preference. Surgical treatmalet of HV affects the physical appearance of individuals as well as negatively affects quality of life due to pain and loss of function, is a difficult process. Therefore, conservative treatmalet should be the primary choice. Careful evaluation of social parameters that are part of conservative treatmalet; will contribute positively to physicians and physiotherapists.

INTRODUCTION

Although Hv, which was first described[1] by Carl Huster in 1871, is expressed as the angle widening of the big toe; it also contain many pathological conditions such as varus deformity, bunion, medial protrusion, sesamoid subluxation and is a complex orthopedic deformity[2,3].

Although the term bunion is often used for HV, bunion is not an accurate expression. The correct use of the used bunion should be in the form of painful swelling occurring in the medial of os metatarsale I following subluxation. The usage accuracy of the term Bunion is important in HV definitions because there are also HV cases without bunion[4]. If bunion is present; with the pressure of the shoes used on this area, severe pain and inflammation occur in the bursa[5].

HV etiology is divided into two groups: instrinsic and extrinsic. The use of narrow / wrong shoes is the primary among extrinsic reasons[7-9]. There are important studies showing the effects of wrong shoe selection on HV formation[10]. Instrinsic causes constitute a wide spectrum[11]. Instrinsic factors are shown as the cause in juvenile and rare congenital HV cases[12]. Although HV is thought to be genetically transitive, there is no scientific data to prove it[6].

There is no accepted standard in the HV classification. Looking at the literature, the classification of angular values is completely relative.

The classifications, made, do not go beyond being a general guide for qualifying mild, moderate and severe deformities to determine the treatmalet option of the physician during the treatmalet planning phase. Therefore, there are many HV angular classifications.The most commonly used of these classifications was created by Mann and Coughlin depending on the HV angle degrees; It is a classification that is defined as mild under 20 degree, moderate between 20-40 degree and severe HV deformity above 40 degree[12]. There are three types of HV groups according to Pigoot classification. These; MTP I joint is subluxated " subluxation type HV ", HV angle is above normal " deviated type HV " and HV angle is between 15-28 degrees " compatible type HV " (accepted as normal by Hardy and Clapham angle value)[13].

With the classification created by Lindgren and Turan in 1987, they divided the HV deformity into six groups according to clinical severity, grade I, II and MTF I joint

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deformity changes observed in radiographic images[14].

The aim of our study is to determine the frequency and severity of HV deformity, which is generally expected to be seen in the elderly population, by using the Mann and coughlin classification technique, and to raise awareness of the extrinsic parameters that cause HV, and to raise awareness to the society in conservative measures.

MATERIALS and METHODS

Ethical approval

Our study was started after obtaining the necessary consent and approval from the Non-Interventional Ethics Committee of Sakarya University Faculty of Medicine (approval of the ethical committee dated 17.12.19 and numbered 396) and the voluntary approval form from the participants.

Individuals

This study was carried out with goniometric measuremalets on 300 randomly selected students from Sakarya University Medical Faculty to determine the frequency of HV among Medical Faculty students.

Goniometric measuremalets; when the person is in an anatomical position; If one arm of the goniometer is proximal phalanx, the other arm of the goniometer was made by placing it on the os metatarsale I and placing the pivot point metatarsophalangeal joint[18] (Figure 1).

Figure 1. Measuremalet of angular severity of hallux valgus using goniometer

The goniometric measuremalet degrees obtained were evaluated as mild, moderate and severe according to the scale created by mann and coughlin. According to this scale, if the goniometric measuremalet value is less than 20 degrees, it is defined as mild HV deformity, if it is between 21-40, it is moderate HV deformity and if it is more than 40 degrees, it is defined as severe HV deformity[12] (Table 1).

Table 1. Evaluation of HV deformity severity according to angular degree (Mann and Coughlin classification) (HVA: Hallux valgus angle)

Severity	Degree
Mild	<20°
Moderate	20°-40°
Severe	>40°

Creating social function parameters of individuals before goniometric measuremalet; physical properties, family HV history, body mass index values and information such as whether they wear suitable shoes or not; The evaluation questionnaire we created using some of the sub-parameters of SF-36 was filled by the participants (Table 2).

Table 2. Social function sub-parameter evaluation survey

SOCIAL FUNCTION SUB-PARAMETER EVALUATION SURVEY			
1. How many shoes do you wear ?			
2.What type of shoes do you usually prefer ?	A) Sport	B)Other	
3.Do you have a history of hallux valgus deformity in your family ?	A)Yes	B)No	
4.What time of day do you prefer to buy shoes?	A)Morning	B)Noon	C)Evening
5.Would you prefer shoes that are smaller than your feet?	A)Yes	B)No	
6.Is there pain in the inner part of the 1st metatarsophalangeal joint of your foot?	A)Yes	B)No	
7.Is there a limitation of function on your great toe?	A)Yes	B)No	

In the statistical analysis of the data obtained at the end of the study, arithmetic mean and standard deviation were calculated using SPSS for Windows Versiyon 21.00 (SPSS Inc., Chicago, IL., USA) program. Pearson's chi-squared test (Pearson's chi-squared test) was used to examine the relationship between the data. Statistical significance level was accepted as $p < 0.05$.

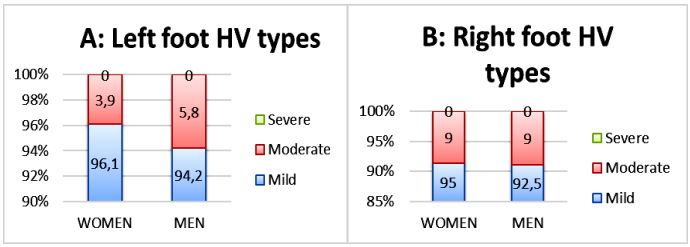
RESULTS

After goniometric measuremalets, there were no significant difference between right and left foot goniometric angle measuremalets. In the comparison between the genders, there were no difference with the value of "p" as 0,843 for the right

foot and 0,927 for the left foot.

According to the data obtained from left foot goniometric measuremalets (p= 0.711), no severe HV deformity (>40°) was detected in any of our participants according to Mann and coughlin classification. Mild type HV deformity (<20°) was 96.1 % in female and 94.2 % in male. Moderate type HV (between 20^0 and 40^0) was 3.9 % in female and 5.8 % in male (Graph 1a).

With the data we obtained from the right foot goniometric measuremalets (p= 0.674), none of our participants had severe HV deformity (>40°). Mild type HV deformity (<20°) was 95 % in female and 92.5 % in male. Moderate type HV (between 20^0 and 40^0) was 9 % in female and 9 % in male (Graph 1b).



Graph 1. Percentages of HV types by sex. (A: Left foot B: Right foot)

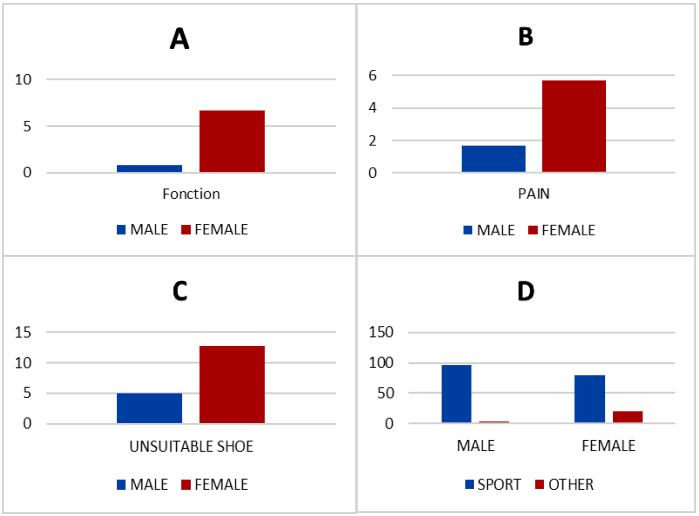
Of the 300 students in our study, 180 were female (60.0 %), 120 were male (40.0 %), and their ages ranged between 18-26 years (average 19.87 ± 1.55). The average body weight of male was 76.35 while the average body weight of female was 72.06. The average Body Mass Index of the participants was 23.73 ± 4. In our study, the shoe size of female participants were 37.14, while the shoe size of male participants were 42.68 on average (Table 3).

Table 3. Sociodemographic data

TABLE 3. SOCIODEMOGRAPHIC DATA					
		N		%	
GENDER	FEMALE	180		60.0%	
	MALE	120		40.0%	
		GENERAL MEAN(±SS)	FEMALE MEAN	MALE MEAN	p VALUE
AGE		19.87 ± 1.55	19,86	19,89	0,843
HEIGHT		170.55±8.47	164,91	179,02	0,000
WEIGHT		73.77±11.97	72,06	76,35	0,002
BMI		23.73±3.20	23,70	23,77	0,864
SHOE SIZE		39,36±2,92	37,14	42,68	0,000

No significant difference was found between genders and family history. There was a difference between gender and incorrect shoes. While the preference of incorrect shoes in female participants was 12.8 %, it was limited to 5 % in male. In terms of time to buy shoes, there was no significant difference for both sexes. When the shoe shopping time was evaluated, it was found that both genders were similar. Significant differences were found between genders, shoe preference, pain and loss of function. Loss of function; it was meaningful between the sexes. The percentage of dysfunction was found to be almost 9 times higher than male, at 6.7% in female (Graph 2a).

Pain rates were found to be 5.6 % in female and 1.7 % in male. The difference here is also statistically significant (Graph 2b). Inappropriate shoes (heels / narrow / pointed) preference was calculated as 12.8 % for female and 5 % for male (Graph 2c). The only parameter that we can relate to the higher incidence of pain and functional losses in female was shoe preference. While female prefer sports shoes at a rate of 79.4 %, this rate is calculated as 96.7 % for male (Graph 2d).



Graph 2. Gender correlation graphs (A: Dysfunction, B: Pain, C: Inappropriate shoe preference, D: Shoe preference)

DISCUSSION

HV deformity is a fairly common foot deformity with increasing prevalence and severity with age[16]. Although it is generally defined as the great toe lateral, os metatarsale I opening to the medial, HV is a chain of complex deformities with many accompanying pathological conditions. The most common and most prominent of these pathologies, metatarsus primus varus (medial rotation of the first metatarsal head) was first introduced by Truslow in the 20 th century. It was identified at the beginning and shown as the first reason for HV. However, today, it is still a matter of controversy whether HV is caused by metatarsus primus or metatarsus primus or not [1-3, 19].

Generally, the etiology of HV; Although not fully revealed, the underlying causes are classified under two main

titles, instrinsic and extrinsic. Considering the family histories of individuals with this deformity, HV is thought to be genetically transitive due to the fact that it is HV positive in 90 percent, but there is no definite evidence of genetic transition[6]. In our study, the familial transition rate was statistically insignificant in both sexes.

In the literature, most of the HV studies focused on deformity, which increased due to Hv severity, and reduction of HV complications. Few studies have also examined the effects of HV on quality of life[20]. The most important emotional feeling that lowers a person's quality of life is pain. The pain that occurs in HV can increase during walking or even continues during rest and causes functional insufficiency. Today, surgical intervention is prioritized in HV treatmalet and the correlation between the performed operations and quality of life is examined [20,21]. However, as we used in our study, the study evaluating social sub-parameters, namely functionality, is very few. Lazadires et al. similar to the study, we found in our study that SF parameters significantly affect HV angular severity[22]. In HV evaluation, the instrinsic and extrinsic causes accompanying HV should be carefully evaluated and then conservative or surgical treatmalet should be decided [23]. In our study, we evaluated the instrinsic and extrinsic factors with the SPF questionnaire we created to examine the underlying causes of HV. We have demonstrated the effect of wrong shoe choice, which is an extrinsic and changeable parameter, on HV. It has been demonstrated with studies that the use of narrow / wrong shoes plays a major role in the formation of HV[7-9]. With the widespread use of fabricated type narrow and pointed shoes in the 1970s, the use of 'Geta', a wide, comfortable local slipper, decreased. Similar to our study, which we have shown that the use of narrow and pointed shoes increases in HV etiology; In 1981, Kato et al. Investigated the HV etiology in Japan; They showed that HV incidence increased due to decreased use of Geta[10]. In our study, as in the study of Kato et al., We found that the rate of pain and loss of function was also higher in the female population, whose rate of wearing inappropriate shoes was higher than that of male. Malez and Morris stated that a preference for high-heeled shoes over 2.5 cm was the primary factor in HV formation in a study they conducted in 2005. They also stated that female wear smaller and pointed shoes when compared to male. In our study, similar findings were found that female wear more narrow, short, inappropriate shoes while male are preferred more than male [26]. Although it is thought that the preference of inappropriate shoes such as heeled narrow or pointed toes is the leading role in the etiology of HV, the fact that HV is not seen in all those wearing such shoes reveals its existence in instrinsic reasons. Intrinsic causes form a wide spectrum such as heredity, os metatarsale I length, pes planus, metatarsus primus varus, hypermobility of MTF I joint, achic contracture, metatarsal oxineiform joint hypermobility [11]. In the juvenile and rare congenital HV cases, instrinsic factors are shown as causes[12].

The HV angle is used to measure and assess the loss of function associated with HV and the pain associated with it. Although radiological imaging is generally used to measure the HV angle, goniometric measuremalets are also used because it is faster and risk free [25-27]. Manchester scale, which is used to measure HV severity, is a noninvasive method and its reliability has been provided with kappa type statistics. HV intensity is graded on this scale by scoring from 1 to 4. With a score between 1 point (no deformity) to 4 points (severe deformity), HV can be evaluated quickly and without intervention [4,26]. To evaluate HV angular measuremalets; The American Orthopedic Foot and Ankle Society (AOFAS) proposes two methods. One of this method; It involves measuring the angle between the mid-longitudinal axes of the proximal phalanx and the 1st metatars, the second is intermetatarsal measuremalet by measuring the angle between the long axes of the 1st and 2nd metatars[29, 30]. By definition, the HV angle is the angle metatarsale I makes to the proximal phalanx[17]. Evaluation of the data obtained from HV angular measuremalets, including mild, moderate and severe; A simple classification method in which HV intensity is divided into 3 groups is widely used in the literature. Accordingly, if the HV angle is less than 20^0 and the first intermetatarsal angle is below 11, it is mild, between 20^0 and 40^0, and if the first intermetatarsal angle is less than 16, the middle degree is above 40 degrees and the first intermetatarsal angle is from 16^0. if it is large, it is considered as serious deformity [31]. According to some studies, the HV angle must be above 15^0 to diagnose HV [17]. Mild lateral deviations, be less than 15, are not sufficient for the diagnosis of HV [14,30]. In our study, we evaluated our goniometric measuremalet results separately for each right and left foot in accordance with this general classification. We did not encounter severe HV angle degree in our study population.

In our study, general HV angle degrees for the right foot were 94 % light type, 6 % medium type; General HV

angle degrees for the left foot were determined as 95.3 % light type HV and 4.7 % medium type HV. According to our measuremalet results, the HV degree was highly below, 20^0 hat is, mild type. Similar to our study, Klein et al. compared the types of shoes worn by a total of 858 preschool children with the HV angle. According to the results of HV degrees that they divided into five groups, they found only 23.9 % HV angles in the normal range. They also did not encounter any serious HV phenomaleon. They found mild and moderate type HV angles in the other four groups as 76.1 %[32].

In our study, although the angular differences between the genders were not statistically significant, the pain and function loss and inappropriate shoes preference were calculated higher in female. In the light of the data obtained, we can say that with the increase in the preference of uncomfortable / inappropriate shoes, the increase in HV severity and the loss of pain and function increase in direct proportion.

CONCLUSION

The results of our study; In determining the instrinsic and ectrinsic factors that contribute to the formation of HV; We are of the opinion that it will contribute to researchers, physicians and physiotherapists. Surgical treatmalet for HV is quite painful and an option that negatively affects the patient's quality of life during the recovery period, so conservative and preventive treatmalets should be planned before surgical treatmalet. In particular, physiotherapists are required to eliminate extrinsic factors in the treatmalet planning stages of HV, direct the patients to the right shoe choice, and handle HV with the underlying and trigger factors, not alone. In the light of this information, following the right ways to eliminate pain and functional losses due to HV and HV; We believe that there will be important benefits in improving the quality of life of the person.

Conflict of interest

The authors declare that they have no conflict of interest.

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