

Associated factors of Hallux Valgus and the Deformity impact on quality of life with and without Surgery - A Review

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ABSTRACT

Hallux valgus is an abnormality of foot characterized by the medial deviation of first metatarsal and the lateral deviation of big toe. The deformity has vast impact on the quality of life and is commonly associated with functional disability and results in foot pain, impaired gait, falls and balance impairment during walking and standing. The aim of this review article is to determine the associated factors of hallux valgus and their effects on the quality of life with and without surgery.

Deformity of hallux valgus is associated with deteriorating effects on the health of foot. The deformity not only impacts the foot health but also health in general. Without the surgical treatment, the devastating effects of foot pain, gait instability and physical appearance affect the social and emotional aspects of life. Surgery leads to better functional abilities of foot and overall quality of life in majority of the patients.

Keywords: Hallux valgus, Deformity, Associated factors, Impact, Quality of life, Surgery

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INTRODUCTION

Hallux valgus is among the most common forefoot deformities¹. It is an abnormality of foot in which there is subluxation and osteoarthritis of the first metatarsophalangeal joint characterized by medial deviation of the first metatarsal and lateral deviation of the big toe². The lateral deviation of the hallux presses against the adjacent toe and could result in prominence of the head of first metatarsal called bunion³. It is commonly associated with functional disability and results in foot pain, impaired gait, falls and balance impairment during walking and standing. Research across the world has documented that hallux valgus is more commonly seen in females and in the elderly. Munteanu et al has mentioned the role of genetics in the development of hallux valgus⁴. Another research has stated that family history was significantly related

to the development of deformity among the individuals⁵.

World over, individuals are affected by the deformity. A cross sectional study conducted in Riyadh has documented the overall prevalence to be 43% (males: 30.7% and females: 49.2%)⁵. Another study conducted in Spain has reported the prevalence to be 39%⁶. A research in Indonesia has stated the prevalence to be 25.25%⁷. Similar prevalence (23%) was observed in a research conducted in Taiwan⁸.

The etiology of the disorder is multifactorial. Female gender, foot style, BMI, age and flat foot are among the common factors⁵. A study has revealed that shoe shape also contributes in the development of this disorder. Constrictive shoe shape worn above the age of 40 years is among the risk factors⁴. Another research has documented that it is more common in individuals with hammer toes⁶. Research across the globe has documented that hallux valgus does not only affect the quality of life but also have impact on the psychological wellbeing of the patients. Treatment options include surgery and it is considered to be playing a fruitful role in improving the emotional status and also quality of life³. Since the deformity of hallux valgus is among the common foot disorders and has vast impact on the quality of life that is why the study was planned to determine the associated factors of hallux valgus and their effects on quality of life with and without surgery.

Search Criteria: The relevant articles were searched through Google, Google Scholar and PubMed databases from 2015 to 2021. The duplicated articles were removed. Only those articles were included which met the inclusion criteria. The inclusion criterion was to include articles in English, mentioning the

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associated factors and its effect on quality of life with and without the surgery. Articles in which methodology was not mentioned clearly and the language was other than English were excluded.

LITERATURE REVIEW

Association of gender

Hsu et al have documented the pathophysiology behind the development of hallux valgus. The deformity is associated with genetic variants and the genetic determinants were found to be sex specific⁹. Females in age range of twenty to thirty nine years with habits of wearing shoes with constrictive design are prone to develop hallux valgus¹⁰. A study conducted on the Spanish population has documented that it was more prevalent among the females (48.1%) as compared to males (28.3%) but there were no statistically significant results in terms of agenesis between the male and female genders⁶. A study conducted in Saudi Arabia also showed high prevalence in the females (49.2%) as compared to 30.7% in males⁵. Parallel results were documented in a study conducted among male and female genders of two different races. Among both the black and white races, the deformity was found to be more prevalent in females¹¹. Another study has revealed contradictory results and stated that the overall health and in specific foot health is similar among the two genders with the difference being there in the severity of the deformity².

Association of age

With the advancing age, there are negative effects on the quality of life of individuals, especially in domains of foot health². A study conducted in Spain has documented that the prevalence of hallux valgus was more in the elderly individuals over the age of 65 years⁶. Another study revealed that the deformity was more common in females above 26 years of age as compared to females of age below 26 years ($p < 0.05$)⁷. A study conducted in America has documented similar results documenting that hallux valgus is more prevalent in the older aged individuals¹¹.

BMI

A research has documented that hallux valgus was not related to BMI of the individuals⁵. A research conducted at Bekasi city, Indonesia has reported contradictory results stating that obese women are more prone to develop the deformity as compared to those who have normal BMI⁷.

Pes planus

Research has documented that individual with flat foot are more prone to develop hallux valgus (48.1% vs 36.1%)⁶. Golightly et al in their study have identified that pes planus contributes in the development of developing hallux valgus¹¹. Faldini et al have also documented similar results in terms of association of flat foot with that of hallux valgus. The research has mentioned the development of pes planus along with hallux valgus in young children in age range of eight to ten years¹². A Korean research has documented contradictory results and stated that pes planus is not associated with the development of hallux valgus¹³. A study conducted in Spain has revealed that it was found to be

more in individuals with pes planus (48.1% as compared to those without the flat foot deformity (36.1%)⁶.

Shoe style

The shoe style is also among the contributing factors in the development of hallux valgus. According to a research, young women prefer to wear high heeled shoes with constrictive toe boxes but as they age they prefer flat shoes with broader toe boxes¹⁰. The foot deformity being more common in females could be attributed to the preference of tight shoes¹⁴. The condition is more common in females wearing shoes with elevated heels height as depicted by the findings of a study which mentioned that 45.2% females wearing heels had the disorder as compared to those who don't wear high heels (39.2%)⁶. A cross sectional comparative study on sales women, conducted in West Java, Indonesia has documented that high heeled shoes play a significant role in contributing to the deformity. The females with high heels are 2.77 times more prone to develop hallux as compared to the other group. Years of shoes wearing also matters; those females who had been wearing high heeled shoes for more than four years are 5.22 times more prone to develop the disease as compared to those who had been wearing for less than 4 years ($p < 0.001$)⁷. A study conducted in Spain has documented that high heels of 6cm or more have a pronounced effect in the formation of hallux valgus. The high heels cause the proximal phalanx of the hallux to be excessively deviated (abducted). The resulting effect of the proximal phalanx pressure on the first metatarsal pushes the first metatarsophalangeal joint and results in adduction¹⁵.

Shape of toe box

The shape of the toe box also affects the development of hallux valgus. A study has reported that females who tend to wear narrower toe box shoes are 1.27 times more prone to the deformity as compared to those who wear broad toe shoes. The high heeled shoes along with narrower toe box create additional pressure on the medial side of the first toe. Females wearing high heeled shoes with narrow toe box are 2.63% more prone to develop the deformity of hallux valgus as compare to those who wear flat shoes with broad toe box⁷. Another research conducted on monozygotic and dizygotic twins have revealed that hallux valgus is not genetically related between the twins rather it is developed due to environmental factors like constricted toe box of the shoe⁴. An interesting study was conducted in Japan on preschool children. The foot was examined for hallux valgus in two groups of students; one wearing shoes at the campus and others who stay barefoot. Those who wear shoes reported to have more chances of developing the deformity than the other group. Among those who wear shoes, those who wear shoes especially tight shoes of less length that accommodate their feet with difficulty reported to have higher prevalence of hallux valgus as compared to those who wear shoes with more length as that of their feet. The deformity was more pronounced on the left side¹⁶.

Quality of life without surgery

Research has proven that hallux valgus deformity has

devastating effects on quality of life⁶. Parallel findings were documented in a study with elderly patients suffering from hallux valgus. The severity of the condition not only affects foot health but health in general². Another study conducted in Japan has documented that quality of life of those with hallux valgus was lower than that of those without. The decision of surgery should not be depending on the severity of disease rather it should be dependent on the effect of deformity on the quality of life¹⁷. Talu et al has mentioned that the deformity affects several components of daily life, negatively impacting the emotional and social lives. It is also associated with features that hampers physical activity of the individuals along with complains of pain¹⁸. An online survey on the patients of hallux valgus has documented some interesting results. When participants were asked if they had to choose between living with the hallux valgus deformity versus sacrificing some years of life to be free from bilateral hallux valgus deformity, the participants opted to sacrifice 1.8 years of life (mean SG score 0.95 ± 0.14) for hallux valgus surgery with 5% mortality rate. This result clearly shows the impact of the deformity on the quality of lives of the individuals. The disease has the same intensity of adverse effects on the health status and quality of life of the individuals as compared to those who are suffering from conditions like cystic fibrosis, inflammatory bowel disease, and aesthetic nasal deformity after primary rhinoplasty etc¹.

Gait instability

The deformity of hallux valgus disrupts the walking pattern of the individuals. A study conducted on females with hallux valgus has revealed that gait was affected due to the forefoot deformity¹⁹. A study published in Journal of Applied Biomechanics has revealed that the deformity of hallux valgus disrupts the gait pattern due to several factors. The rear foot becomes everted along with lack of stability and coordination between the forefoot and the midfoot. This leads to decrease in foot rigidity and excessive mobility of the rear foot resulting in deformed gait patterns²⁰. A research conducted in South Korea has revealed that hallux valgus affects the parameter of gait as well as the intersegmental motion of foot. More the severity of the deformity more will be the effect on walking style of the individuals¹³. Another research conducted in Queensland, Australia has documented that mentioned that severity of hallux valgus is directly related to the impairment of gait, more severe the hallux valgus more will be the gait impairment. Moderate and severe hallux valgus can affect the abduction and plantar flexion of hallux. This leads to the mediolateral sway during the single leg stance²¹.

Foot pain

The condition is associated with pain in the foot⁵. A community based study conducted in America revealed that foot pain was more prevalent in females of Afro-American origin and American men with hallux valgus deformity¹¹. Another study conducted in Spain has revealed that hallux valgus deformity is associated with foot pain which affects quality of life of individuals⁶. A study presented contradictory results and mentioned that hallux valgus is not associated with foot pain¹⁰. A study conducted on

women with bilateral hallux deformity has documented that there are pathological changes that result in pain in the foot. These symptoms negatively affect the quality of life and functional status of the women¹⁴.

Functional disability of foot

Hurn et al have mentioned that patients with hallux valgus have weakened plantar flexion and abduction of foot. This in turn leads to foot functional activity weakened and also results in increased risk of fall²¹. A study conducted in Spain has mentioned that hallux valgus adversely affects the foot health and more severe the deformity is, more will be the impairment of functional status of foot²².

Quality of life after surgery

Makhdom et al have documented that although hallux valgus has profound effects on the quality of life, still the reason behind individuals seeking for surgical treatment is for the cosmetic reasons¹. A study conducted in Japan measured the effect of hallux valgus on the quality of life pre and post-surgery. General health and wellbeing were improved according to health related quality of life questionnaire¹⁷. Zhu et al²³ have mentioned that after the span of two years of corrective surgeries for hallux valgus, patients have observed positive impact on the quality of life. The better prognosis was directly proportional to the young age, good physical and mental preoperative health of the individuals undergoing surgeries. The positive impact of young age on the better results of surgery could be explained by the higher mineral bone density as well a functional status of muscles. Another study conducted in Brazil has documented the affirmative effects of hallux valgus corrective surgeries on quality of lives of the patients with medium and severe hallux valgus deformities²⁴. Another research article documented parallel results in terms of beneficial effects of hallux valgus surgeries on the quality of lives. The physical body pain leads to better health status of the individuals²⁵. A study conducted in Turkey documented contradictory results and mentioned that hallux valgus surgeries negatively affect the physical functioning, emotional wellbeing and general health status of the patients. The emotional wellbeing and body pain were being positively correlated with the advancing age individuals²⁶. A study has documented that postoperatively, 31% of patients reported to have residual pain after a span of 6 months. Visual analog scale showed improvement by majority (81%) after a period of 2 years⁸. A systemic review analyzed that in comparison to patients who had conservative management verses those with surgeries, surgeries were observed to be associated with favorable outcomes in terms of pain relief, patient satisfaction and quality of life. Out of the types of corrective surgeries for hallux valgus, distal chevron osteotomy was observed to be more effective than others²⁷. A study conducted in Romania has documented that surgical correction of the deformity leads to alleviation of foot discomfort and pain along with increase mobility of foot. As the quality of life improves, that is why anxiety and depression developed as a consequence of this deformity subside³. A study conducted in Taiwan has documented that the main reason behind people opting for

corrective surgeries are foot pain and limited motion. After the surgery, patients were satisfied seeing their foot appearance and quality of life was improved²⁸. A study conducted in Brazil has reported that after the surgical osteotomy in patients with moderate to severe hallux valgus, improvements were observed. The radiological parameters were improved along with refinement in the quality of life. The patients felt better physically, emotionally and also socially the surgery had a positive impact on their lives²⁹. The first metatarsal osteotomy as treatment for moderate hallux valgus and first tarsometatarsal arthrodesis for severe hallux valgus have favorable results on the Visual Analog Scale for pain³⁰. Although most of the studies have documented the positive impact of corrective surgeries for treatment of hallux valgus, a study conducted in Australia has mentioned contradictory results. The Manchester Oxford Foot Questionnaire (MOXFQ) was used to assess the outcome after surgery. It was found that there was no correlation among the severity of the deformity, degree of surgical correction and the outcome of surgery. The long term outcomes scores were worse than short term and mid-term outcomes. After a period of five years post-surgery, 25.9% of the patients showed dissatisfaction to the surgical procedure³¹.

Recommendations

The deformity of hallux valgus can be avoided by wearing the right choice of shoes. As heel size and the width of fore part of shoe are among the contributing factors, therefore there is a need to create awareness among the public to avoid wearing high heeled and constrictive toe box design shoes⁴. Conservative management in the form of using shoes with inner soles and toe separators can aid relieve the condition to some extent. Also, the intramuscular injections of Botulinum toxin type A (BTA) could lead to alleviation of symptoms and better quality of life. Future researches that focus on conservative management should be planned³².

CONCLUSION

Deformity of hallux valgus is associated with deteriorating effects on the health of foot. The deformity not only impacts the foot health but also health in general. Without the surgical treatment, the devastating effects of foot pain, gait instability and physical appearance affect the social and emotional aspects of life. Surgery leads to better functional abilities of foot and overall quality of life in majority of the patients.

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