Int. J. Curr. Res. Med. Sci. (2022). 8(10): 1-7

International Journal of Current Research in Medical Sciences

ISSN: 2454-5716

(A Peer Reviewed, Indexed and Open Access Journal)

www.ijcrims.com

Original Research Article

Volume 8, Issue 10 -2022

DOI: http://dx.doi.org/10.22192/ijcrms.2022.08.10.001

Hallux deformity influence - quality of life

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Abstract

Background: Hallux valgus is a very common deformity of the big toe and can befamilial or acquired. Knowledge of risk factors of hallux valgus is important in order to prevent or minimize progression of this deformity, since a surgical intervention is the only treatment to correct this deformity**.** The objective of this study was to determine the risk factors of hallux valgus deformity and the influence in quality of life

Material and Methods: This was a cross-sectional study was conducted in Gadarif state, eastern Sudan from January to June 2021.Structured questionnaires were used to collect data from participants. An informed consent was obtained before data collection.

Results: A total of 59 subjects from Gadarif state with HA were enrolled in this study. The females were 32 (54.2%).The most common affected age group was > 35 years accounted 44 (74.6%).33 (55.9 %) of study subjects had normal body weight(statistically not significant p=0. 957).41(69.5%) subjects had a family history of HV (statistically significant p=0. 000). 20/32 (62.5%) female use high heelShoe.44 (74.6 %) subjects had a weakness hallux plantar flexion action and abduction(statistically significant p=0. 000).

Conclusion: This study found the prevalence of HV increased with age and was higher in females. There was significant correlation between the family history and hallux deformity. Also the study observed significant association between the severity of hallux deformity and impairment of functions of hallux plantar muscles. There is a reduction in health in general and particularly in foot health with increasing severity pain of hallux deformity that appears to be associated with increase in age.

Keywords: hallux valgus, female, male, big toe pain, family history, life quality, Gadarif state, Sudan

Introduction

The hallux is called the big or great toe due to its large size and importance in weight bearing. The big toe represent as the fulcrum of forward propulsion [1]. Hallux composed of proximal and distal phalanges, the former articulates with the first metatarsal bone to form the first metatarsophalangeal joint (MTP) joint. Lateral deviation of the great toe at the first metatarsophalangeal joint causes Hallux valgus (HV) deformity [2]. HV It is the most common foot deformity in adults affecting approximately 12–70% of general population [3] and 30–58% of women, and its prevalence increases with age[4]. HV is characterized by medial deviation of the first metatarsal bone, lateral deviation of the hallux, and a prominent metatarsal head [5].

There are intrinsic muscles such as Abductor halluces, Flexor digitorum brevis, oblique head of adductor hallucis, and Flexor hallucis brevis attached within the foot, act to support the arch feet and assist in holding the toes on the ground. Hallux valgus deformity lead to the weakness of performance of these muscles and alters their actions at first MTP joint such as plantar flexion, as the metatarsal bone move medially, the base of the proximal phalanx is carried with it, and the phalanx pivots around the adductor hallucis muscle that inserts into it, causing the distal end as well as the distal phalanx to deviate laterally in relation to the center of the body[6.7]. The long flexor and extensor muscles then have a bowstring effect as they are displaced to the lateral side of the joint, which can lead to increased stress on the proximal phalanx. There is metatarsophalangeal angle lays between the longitudinal axis of the 1st metatarsal bone and the proximal phalanx of the big toe. In normal persons this angleis 8° to 20°, an angle greater than 20° was defined as hallux valgus angle [8].

Knowledge of risk factors of hallux valgus is important in order to prevent or minimize progression of this deformity, which is thought to contribute to impairment of balance and gait, and to increased risk of falls[9]. Surgical interventions are much cost and had medical risks that could lead to other complications in elderly, in addition to that hallux valgus may also be recur[10]. The cause of hallux valgus is varied. It may result from a hereditary factor and is often familial. Women tend to be affected more than men, because they keep up with fashion life style that may contribute to the incidence of hallux deformity, if the patient wears tight or pointed shoes, tight stockings, or high-heeled shoes. There are no data available regarding the hallux valgus in Gadarif state, therefore the aim of this study was to determine the risk factors of hallux valgus such as age, sex, pesplanus (flatfoot), use of high-heeled shoes and the influence of hallux valgus in quality of life

Methods

A cross-sectional study was conducted in Gadarif state, eastern Sudan from January to June 2021. A total of 59 subjects were enrolled in this study. Demographic data was collected by face-to-face interview via questionnaire. Subjects with chronic joint disease. musculoskeletal disorders of lower extremities affecting the feet such as arthritis , history of surgery of foot and traumatic injury of lower extremities were excluded. The study was approved by the ethics committees of Faculty of Medicine and Health Sciences, Gadarif University, Sudan. Informed consent was taken before data collection.

Statistical analysis

Data were analyzed using the Statistical Package for the Social Sciences, version 20 (SPSS Inc., Chicago, ILL, USA).P values less than 0.05 were considered statistically significant.

Results

A total of 59 subjects from Gadarif state with HA were enrolled in this study. The females were 32 (54.2%)(Table I.), with a male-to-female ratio of 1: 1:9. The most common affected age group was > 35 years accounted 44 (39.1).42 (71.2 %) subjects were from urban areas (Table. I).Occupations requiring prolonged periods most frequently 35(59.3 %).

Table 1: Demographics data of the study subjects (*N* 59)

Details of the subjects N (%)	
Gender	
Male	27 (45.8%)
Female	32 (54.2%)
Age (Year)	
<25	2(3.4%)
25-35	13 (22%)
>35	44 (74.6 %)
Residence	
Rural areas	17 (28.8%)
Urban areas	42 (71.2 %)
Occupation requring	
prolonged periods	35 (59.3 %)
short periods	19 (32.2%)

The means and standard deviations (SD) of the Height, Weight and body mass index (BMI) of the study subjects were presented in (table 2). 33 (55.9 %) of study subjects had normal body weight, (table 3).There was no significant association (p= 0. 957) between BMI of the subjects and gender.

Table 2: means and SD of Height, Weight and BMI of the of the subjects (N 59)

Height (cm)	165.49±5.77 (150–179)
Weight (kg	65·54 ± 6·38 (55–82)
BMI (kg/m2	24·33 ± 1·70 (19·28–27·68)

Table 3: Distribution of BMI of the subjects and gender (N 59)

Gender Cross tabulation				
BMI		Female	Male	Total
	Normal	18	15	33
	Above normal	14	12	26
Total		32	27	59

HV bilateral was present in 39% of study subjects. HV was most frequently in subjects with a big toe longer than the second toe 43 (72.9 %).41(69.5%) subjects had a family history of HV(table 4) with statistically significant (p= 0. 000).

Severe hallux pain was reported in 23(39 %) of study subjects during different activity. 20 (62.5%) female use high heel Shoe, 15(75%) female wearing high-heeled shoes as their usual type of shoe for long period (table 4). Statistical significant was observed (p<0.034). 5(25%) female not worn as usual shoe type. 44 (74.6 %) subjects had a weakness of hallux plantar flexion action and abduction, normal action was found in 15 subjects with mild deformity (table 4), a significant correlation (p < 0.000) was observed between the hallux deformity pain and weakness of plantar hallux muscles functions.

Table 4: Factors related to prevalence of hallux valgus

Factors N (%)	
HV present in	
unilateral	
right big toe	17(28.8%)
left big toe	19(32.2%)
bilateral toes	23(39%)
big toe length	
shorter than second toe length	5(8.5%)
equal in length to the second toe	11(18.6%)
Longer than second toe length	43(72.9%)
Hallux pain was classified as:	
Mild	19 (32.2%)
Moderate	17 (28.8%)
Severe	23 (39%)
Past History	
Yes	41 (69.5%)
No	18 (30.5%)
Pesplanus	
Absent	33 (55.9%)
present	26 (44.1%)
Female use of high-heeled shoes	
Yes	20/32 (62.5. %)
No	12/32 (37.5%)
Hallux action strength	
hallux plantar flexion action and abduction	44 (74.6 %)
weak	15 (25.4%)
normal	

Discussion

HV is health problem, associates with foot pain, poor balance, gait impairment, hallux muscle weakness, immobility, disability, risk of falling and lesser quality of daily life[11, 12, 13].Several factors are thought to associate with HV such as metatarsal length, hypermobility, obesity and foot posture.

In this study hallux valgus is more prevalent in age group > 35 years accounted 74.6%and is more prevalent in females (54.2%) than the male. This was in line with previous study carried out by Nix et al [4] who reported that HV prevalence increases with age and in women. This difference in prevalence may be due to structural foot differences and lifestyle differences in female, including choice of footwear [14]. 42 (71.2 %) subjects were from urban areas; while 17 subjects were from rural areas. Cho et al [13] reported the prevalence of HV in a rural Korean middle-aged population. Occupations requiring prolonged periods most frequently (59.3 %) in this study.

This study shows that bilateral HV was most frequent (39 %.) among study subjects. This result was consistent with previous studies. HV is usually a bilateral phenomenon [3,15]. Also the current study revealed that44.1% of subjects had pes planus (flatfoot). Taluet al [16] found flatfoot in 63% of the subjects with hallux valgus. Coşkun et al[17] reported that all of the participants were found to have flatfoot.

This study showed that the frequency of HV was higher in female wearing high-heeled shoes (62.5. %). There was significant correlation between the hallux deformity and High heeled shoes.($p < 0.034$). Talu et al [16] found 25.9% of subjects used high heel shoes. Shoes with higher heels fixed the foot in a more dorsi-flexed position, and a strong force compress the anterior foot, which flattens the transverse arch and makes the foot more susceptible to HV [18]. Prolonged use of shoes with a narrow toe box or high heels may lead to development or exacerbation of HV. HV can be exacerbated by internal and external factors, particularly among those with a family history of HV [18]. Subjects were not able to carry out all physical activities desired, such as, working for long period and climbing stairs.

Foot function was related to the hallux valgus in the obese individuals [19]. Some studies have found an association between HV and increasing body mass index (BMI) whereas others have found no association. In the present study, HV was most frequently (55.9%) in the subjects that had normal body weight, this finding statistically not significant ($p= 0. 957$). Frey and Zamora [20] found that individuals of normal weight (62% women) had an increased hallux valgus compared to overweight or obese individuals.

In this study the HV was most frequently in subjects with a big toe longer than the second toe (72.9 %). Feet with a big toe longer than the second toe are more susceptible to the effects of footwear and weight-bearing and are more likely to develop HV than feet with a big toe shorter than or equal in length to the second toe [21].

Our finding revealed that 69.5% of study subjects had family history, there was statistically significant association between the HV and family history ($p = 0.000$).There appears to be a hereditary component, a majority of subjects have a first-degree family member who has hallux deformity. The high frequency of family occurrence suggests the involvement of inheritance of anatomic and morphologic characteristics that increase susceptible to HV, such as foot morphology, joint shape, and ligament flexibility[18].Piqué-Vidal et al[22] found more than 90% of patients with painful HV, had a history extending over 3 generations, which suggests the presence of incomplete autosomal dominant inheritance.

In current study all the subjects suffer from hallux pain, the severe pain was found in39 % of the study subject particularly in bilateral hallux. The presence of pain in MTP joint impairs its smoothness and leads to the limitation of activities [16]. Previous study by Abhishek et al [23] highlighted the importance of big toe pain accompanying HV, reporting that health-related quality of life was progressively impaired in adults aged 30 years and older with HV alone, big toe pain alone, and HV with big toe pain.

This study found significant correlation between the hallux deformity pain and weakness of plantar hallux muscles functions ($p = 0.000$). Mickle et al[24] reported that decreased hallux plantar flexion strength in people with HV. Foot pain has an adverse impact on function, and reduced hallux plantar flexion strength [25].

Tanaka et al [26] demonstrated that the hallux plantar flexors are important contributors to postural control. The intrinsic foot muscles such as abductor hallucis is important in hallux plantar flexion, medial longitudinal arch stabilizer [27] and is the only muscle that can directly keep the hallux from displacement laterally [6]. Stewart et al [28] found abductor hallucis muscle atrophied in patients with hallux valgus. HV most often leads to cartilage erosion at the first MTP joint and the metatarsosesamoid joints and erosion of the inter-sesamoid crista due to sesamoid displacement and rotation. Bock et al [29] found that 73% of patients with HV were found to have some degree of cartilage erosion.

Menz et al [30] found a significant association between HV severity and balance performance. López López et al[31] showed that a sample of older people with varying degrees of HV revealed progressive reduction in general health and foot health with increasing severity of HV deformity, degrees of HV impact the quality of life in relation to foot health. General foot health appeared to increase with severity of deformity in the HV group[32].

Conclusion

This study found the prevalence of HV increased with age and was higher in females. There was significant correlation between the family history and hallux deformity. Also the study observed that, severity of hallux deformity significantly impaired plantar hallux muscles functions. There is a reduction in health in general and particularly in foot health with increasing severity pain of hallux deformity that appears to be associated with increase in age.

Conflict of Interests

The authors declare that they do not have conflict of interests regarding this work.

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How to cite this article:
Samia O Massaad, Sami Eldirdiri Elgaili Salah, Kamal Dafaalla Alamin, Eman Elafef Mahgoob. (2022). Hallux deformity influence - quality of life. Int. J. Curr. Res. Med. Sci. 8(10): 1-7.
DOI: http://dx.doi.org/10.22192/ijcrms.2022.08.10.001