



Effect of Footwear Choice on FootBiomechanics-Survey Study

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Abstract

Background: Footwear is frequently worn on a daily basis to provide foot protection and warmth. However, over time, a shoe has evolved into more than just a piece of clothing, providing a sense of identity and image, inspiring imaginative fashion designs. A web-based cross-sectional study. The number of participants was 520 and efforts were made to sustain maximum representativeness. A total of 520 responses were collected using the Google Form link

(https://docs.google.com/forms/d/e/1FAIpQLSc0qYbaiMTw4f4OyzbghLkW5MKdp38JjnGtgYr1lkI80FN4SA/viewform?usp=sf_link). From this survey study, it has been concluded that most people prefer to wear flat shoes, preferably a good pair of branded and comfortable shoes. It has been observed that due to faulty footwear choices, people experience foot and back pain, and people agree that most of the musculoskeletal issues will resolve once they start focusing on good footwear choices. The study revealed that the footwear we choose has a great effect in the biomechanics of the foot. Survey discussed about the two main category of footwear and analyzed that most of the participants opted for comfort over style by choosing flats over heels. Also it was seen from the previous studies that heels affect the foot mechanics such as transverse arch of foot and ground reaction forces on foot

Key words: Footwear Choice, foot arches, heels, branded shoes

Main text

1. Introduction

Footwear is frequently worn on a daily basis to provide foot protection and warmth. However, over time, a shoe has evolved into more than just a piece of clothing, providing a sense of identity and image,

inspiring imaginative fashion designs.^[1] Design-led shoes are frequently unsuitable in terms of structure and function for the wearer's foot^[2]. Innovative designers create enormous heel heights, narrow toe boxes and enticing materials. However, footwear choices are not solely influenced by design, and women typically choose a shoe based on the activity for the day as well as comfort. Footwear shopping frequently causes stress in people's lives because there is a limited selection of shoes that fit properly and the prices are high^[3]. This is reflected in the failure to accurately measure the foot size prior to purchasing a shoe, resulting in an estimated 50% of the population wearing ill-fitting shoes^[4]. This disparity in foot and shoe shape and sizing is frequently thought to contribute to common foot pathologies^[5,6]. When ill-fitting shoes are linked to the presenting complaint, footwear advice is widely integrated into effective treatment plans in a clinical setting, but there is little understanding of what specific advice should be given. Although there are some footwear assessment tools available to help clinicians evaluate shoes^[7,8], there are some factors that categorise "healthy" footwear that are unfounded and frequently based on myth. Wearing ill-fitting shoes will cause musculoskeletal based pathology.

Ill-fitting footwear

Although some attempts have been made, defining ill-fitting footwear, particularly the appropriateness of fit, is subjective and difficult to quantify^[9,10]. Ill-fitting footwear can be defined as a shoe that is too long and wide, resulting in a sloppy fit, but it can also be too short and cramped, resulting in a tight fit^[11,12,13]. However, ill-fitting may extend beyond length and width to include shoes that obstruct normal foot function, resulting in an altered gait pattern as a result of the shoe. Because there is no single category for ill-fitting footwear, the effects of wearing ill-fitting shoes can vary from person to person.

Several observed changes have been reported when considering the impact of wearing ill-fitting footwear on gait parameters. Balance and increased risk of falling^[5], increased dorsal toe pressure^[16], spatiotemporal factors such as lowered gait velocity and stride length^[13], and range of motion^[14] are examples of these. Using a shoe that does not conform to an individual's normal function and the environment will cause changes in movement patterns seen in gait, as highlighted. In addition to the observed gait changes, the clinical effects of ill-fitting footwear can result in skin lesions (blisters, hyperkeratotic lesions, rubbing soreness, and ulceration)^[15,16]. These changes, it is suggested, can then lead to pathology and pain^[17,18].

High Heels

High heeled shoe styles are an example of ill-fitting footwear, with the design giving up fit to keep the shoe on the foot and style took priority over functionality. The height of a shoe's heel is frequently the subject of research and media attention. Outside of athletic footwear, the most frequently researched footwear topic is the effects of high heels shoes on gait parameters. This body of knowledge indicates that

walking in a high heel shoe affects more than one isolated parameter, but rather a collection of changes that alter gait ^[20,21]. The most common of these changes involve increased forefoot pressure, compromised balance, changes in knee moments, altered muscle activity, and forefoot pronation.

As heel height increases, so does forefoot pressure toward the medial side of the foot ^[22-24]. The forefoot is loaded as the centre of pressure shifts anteriorly from the altered stack at the rearfoot. When the heel stack exceeds 2 cm ^[24], the pressure increases and continues to increase as the height increases ^[25]. Even when the heeled shoes are removed, the increased forefoot pressure persists, with frequent users experiencing elevated pressures when walking barefoot ^[26]. Other than an association between high heel shoes and painful callus, there is little evidence to support a negative outcome for the observed increases in forefoot pressure ^[27].

2. Methodology

Study design and rationale

A web-based cross-sectional study was conducted on the general population to assess that **Shoes can affect foot Biomechanics** using a validated questionnaire. This study was a rapid, large cross-sectional online survey conducted (September 7 2022 to November 1 2022) in India. The data was collected using Google Form web survey platform. A standard study invitation message along with the link to the online survey was shared through personal and social contacts via email, Facebook, Instagram, and WhatsApp. Participants were asked to share the study link to increase number of study participants, which helped in conducting a nationwide survey. Participants were also requested to be honest in their responses. Responses were saved only by clicking on the “submit” button provided at the end of the questionnaire.

Study participants

The principle of maximum diversity was followed to recruit a representative sample for this study. The number of participants was 520 and efforts were made to sustain maximum representativeness. A total of 520 responses were collected using the Google Form link.

Survey questionnaire

The electronic survey questionnaire was designed to assess that Shoes can affect foot Biomechanics such as comfortable shoes, branded shoes, shoes with good sole. The questionnaire composed of 10 questions assessing Shoes can affect foot Biomechanics.

3. Results

The following are the survey questions along with the detail of the answers collected:

1. Do you prefer wearing flats or heels daily?

According to the survey maximum participants prefer wearing flats over heels as majorly college students were the part of this survey and they want flats for their everyday comfort. (Figure 1)

2. Do you prefer branded or non branded source?

56.8% study participants prefer wearing branded shoes while 48.2% participants wear non branded shoes. (Figure 2)

3. How many pair of shoes a person have for daily user?

For this 56.5% supports 1 good pair, 40.2% goes with 2-4 pairs and 3.3% said that 5-10 pairs of shoes are required by a person for daily use. (Figure 3)

4. Does comfort matters or the money?

When asked about the comfort and money, 76.9% selected comfort over money. (Figure 4)

5. Do you feel morning stiffness in your foot?

40.2% participants feel morning stiffness while 59.8% do not feel any stiffness in the morning. (Figure 5)

6. Do you have lower back pain?

From the survey we found that 24% participants suffer from lower back pain and 76.5% do not have back pain. (Figure 5)

7. Do you have any foot related issue?

In response to this 90.2% participants were found to have foot related issue and only 9.8% did not have any problem in their foot. (Figure 5)

8. Do you think a better shoe can be a cure to major of the foot and back related issue?

Majority of the participants believe that a better shoe can relive foot or back issues and there were 76% participants who went with yes and 24% participants disagree to the statement. (Figure 5)

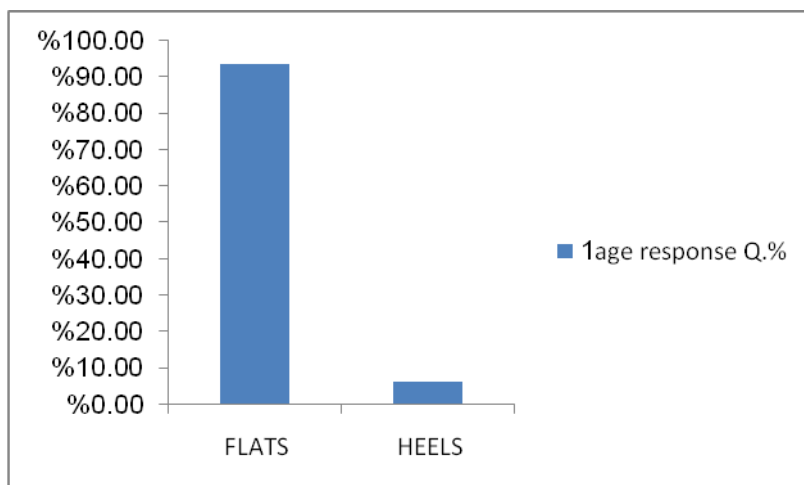


Figure 1. Most of the population prefers to wear flats as compared to heels.

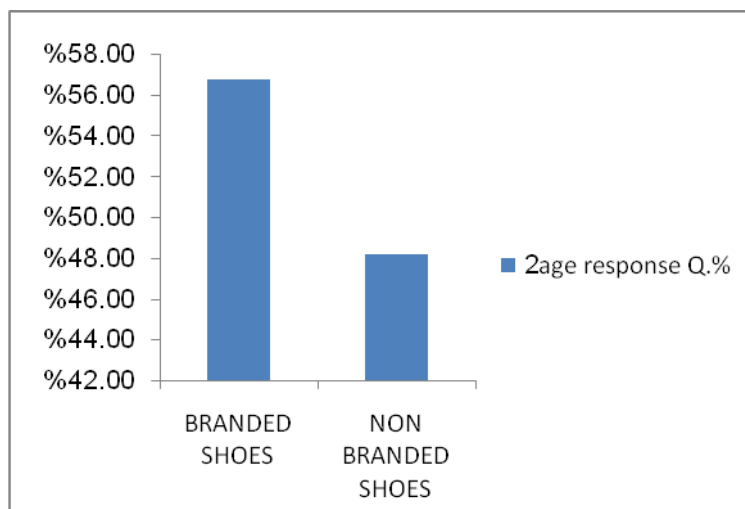


Figure 2. Most of the population prefer branded shoes as compared to non branded shoes.

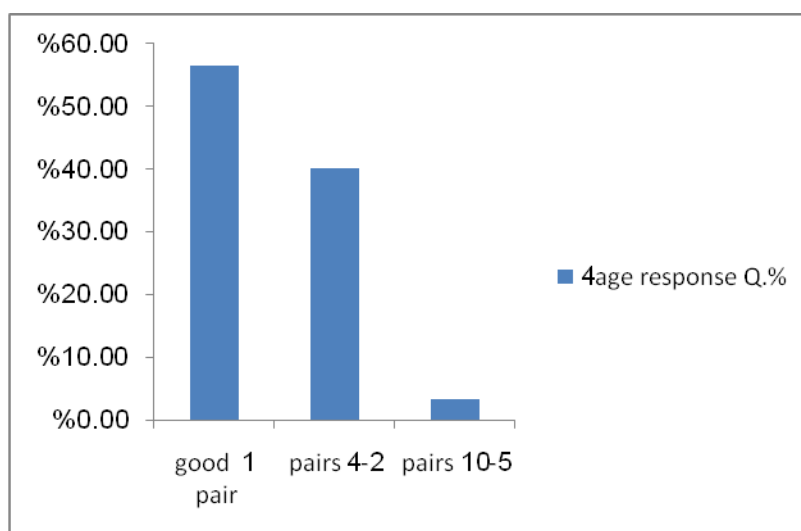


Figure 3. Most of the population prefer 1 good pair of shoes as compared to buy 5-10 pairs.

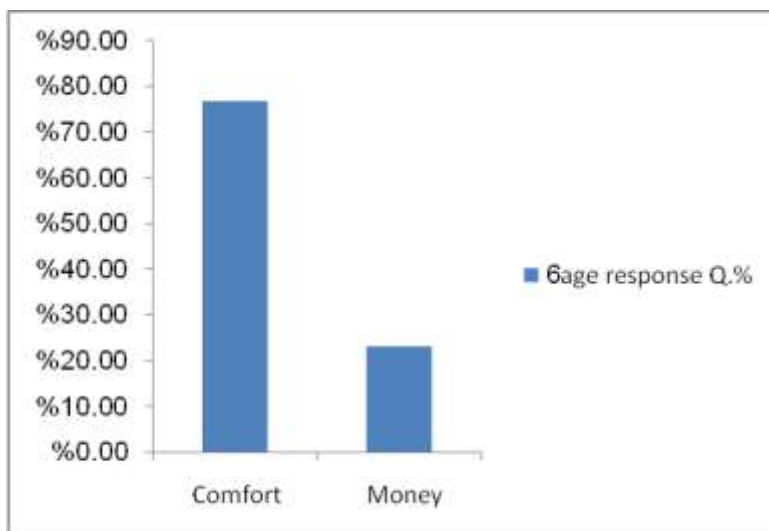


Figure 4: Most of the population prefer comfort over money.

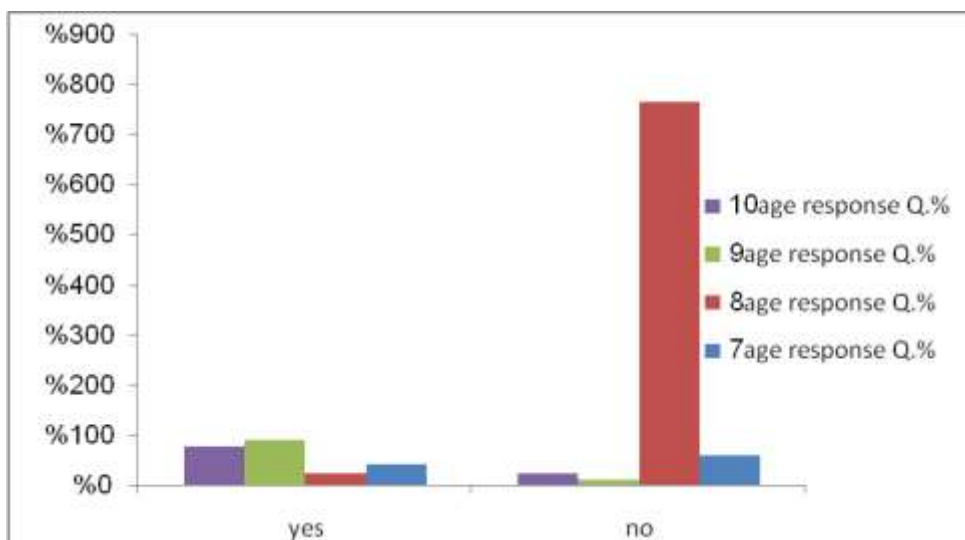


Figure 5

4. Discussion

The study revealed that the footwear we choose has a great effect in the biomechanics of the foot. Survey discussed about the two main category of footwear and analyzed that most of the participants opted for comfort over style by choosing flats over heels. Also it was seen from the previous studies that heels affect the foot mechanics such as transverse arch of foot and ground reaction forces on foot^[28]. Moreover it was seen that majority of the participants had foot related issues and lower back pain and the main reason for this is extremely high rate of good quality or so called branded shoes, participants prefer wearing branded over non branded for comfort but somewhere hesitate to pay the hefty amount and at the end settle for

the low budget shoe that in some or the other way affects the biomechanics of the foot and this has been confirmed from the previous study that showed that high heels can cause plantar fascia strain and tightness and good quality shoe with proper medial arch support will reduce the strain and tightness of plantar fascia^[29].

5. Conclusion

From this survey study, it has been concluded that most people prefer to wear flat shoes, preferably a good pair of branded and comfortable shoes. It has been observed that due to faulty footwear choices, people experience foot and back pain, and people agree that most of the musculoskeletal issues will resolve once they start focusing on good footwear choices.

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Impact statement

From this survey study, it has been concluded that most people prefer to wear flat shoes, preferably a good pair of branded and comfortable shoes. It has been observed that due to faulty footwear choices, people experience foot and back pain, and people agree that most of the musculoskeletal issues will resolve once they start focusing on good footwear choices.

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Permissions

No permissions were required

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