

**Original Communications****PREVALENCE OF HALLUX ABDUCTO VALGUS AMONG VARIOUS GROUPS IN ANAMBRA STATE OF NIGERIA****Chijioke M. Okeke, Ukoha U. Ukoha***Department of Anatomy, Nnamdi Azikiwe University Awka, Nigeria***RESUMEN**

El hallux abducto valgus es caracterizado por la desviación lateral de la falange proximal del hallux, desviación medial del primer metatarsiano huesos y subluxación de la primera articulación metatarsal-falángica. El objetivo de este estudio fue determinar la prevalencia del hallux abducto valgus entre los residentes del Estado de Anambra de Nigeria. El estudio fue un estudio descriptivo transversal, mediante un cuestionario estructurado. Se realizó entre los sujetos masculinos y femeninos en los siguientes grupos ocupacionales: los militares, la policía, el cuerpo de seguridad vial, estudiante de medicina, estudiantes de enfermería, comerciantes y agricultores. Un total de 1033 sujetos dentro del rango de edad de 15 a 74 años (SD 12.9 años) fueron estudiados. Hallux abducto valgus fue identificado por la inspección de los pies. Prevalencia de hallux abducto valgus en la población estudiada fue de 12,9%. Hallux abducto valgus fue más frecuente en varones (14,3%) que en mujeres (11,2%); la diferencia no fue estadísticamente significativa. Afectación bilateral del hallux abducto valgus (5,5%) fue más frecuente que la afectación de uno de los pies (derecha - izquierda, 2,6% - 4,7%). Prevalencia de hallux abducto valgus aumentó con el incremento de la edad. La prevalencia del hallux abducto valgus entre diversos grupos ocupacionales incluyen: Militares (20,7%), la policía (18,0%), los agricultores (17,0%), el cuerpo de seguridad vial (16,7%), los estudiantes de enfermería (10%), los estudiantes de medicina (9,9%), los comerciantes (8,3%). La prevalencia del hallux abducto valgus en nuestro estudio fue de 12,9%. La prevalencia aumenta con la edad. La diferencia en la prevalencia de hallux abducto valgus en varones y mujeres no fue significativa.

**Palabras Clave:** *Hallux abducto valgus, predominio, Nigeria*

**ABSTRACT**

Hallux Abducto Valgus is characterized by lateral deviation of the proximal phalanx of the hallux, medial deviation of the first metatarsal bone, and subluxation of the first metatarsophalangeal joint. The objective of this study was to determine the prevalence of hallux abducto valgus among residents of Anambra State of Nigeria. The study was a cross sectional descriptive study, using a structured questionnaire. It was conducted among male and female subjects in the following occupational groups: Military, Police, Road Safety Corps, Medical student, Nursing student, Traders and Farmers. A total of 1033 subjects within the age range of 15 to 74 years (SD 12.9 years) were studied. Hallux abducto valgus was identified by inspection of the foot. Prevalence of hallux abducto valgus in the study population was 12.9%. Hallux abducto valgus was more prevalent in males (14.3%) than in females (11.2%); the difference was not statistically significant. Bilateral affection of hallux abducto valgus (5.5%) was more prevalent than affection of either of the individual foot (Right – 2.6%, left – 4.7%). Prevalence of hallux abducto valgus increased with increment in age. The prevalence of hallux abducto valgus among various occupational groups include: Military (20.7%), Police (18.0%), Farmers (17.0%), Road Safety Corps (16.7%), Nursing students (10%), Medical students (9.9%), Traders (8.3%). The prevalence of hallux abducto valgus in our study was 12.9%. The prevalence increased with increasing age. The difference in prevalence of hallux abducto valgus in males and females was not significant.

**Key words:** *Hallux abducto valgus, prevalence, Nigeria*

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## INTRODUCTION

The term Hallux Abducto Valgus (HAV) means abnormal deviation of the big toe away from the midline. It is characterized by lateral deviation of the proximal phalanx of the hallux, medial deviation of the first metatarsal bone, and subluxation of the first metatarsophalangeal (MTP) joint (Dare et al, 2005). Hallux Abducto Valgus is associated with a medial prominence (bunion) at the first MTP joint which is caused by protruding head of first metatarsal bone (Janssen et al, 2014) with swollen and inflamed skin as a result of friction from shoes (Okuda et al, 2014). Bunions may also be caused by some other factors which include osteoarthritis, bursal inflammation, ganglion formation or gouty arthropathy.

The aetiology of HAV is not clearly identified (Morales-Orcajo et al, 2015). Some of the suspected aetiological factors include: high-heeled shoe wearing, excessive weight-bearing, genetic factor, race and sexual dimorphism (Perera et al, 2011). The commonest symptom of HAV is pain (Dare et al, 2005, Janssen et al, 2014, Dufour et al, 2014, Nguyen et al, 2010). Other symptoms include ill fitting of foot wear, gait abnormalities, poor balance and falls in older adults (Nguyen et al, 2010), decreased function (Dufour et al, 2014), worsened physical performance and quality of daily life. Diagnosis of HAV is made if the angle of deviation of the hallux is greater than 15 degrees.

The true prevalence of HAV is difficult to determine (Roddy et al, 2008) as there are variable reports from several studies. A systematic review on the prevalence of HAV in the general population by Nix et al (2010), reported a prevalence of 23% in adults aged 18-65 years (CI:16.3 to 29.6) and 35.7% in elderly people aged over 65 years (CI: 29.5 to 42.0). A study that was conducted among patients aged 30 years and above in Nottingham, United Kingdom showed a prevalence rate of 28.4% (Roddy et al, 2008). A national health surveys in the United States have reported a prevalence of 0.9% across all age groups in 1996 (Adams et al, 1999). A study conducted among a rural Korean community between the age range of 40 to 69 years gave a prevalence of 64.7% (Cho et al, 2009). Okuda et al (2014) studied the prevalence of HAV among 634 female student about 20 years of age or less in Japan and reported a prevalence rate of 29.7%. Daniel and Lobo (2010) reported a prevalence of 36.5% among a Chinese female population. In Nigeria, Owoeye et al (2011), reported a prevalence of 15.4%, among a youth population in Lagos, while a survey conducted among three ethnic groups in

Delta state showed a prevalence of 28%, 25% and 23.3% for Isoko, Urhobo and Delta Ibo respectively (Dare et al, 2005).

The literature suggests that HAV is more prevalent in women; a notion which is attributed to use of high heeled shoes in women (Dare et al, 2005, Okuda et al, 2014, Morales-Orcajo et al, 2015, Nguyen, 2010, Mafart, 2007). A study in Boston among elderly subjects reported a prevalence of 58% in women and 25% in men (Nguyen, 2010). The Framingham study (Dufour et al, 2014) conducted in Massachusetts reported a prevalence rate of 44% in females and 22% in men among people within the ages of 36 and 100 years. The prevalence of HAV is thought to be more in elderly people as compared to younger people, (Dare et al, 2005, Okuda et al, 2014, Dufour et al, 2014, Nguyen, 2010, Cho et al, 2009, Mafart, 2007), which is probably due to bone changes associated with ageing (Roddy et al, 2008).

HAV can occur on one side (unilateral) or both sides (bilateral) of the feet. Some studies reported higher prevalence for unilateral occurrence of HAV (Cho et al, 2009, Owoeye et al, 2011) while some others reported higher prevalence for bilateral occurrence (Dare et al, 2005, Roddy et al, 2008).

The impact of HAV to the health of people has not been reported in the South Eastern Nigeria as at the time of this study. Therefore, this study will provide a basis for such a study and it will help to mobilize sensitization for interventions aimed at prevention of the deformity.

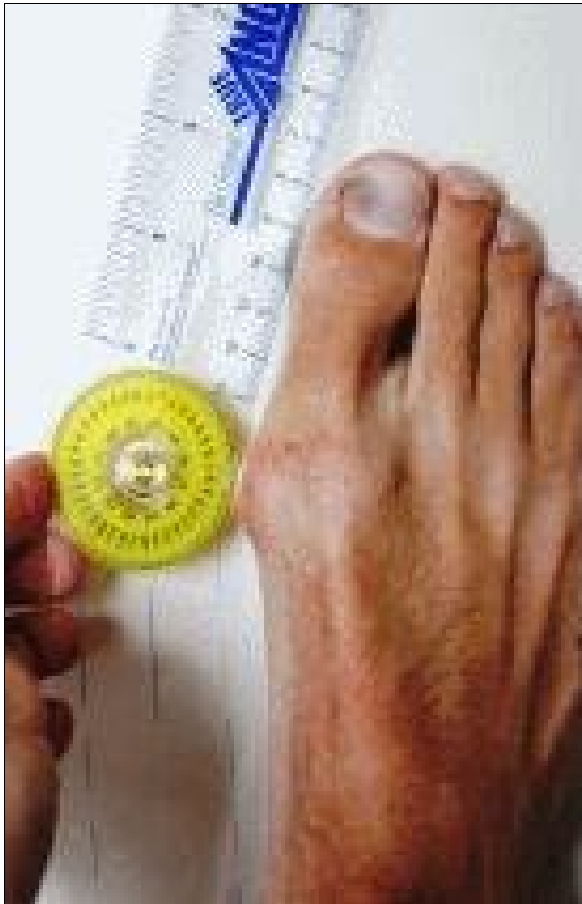
## MATERIAL AND METHODS

The study was conducted among occupational groups in Anambra State, located in the South Eastern part of Nigeria. The people are mainly the Igbos and the groups included the Military, Police, Road Safety Corps, medical students, nursing students, traders and farmers. Age range was between 15 years and 74 years (SD 12.9 years).

The study was a cross-sectional study. Structured questionnaire was self administered to document subject's age, gender, occupation, type and duration of foot wear. Recordings of the measurements of height and weight were also documented. Hallux abducto valgus was identified by inspection, by comparing the orientation of the subject's hallux with a picture that shows the hallux angle to be greater than 15 degrees (figure 1).

Consenting male and female subjects who do not have obvious foot deformity and who do not use

walking staff were included in the study while the subjects who had the following conditions were excluded; severe foot trauma, rheumatoid arthritis, pregnancy and foot surgery.



**Figure 1** - Measurement of hallux deviation angle (Adapted from Janssen et al, 2014)

The occupational groups were selected at random, after which, all the consenting subjects from a selected group were studied. Total of 1033 subjects were studied. This included:

Military	58
Police	123
Road Safety	119
Medical Student	141
Nursing Students	200
Traders	228
Farmers	164

A team of six people (three pairs) in all was recruited and trained for the measurements. In each pair, one person takes the measurements while the assistant records the measurement. The detail of the research work was explained to the subjects after which consent was obtained. Questionnaire was used to collect relevant bio data.

Data was analyzed using Statistical Package for Social Sciences (SPSS) version 21. Prevalence of HAV was determined by cross tabulation. Test of significance for the differences in the prevalence of HAV was done with Chi-Square test. Significance level was set at P = 0.05.

**RESULTS**

Out of 1033 subjects that were studied, 133 (12.9%) subjects had HAV defect on at least one foot. Among this number, 27 (2.6%) subjects had HAV defect only on the right foot; 49 (4.7%) subjects had HAV only on the left foot, while 57 (5.5%) subjects had bilateral occurrence of HAV (Table 1). Our result also showed that prevalence of HAV was more among male subjects than female subjects (Table 1); but the difference was not statistically significant (p=0.166).

Gender	HAV present				HAV Absent	Total Number
	Right foot only	Left foot only	Both feet	Total		
<b>Male (n=548)</b>	15	31	32	78(14.3%)	470	548(100%)
<b>Female (n=485)</b>	12	18	25	55(11.2%)	430	485(100%)
<b>Total Number</b>	27(2.6%)	49(4.7%)	57(5.5%)	133(12.9%)	900	1033(100%)

**Table 1** - Prevalence of Hallux abducto valgus (HAV) among subject

The prevalence of HAV from our study significantly increased with increasing age ( $P=0.00$ ), with highest prevalence (38.5%) among those who were 60 years and above and the lowest (9.1%) among those who were between 15 and 29 years (see Table 2).

Among the occupational groups (Table 3), the military had the highest prevalence of HAV with 20.7% while the traders had the least prevalence with 8.3%. The difference in the prevalence of HAV among various occupational groups was statistically significant ( $P = 0.02$ ).

Presence of HAV	15-29 years	30-44 years	45-59 years	≥60 years	Total
HAV present (%)	50 (9.1%)	35(11.5%)	28(21.9%)	20 (38.5%)	133
HAV absent	498	270	100	32	900
Total	548(100%)	305(100%)	128(100%)	52(100%)	1033

Table 2 - Prevalence of Hallux abducto valgus (HAV) across age categories

Occupation	HAV present (%)	HAV absent	Total number
Military	12 (20.7%)	46	58 (100%)
Police	22 (18.0%)	100	122 (100%)
Farmers	28 (17.0%)	137	165 (100%)
Road Safety corps	17 (16.7%)	102	119 (100%)
Nursing students	21 (10.5%)	179	200 (100%)
Medical students	14 (9.9%)	127	141 (100%)
Traders	19 (8.3%)	209	228 (100%)
Total Number	133	900	1033

Table 3 - Prevalence of Hallux abducto valgus (HAV) across various occupational groups

## DISCUSSION

From our study the prevalence of HAV among occupational groups in Anambra State of Nigerian was 12.9%. This value was lower than 34.3% reported by Dufour et al (2014) in the

Framingham study (USA). It was also lower than 28.4% and 64.7% reported in the United Kingdom (Roddy et al, 2008) and South Korea (Cho et al, 2009) respectively. These differences may be due to differing ethnic/racial origin. However, our finding suggests that the

prevalence of HAV is lower in Nigeria than in the Western population. The increased prevalence reported in the western countries has been attributed to the western style of foot wear (Cho et al, 2009), which constricts the foot.

In Nigeria, a study by Dare et al (2005) among the three ethnic groups located in Delta State of Nigeria reported prevalence rates of 28% (Isoko), 25% (Urhobo), and 23.3% (Delta Ibo). These values are higher than ours. The difference between the age ranges in their work (10 to 30 years) and in ours (15 to 74 years) may have attributed to the difference of prevalence rate. Owoeye et al (2011) reported a prevalence of 15.4% among secondary school and undergraduate students in Lagos, South Western Nigeria.

The slight male preponderance in the prevalence of HAV in our study was not statistically significant. It is generally believed that HAV is more prevalent in females than in males (Dare et al, 2005, Morales-Orcajo et al, 2015, Dufour et al, 2014, Nguyen, 2010, Cho et al, 2009), but our study did not support this assertion. However, it is reported that the true sex ratio in the prevalence of HAV is actually unknown (Perera et al, 2011). Our result also showed that the prevalence of HAV increases with increasing age. This is similar to the findings of Dare et al (2005) and Okuda et al (2014).

In decreasing order of magnitude, the total number of subjects who had HAV in our study was: both feet 57(5.5%), left foot 49(4.7%) and right foot 27(2.6%). Thus, affectation of HAV on both feet was more prevalent than affectation of HAV on either of the foot individually. This is similar to the study by Dare et al (2005), (both feet 17.3%, right foot 5.9% and left foot 4.7%) and Roddy et al (2008), (both feet 16.9%, right foot 7.0% and left foot 6.0%). It did not agree with findings of Owoeye (2011), (left foot 5.9%, right foot 5.8% and both feet 3.7%) and Cho et al (2011) (left 30.8%, right 4.1% and both 29.9%).

The reason for the difference in the distribution of HAV between the left and right foot is not known. It may be due to biomechanical or genetic factors. Thus in future studies, there should be need to investigate the association of HAV with behavioral characteristics like handedness, posture, gait patterns, football playing; or factors like osteoarthritis in order to explain unilateral affectation of the defect. Unfortunately, the scope of our study did not permit such examination. To our knowledge, only one study reported association of handedness with HAV (Nguyen et al, 2013). They found that left handed people were more likely to have HAV on the left foot. However, no mention was made of that of right foot and there was no explanation for that finding.

The findings of our study showed relatively higher prevalence of HAV among the military and paramilitary groups. This may be attributed to the boots continually worn by persons in these occupations or by prolonged standing associated with their work.

There are some limitations to our study. Being a cross-sectional study, this study cannot be used to establish a causal relationship between HAV and variables like age or occupation; but it may be used to generate a hypothesis. In our study, HAV was diagnosed by inspection of the foot. This is a rough method of diagnosing HAV, mainly used for field study. The gold standard for diagnosis and assessment of HAV is by radiographic method which was not utilized in this study.

It is important to determine the prevalence of HAV in our locality because it will serve as a tool in assessing the impact of HAV on the health of the subjects. Such knowledge forms bedrock for preventive measures and clinical intervention. The prevalence of HAV seemed to be lower than that of the western world and it increased with increment in age. The difference in the prevalence of HAV in males and females was not significant. There is need for further evaluation of the role of such factors like shoe wearing, gait pattern and handedness on the pathogenesis of HAV.

#### **Conflict of Interest**

None

#### **Funding**

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#### **Ethical approval**

It was obtained from the ethical committee of the university.

#### **Informed consent**

It was obtained from subjects

#### **Contributions**

C.M.O: Substantial contribution to conception and design, substantial contribution to acquisition of data, substantial contribution to analysis and interpretation of data, drafting the article, critically revising the article for important intellectual content

U.U.U: Substantial contribution to conception and design, critically revising the article for important

intellectual content, final approval of the version to be published

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