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Prevalence of Hallux Valgus Deformity in Females Residing in South Pune

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Abstract

Aim: Hallux valgus (HV) is a common forefoot deformity. The aim of the study was determining the prevalence of hallux valgus among female population residing in South Pune.

Method: A questionnaire was shared to 100 female participants from South Pune. The participants were requested to provide information on demographic data, foot pain, choice of footwear and self-report assessment of HV. The questionnaires were analysed using descriptive statistics.

Result: A total of 100 female participants were included in the study. The findings, revealing a 34% prevalence of Hallux Valgus among participants. Out of which only 10% of females complained of big toe pain.

Conclusion: In South Pune population, HV is a prevalent foot deformity that is associated with big toe pain and its prevalence increases with age. Attention to the foot, even in absence of pain is necessary. Preventive measures and education on the HV deformity is required.

Keywords: Bunion, foot, hallux valgus, prevalence, big toe pain, footwear.

Introduction

Hallux valgus (HV), also known as a bunion, is one of the most common forefoot deformities.[1] Hallux valgus (HV) is a common condition affecting the forefoot in which the first metatarsophalangeal joint is progressively subluxed due to the lateral deviation of the hallux and medial deviation of the first metatarsal. It manifests as a deformity in the big toe, causing it to bend towards the other toes, and the joint tends to become red and painful.

HV deformity is most likely a result of multiple contributing factors, including genetics, gender, age, constricting footwear, short first metatarsal, dorsiflexed first metatarsal, flexible or rigid forefoot varus, rigid or flexible pes planovalgus, gastrocnemius equinus, abnormal foot mechanics, and joint hypermobility. [1] HV has been linked to functional disability, including foot pain, impaired gait patterns, poor balance, and falls in older adults. [2]

The deformity is a relatively common condition. It occurs in approximately 23% of adults aged 18 to 65 years and up 36% of adults older than 65 years. When looking at adult females, HV deformity occurs as high as 30%. [1] Interestingly, when comparing women and men, women are found to have HV deformity twice as often, with a ratio as high as 15:1 [1] females affected for every male in one study. It is widely recognized to be a disease more prevalent in female patients across all ages than in males, which is likely

related to differences in footwear, osseous anatomy such as a smaller and more rounded metatarsal head, generalized ligamentous laxity, and first ray hypermobility in females. [3]

The results of studies were grouped by age of study population. The prevalence was 11% in individuals younger than 20 years old, 12.22% in adults aged 20 to 60 years and 22.7% in elderly people aged over 60 years old. [4] The prevalence of hallux valgus increases with age because of alterations in joint mechanics and plantar loading patterns that occur with aging. Hallux valgus also appears to have a strong genetic predisposition. In a large Level IV study, 90% of patients with hallux valgus had at least 1 similarly affected family member. [3]

The wearing of constricting and high heel shoes are extrinsic factors, which are important in the development of hallux valgus. The design of shoes includes the comfort and packaging of foot. The packaging of foot brings the largest stress to the medial side of the first MTPJ capsule. Because in activities such as running and jumping, the windlass mechanism of the MTPJ plays a fundamental role. When wearing shoes, the elastic moduli of the shoe's uppers, the skin, the muscle tendons and ligaments are not consistent, resulting in stress-shielding, and then increasing stress concentration on muscle tendons and ligaments. In addition, when the MTPJ involves windlass, the shoes bring stress-shielding to the medial side of the first MTPJ other than bearing the pressure. When exercising, e.g., jogging, the repetitive stress concentration, stress-shielding, and stress shearing will lead to the MTPJ bunion because the stress-growth relationship proves it to be so. [5]

The diagnosis is typically through a physical exam. However, imaging is essential because it helps assess the severity of the deformity.

Root et al. divided HV deformity into four stages, as outlined below:

Stage 1: Lateral displacement of the hallux at the MTP joint

Stage 2: Progression of the hallux abduction (hallux pressing against the second toe)

Stage 3: Increased intermetatarsal angle, possible associated second hammertoe deformity

Stage 4: Partial/Complete hallux dislocation at the MTP joint. [1]

Classification is mild, moderate, and severe based on the weight-bearing anteroposterior, lateral oblique, lateral, and sesamoid axial views. [3]

Severity of Deformity	Hallux Valgus Angle (HVA)	First-Second Intermetatarsal Angle (IMA)	Treatment
Normal	<15°	<9°	None
Mild	<20°	9-11°	Distal osteotomy ± soft tissue procedure
Moderate	20-40°	11-16°	Proximal osteotomy ± soft tissue procedure
Severe	>40°	>16°	Proximal osteotomy or first tarsometatarsal arthrodesis ± soft tissue procedure

Treatment of patients with HV deformity revolves around non-surgical and surgical treatments. If conservative treatment proves ineffective, surgical management is the next recommended course of action.

The goal of conservative treatment is to manage the symptoms without correcting the anatomical deformity. Non-surgical treatments options include:

- Shoe modification: Low-heeled, wide shoes.
- Orthoses: Improves alignment and support.
- Analgesics: Acetaminophen and NSAIDs.
- Ice: Icing the inflamed deformity to reduce inflammation.
- Medial bunion pads: Prevents irritation of HV deformity.
- Stretching: Helps maintain joint mobility in the affected joint. [1]

If non-surgical treatments are unable to control the pain, the treatment is deemed to have failed. HV deformity can result in several complications, including Bursitis (most common), Second toe hammertoe deformity, Degenerative disease of the metatarsal head, Central metatarsalgia, Medial dorsal cutaneous nerve entrapment, MTP joint synovitis. [1]

Methodology and Materials

Methodology: -

1. Study design: Observational study
2. Study type: Survey based
3. Sample size: 100
4. Target population: Female
5. Sampling method: Simple random sampling

Materials Required: -

1. The HV self-report i.e. The Manchester Scale
2. Self-made questionnaire form

Inclusion criteria: -

1. Participants within age range, 20-49 years.
2. Participants should voluntarily agree to participate in the study and provide informed consent.

Exclusion Criteria: -

1. Participants that are unwilling to provide consent to participate in the study.
2. Individuals who have a history of foot surgeries.
3. Individuals with recent foot injuries or trauma

Procedure: -

- Ethical clearance is taken from Tilak Maharashtra Vidyapeeth College of Physiotherapy. And a self-made questionnaire was developed that had relevant information related to Hallux Valgus, foot problems and foot wear.
- A validation procedure was conducted to ensure the clarity and reliability of the questionnaire. The questionnaire included sections about participates demographic data, pain and foot assessment.
- Potential participants were identified and approach through community centers, health facilities via online platform.
- The participants willing to participate were explained about the purpose, and importance of the study along with the procedure and were asked to sign an informed consent form (approved by the institution) priorly.

- Participants provided demographic details, including age, through the Google form. The questionnaire form consisting of dichotomy questions along with a Hallux Valgus self-report form i.e. the Manchester Scale.
- Implemented checks in the Google form to ensure completeness and accuracy of responses it also included a confirmation step to verify that participants understand the questions.
- Participants submitted the completed Google forms electronically and were ensured the confidentiality of participant responses.
- Store collected data securely and restrict access to authorized personnel only. Review and clean the collected data to rectify any errors or inconsistencies.
- Summarized the data, prevalence rates, and associations found in the analysis. Periodically review a subset of collected data to maintain the quality and reliability of the dataset

Results

Table 1: Shows the prevalence of HV Deformity

Prevalence of the HV deformity	No. of Participants
Presence of HV	34
Absence of HV	66

The above data is pictured in the next graph

Figure 1: Shows the prevalence of HV deformity

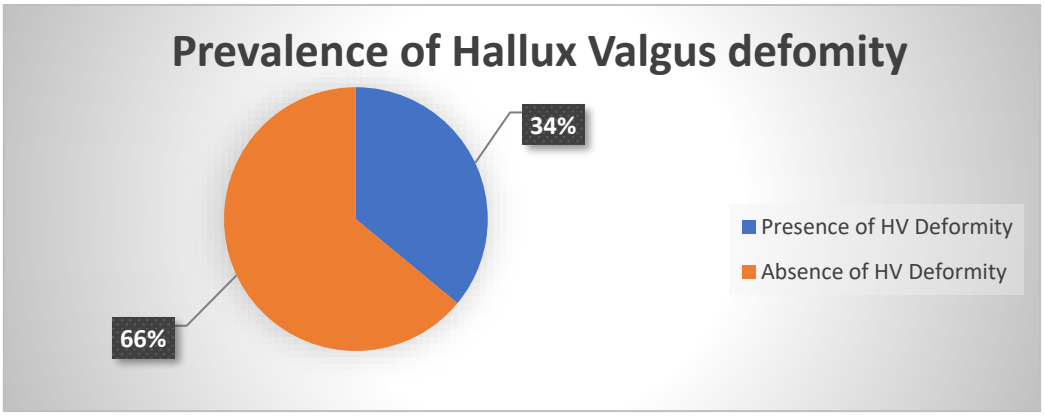


Table 2: Shows the site of pain

Site of pain	No. of Participants
A (Hallux Valgus)	10
B (Metatarsalgia)	2
C (Stress fracture)	1
D (Tendonitis)	3
E (Achilles tendonitis)	10
F (Plantar fasciitis)	23
No pain	51

The above data is pictured in the next graph

Figure 2: Shows the site of pain

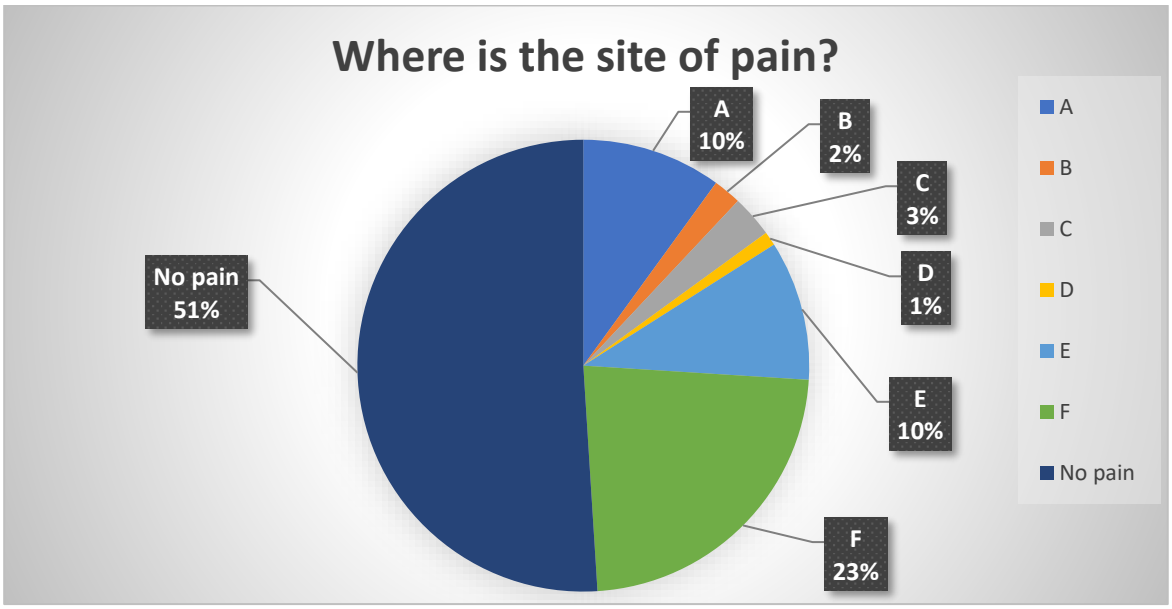


Table 3: Shows that if there was big toe pain of participants who complained of foot pain near MTP joint

Big toe pain	No. of participants
Yes	3
No	7
Didn't answer	90

The above data is pictured in the next graph

Figure 3: Shows if there was big toe pain

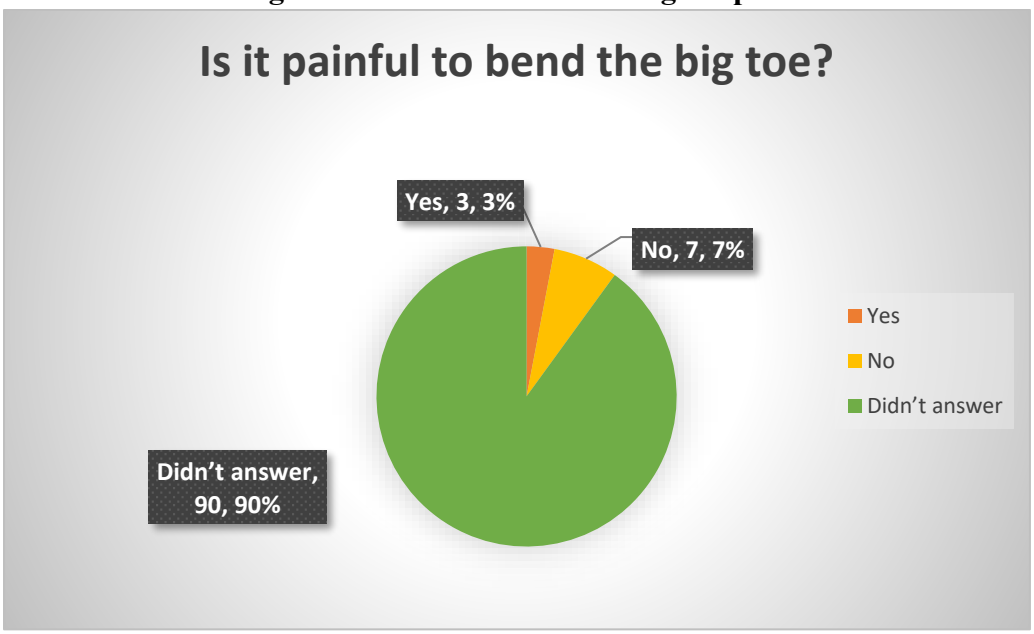
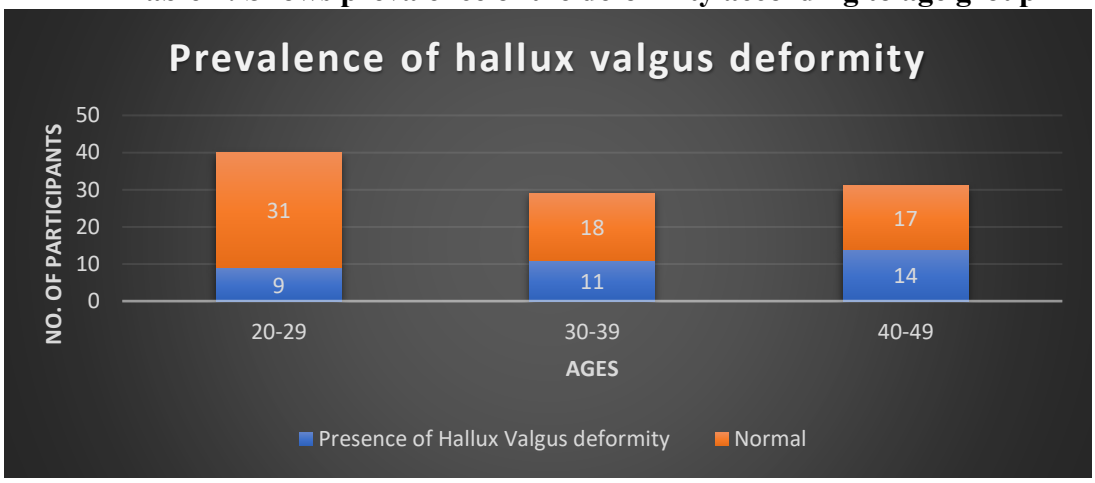


Table 4: Shows prevalence of the deformity according to age group

Age category	Presence of Hallux Valgus deformity	Normal	Total no. of participants
20-29	9	31	40
30-39	11	18	29
40-49	14	17	31

The above data is pictured in the next graph

Table 4: Shows prevalence of the deformity according to age group



Discussion

The present study aimed to investigate the prevalence of Hallux Valgus deformity in a sample of females residing in South Pune, comprising 100 participants. Our findings reveal that 34% of the participants exhibited Hallux Valgus deformity. This prevalence rate underscores the significance of Hallux Valgus in the female population, which is consistent with, existing literature. [1] (Hallux valgus) suggesting that this deformity is more common in females, which is likely related to differences in footwear, osseous anatomy, generalized ligamentous laxity, and first ray hypermobility in females. [70] Constricting footwear, such as high heels, is considered an extrinsic predisposing factor for hallux valgus

Pain

It is seen that nnearly half of the participants i.e. 49%, reported experiencing foot pain. Upon closer examination of those reporting foot pain, we identified various sources of discomfort. Among the participants with pain, as shown in figure 2, 10 attributed their discomfort to Hallux Valgus deformity. Furthermore, the distribution of pain sources revealed other conditions such as Metatarsalgia 2%, stress fractures 1%, tendonitis 3%, Achilles tendonitis 10%, and plantar fasciitis 23% were identified as additional sources of foot pain. As figure 3 shows that despite having deformity, with only 10% reported discomfort of the big toe, and about 24% of females did not experience big toe pain even if there was presence of the Hallux Valgus deformity.

Age distribution and prevalence of Hallux Valgus deformity

Figure 4 shows that among females aged 20-29, constituting a prevalence rate of 22.5%. In the 30-39 age group, resulting in a prevalence rate of 37.9%. Among females aged 40-49, reflecting a prevalence rate of 45.2%.

Footwear and prevalence

The data provides insights into the role that different shoe styles play in the development of Hallux Valgus among females.

Notably, out of 100 participants, 23 women opted for flats with a wide round toe box in which 7 females exhibited the deformity. Similarly, flats with a narrow-pointed toe box show a prevalence of 3 out of 7, indicating a higher occurrence compared to wide round toe box flats.

Normal-height shoes, with a wide round toe box demonstrated instances of Hallux Valgus, with 7 out of 16 female who wore these types of footwear. But only 6 females out of 100 opted for narrow toe box in which neither of them showed signs of the deformity.

Shoes were widely a choice of footwear among all the female showed a prevalence of 14 out of 41 women's.

The data also points to the impact of high-heeled shoes on Hallux Valgus, with 2 out of 100 women who chose high heels with a narrow-pointed toe box and 1 out of 100 with high heels featuring a wide round toe box experiencing the deformity.

The study reveals a noticeable trend: an increase in the prevalence of Hallux Valgus with advancing age. This aligns with existing literatures suggesting that age is a significant factor in the development of this deformity. If left untreated, Hallux Valgus tends to be a progressive condition. The worsening deformity can exacerbate its impact on physical functioning and gait over time.

One of the intriguing findings of this study is the significant number of individuals with Hallux Valgus who did not report experiencing pain. Traditionally, pain has been considered a hallmark symptom of this deformity, leading individuals to seek medical attention. The discrepancy between deformity prevalence and reported pain suggests that individuals may not perceive the importance of mild discomfort or may not be associating it with their foot structure. This finding highlights the necessity of educating the general population about the various manifestations of Hallux Valgus and the importance of seeking medical advice even in the absence of severe pain.

Surprisingly, the age group (20-29) also demonstrated a notable prevalence of Hallux Valgus.

In a meta-analysis of 78 reports of HV, the prevalence of HV was 15.0%among people younger than 18 years and 26.3% among those aged 18 to 65 years. The potential contributing factors could be lifestyle factors, occupation, footwear choices and genetic predispositions might be responsible for developing HV later in life. Further exploration within this age group may provide insights into the mechanisms behind early development.

The research also delved into the association between various types of footwear and the occurrence of the deformity. This reinforces existing literature suggesting that high heels, an extrinsic predisposing factor, may contribute to the development of Hallux Valgus due to increased pressure on the forefoot. Also it was noted, despite the generally considered comfort and foot-friendly design of wide round toe box flats, shoes etc a portion of women still experiences Hallux Valgus

The Role of Footwear in the Pathogenesis of Hallux Valgus: A Proof-of-Concept Finite Element Analysis in Recent Humans and Homo naledi (2020) reported that ill-fitting shoe wearing is the leading cause in the pathogenesis of HV and hypothesized that even wearing appropriate footwear could contribute to the development of HV deformity.

The data underscores the complexity of the relationship between footwear and Hallux Valgus. While certain trends are apparent, it is crucial to recognize that individual factors, including foot anatomy and genetic predisposition, also play significant roles in the development of this deformity.

Thus, even though there is prevalence of the deformity, the lack of awareness among individuals, marks the importance of public health initiatives and educational campaigns.
While our study provides valuable insights, it is essential to acknowledge its limitations, including the relatively small sample size warrants cautious interpretation; future research with larger cohorts may provide a more robust understanding of the prevalence.

Conclusion

In conclusion, prevalence rate of 34% of Hallux Valgus in females was found with age, big toe pain and type of footwear.

Limitation

- Assessment of quality of life
- Body mass index (BMI)
- Foot prints
- Balance assessment
- Gait Analysis

Future scope

- Future research should explore biomechanical aspects
- Additionally, studies tracking individuals from a young age into adulthood could uncover the early onset of Hallux Valgus and its progression over time.
- Analysis of the gait pattern, how each alteration can involve changes in stride length, step width, and the distribution of weight across the foot along with the biomechanics of footwear, considering not only design but also the material properties, to better comprehend the role of shoes in Hallux Valgus pathogenesis.

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