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Original Article

Impact of High-Heeled Footwear on the health of the young female students of selected colleges of Mangalore, India

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ABSTRACT

Introduction: High-heeled shoes are a leading cause of foot problems and chronic lower limbs, as well as discomfort, fatigue, and an increased risk of injury. The research aimed to analyze the influence of wearing high-heeled shoes on the foot health of young females. The study emphasizes the need to create awareness among females about the detrimental impacts of utilizing heeled footwear over the long term on discomfort, BMI, and functional capacity. A slight change in footwear choices could significantly reduce discomfort and disability experiences.

Methods: Purposive sampling was used to select 50 young female students studying in Mangalore's undergraduate college for the cross-sectional study. A pre-designed and pre-tested structured Google Form questionnaire was used to examine the socio-demographic characteristics and outcome measures, including the location of pain, the intensity of the pain, and functional ability. Data was collected in the second half of 2020. Descriptive and inferential statistics were used to analyze the data.

Results: According to the survey, 46% of young female students exhibited poor functional activities while wearing high heels. It was found that 12% of students had pain in their toes all of the time, 8% had pain in the arch of their foot, and 25% had discomfort in their lower back occasionally. About two-thirds (64%) felt averagely manageable discomfort.

Conclusion: The study found that wearing heeled shoes has a significant influence on women's musculoskeletal systems. Young females will be better able to resist pain from the deforming effects of footwear if they condition their feet properly and choose the appropriate footwear.

Keywords: Foot pain, High heeled footwear, Young female students

Introduction

The ultimate fashion signifier of being a woman is high-heeled shoes. The sexiest and most feminine shoe a lady may wear is the high-heeled shoe. High heels have the power to alter the wearer's posture and appearance dramatically. Heels lengthen the leg and slim the calves and ankles. Wearing heels creates a contradiction because the physical changes affect how a woman feels and are often regarded. A woman grows taller and strikes a defiant attitude that represents sexuality and strength. High heels, on the other hand, can make a lady helpless, teetering and wobbly, unable to walk, docile, and weak.[1]

Even though high heels are detrimental to health and comfort, ladies nonetheless wear them on occasion. Women frequently make sacrifices for the sake of foot fashion and pay a great price when pain and deformity arise.[2] According to the Spine Health Institute, 72% of women would wear high heels at some point throughout their lives.[3] According to a survey, 48.5% of women wore high

heels daily or on weekends for social engagements. When worn regularly, high heels put a strain on the back, toes, ankle, and knee joints.

High-heeled shoes can harm the spine, hips, knees, ankles, and feet, as well as significantly affect posture and stride. High heels also cause toe sprains, leg and back pain, and greater weight bearing on the toes.[2] Furthermore, wearing high heels causes poor posture and increases the chance of falling, especially among the elderly. Long-term use of high-heeled shoes causes changes in body weight distribution on the feet, with increased weight bearing on the frontal area of the foot. Wearing high heels might disrupt bodily balance and functional functioning. In women between the ages of 20 and 29, high heels cause lower back discomfort.[5]

By flexing or forward bending the hips and spine, the human body strives to compensate for the off-kilter balancing heels. High heels, particularly pointed ones, tighten the calf, hip, and back muscles as a result of the added pressure. Excessive muscle fatigue and strain are the result.[2] Muscle discomfort was mostly observed in the foot and lower limb owing to high heels, with 29.6% and 24.7 % respectively, while back pain accounts for 9.9%. High heels cause venous insufficiency in the calf muscle, producing foot and lower limb pain. The muscles of the lower back are also harmed as lumbar curvature increases.[6]

The data above reveals that wearing high heels causes a variety of health concerns. The influence of high-heeled footwear on the health of young females piqued the researcher's curiosity. As a result, women should be aware of how to avoid the negative effects of high-heeled footwear as well as the potential risks. The goal of this study was to discover a link between pain levels and functional activities to improve future health. The findings of this study could help young females determine and execute healthy footwear choices to avoid further complications.

Methods

High heels have been worn by women at some point in their lives, and many do so daily. In clinical and institutional settings, the prevalence ranges from 39% to 78%, comprising a significant share of the female population.[7] The goal of the study was to look into female students' footwear preferences in terms of comfort. Following a review of the literature, a survey was created with the assumption that long-term usage of high-heeled footwear had a negative influence on the health of young women.

Through an internet platform, a cross-sectional survey was conducted targeting the female universe doing their graduations in Mangalore. The sample size was estimated using the one-sample mean formula.[8] Considering the standard deviation (σ) of the sample age as 5.12 with a precision (d) of 1.6 and a 95% confidence interval ($Z_{1-\alpha/2}$ - two-tailed probability), the sample size was calculated using this formula: $N = Z^2_{1-\alpha/2} \times \sigma 2 / d^2$. Thus, the sample size required for the study was 39.34. Considering a possible 10% loss of sample, the final sample size was 50. To pick the sample and extract as much information as possible that could be acquired, purposive sampling was performed. This enables us to describe, how the population will be significantly affected by the findings. The pain was assessed using the numerical pain rating scale.[9] The questionnaire was adapted from FHSQ[10] and was formatted as follows: The first portion was for the sample's sociodemographic characteristics, followed by questions to determine the sample's footwear-wearing habits. The final component aimed to determine the sample's foot health using three subcategories: site of pain, level of pain, and functional abilities. A questionnaire test was used to ensure that the questions were understood and delivered in an electronic format. Young women, 18–20 years old, studying in selected degree colleges and available during the data collection were included. Those who had any neurological condition affecting lower limbs were non-ambulatory and relied on walking aids, as well as those who refused to sign the consent form, were excluded

Young female students were asked about their sociodemographic and clinical characteristics during interviews. The baseline data was collected on the type of footwear worn, heel height, back pain history, frequency and duration of wearing, and reasons for wearing high heels. All participants underwent a clinical examination that included measuring their height and weight while barefoot and wearing light clothing on a calibrated weighing scale. The BMI (body mass index) was determined. The participants completed a self-administered foot health questionnaire that included both foot-specific and general health questions. The toes, arch of the foot, heel, calf muscles, knees, and lower back were all evaluated for pain. The discomfort felt when wearing high-heeled footwear was rated on a numerical pain rating scale. Functional ability was elicited using a 5-point Likert scale.

The institution's ethics committee provided ethical permission, and ethical practice was

followed throughout the investigation. The questionnaire was created and adapted from prior studies to capture the frequency and duration of wearing high heels over time. The schedule was created and validated by subject matter specialists. A reliability of 0.72 (Cronbach's alpha) was obtained.[11] Eligible samples (50) were selected through purposive sampling and were directed to a Google form to complete a pre-designed questionnaire. Instead of providing a written signature, respondents confirmed their approval electronically. The ethics committee authorized the protocol. The location of pain, level of pain, and functional ability were all measured using a foot health questionnaire.

Statistical analysis was undertaken using descriptive statistics and Spearman's correlation coefficient. Non-parametric tests like Chi-square tests were used. The significance level was set at $p < 0.05$.

Results

The online survey received replies from 50 female students, the majority of whom were young ladies in their final year of study (62%). The socio-demographic information on the questionnaire included height and weight measurements. The participants were instructed to choose comfortable footwear. Questions on frequency, duration of use, heel height, and how certain shoes made them feel were used to probe wearers' habits.

More than half (58%) of young ladies had a healthy BMI. Flat shoes were chosen by 75% of respondents, compared to 21% who chose high-heeled shoes. Nearly 64% of students wore heels between 2.5 and 3.5 cm. One-third of the respondents (34%) associated footwear with a fashionable appearance and utilized it as a dress guideline (56%).

Four out of five (80%) of the respondents chose high-heeled shoes for the event. We found that most students do not wear high heels beyond 2.5 cm for everyday tasks. For 3-6 hours, about 40% of females wore high heels. A significant number of respondents reported that it made them feel more feminine. When wearing high heels, 22% of respondents claimed that it improved posture and provided a feeling of being taller.

The sites of pain were most common in the toes (12%) and heels (14%), respectively, for female students. Wearing high-heeled shoes occasionally caused pain in the lower back (48%) in nearly half of the respondents.

Detailed data on the pain level of the respondent might be observed in Table 1. While the data on functional ability are displayed in Table 2.

Table 1: Pain assessment using the visual analog scale (N=50)

Level of pain	Number of sample = 50	
	Frequency (f)	Percentage (%)
Mild	16	32.0
Moderate	33	66.0
Severe	1	2.05

Table 2: Functional ability assessment (N=50)

Functional ability	Number of sample =50	
	Frequency (f)	Percentage (%)
Good	9	18
Average	18	36
Poor	23	46

Table 3: Correlation between pain level and functional activities and BMI (N=50)

Correlation coefficient	Pain – functional ability	Pain - BMI
r	-0.0076	-0.1584

*Significant at $p < 0.05$

Discussion

Women's attractiveness is enhanced by high heels, but their lumbar curvature is altered. In this era, high heels are becoming increasingly popular. The bulk of the young women in the sample (46%) were under the age of 20, while 36% were over 20 years old. Consistent findings are observed in several studies conducted on heel height among females who wear high heels. High-heel wearers were more prevalent among the younger generation (ages under 24 years).[12, 13,14,15,16]

Carrying extra body weight puts a lot of strain on the bottom of the foot. Extra weight can cause harm to the foot and ankle joints.[17] Foot and ankle disorders are significantly more common in people with a higher BMI. The majority of the young females (58%) in the present research had a normal BMI. According to a study on the prevalence of foot deformity among urban working women, more than half of the women (65%) had a normal BMI.[18] Because of the affluent lifestyle of individuals, particularly students, the prevalence of overweight and obesity is on the rise in our era.[19] The findings of other studies are inconsistent, showing that the majority of the informants were overweight (BMI of 25.45 +/- 4.51 kg/m).[7,13]

According to our statistics, more than half (52%) of the women wore flat shoes, 32% casual shoes, and 16% high heels. Supporting studies revealed that the majority of women (38%) wore wedge heels, and the majority of them (40%) wore HHS with a leather sole.[16, 20] Similarly, the findings of the study conducted on the comfort of young adults were consistent. They started to wear sneakers (48.52%) and ballerina flat versions (14.2%) more frequently, and also chose to wear flat heels up to 2 cm (33.88%) and boots daily (14.88%).[12]

The present study findings revealed that the majority of young females (80%) wore high heels at least once on special occasions such as parties and social gatherings, whereas only 8% of the sample wore high heels all the time. The findings are consistent with a study on the association of pain and functional limitations among working women. The results showed that flat shoes were worn every day, as were comfort shoes, while heeled shoes were worn 2-3 times per week.[21] The study findings are supported by a study conducted on heel height and low back pain wherein women (45%) wore heels daily during their working hours.[14]

According to the findings of the current study, 64% of females wore heels less than 2.5 cm, and 6% wore heels more than 5 cm. Furthermore, the findings of the study on musculoskeletal discomfort and high heels revealed that 63% of females wore HHS for four days each week and 37% wore HHS for at least seven hours every day.[16] Studies on awareness of risk related to footwear problems report that heels should not be higher than 2 inches in height. The pressure on the forefoot increases as the heel height increases.[20] When women wore heels, the results were comparable, according to a study on back pain and functional limitations.[14]

In contrast to our findings, an article on sales promotion girls found that 89.4% of young girls wore middle heels (5-7 cm) and 10% of young girls wore high heels (8-10 cm).[13] Results from the study on high heels and comfort shoes discovered that the majority of people do not wear high heels (above 5 cm), but when asked what style of shoe they would like to wear more often, a substantial number of people said models with high heels. With varied models, younger people chose heel heights of more than 7 cm (12.84%).[12]

According to the current study data, 56% used heels as a dress code, 34% to seem fashionable, and 22% to improve posture and appear taller. Another study on the prevalence of musculoskeletal pain with different heel heights showed that high heels were worn by 14% of women, 77% for comfort, 7% for work, and 2% for other reasons.[22] In other studies, when respondents were asked what high heels meant to them, the majority associated them with beauty and femininity, followed by sacrifice and discomfort.[12]

According to the findings of the current study, 12% of the participants always experienced toe discomfort, and 14% had heel pain. Consistent findings were observed in studies on heels and musculoskeletal discomfort. High heels caused discomfort in the foot and lower limb (29.5% and 24.7%), but flat sandals caused pain in the foot and lower limb (39.5% and 19.8%, respectively).[14, 16, 23] The findings are also in line with those of a survey of 200 ambulatory responders, which found that 21% of them felt ankle pain.[20]

The current study found that 64% of the participants had tolerable pain and 2% experienced severe discomfort. The findings are in line with a study on the impact of high heels on the young generation. Results found that 18.8% of the sample had foot edema.[15] Long heels can cause both heel and back pain. The findings of the present study confirmed that 90% of the participants had no back pain. Approximately

68% of females from another study report low back discomfort, with 11% of individuals reporting probable impairment as a result of LBP symptoms.[13, 15] The findings are in line with the findings of a study that found that 45% of women's backs hurt as a result of wearing heels.[14]

Limitations

Researchers confined the usage of foot health questions in the tool to a few subsections. Only one location was used to collect research samples. The sample size was limited to a small group of female students, which, if increased, could improve the study's results. Personal interviews, rather than online interviews, could have provided more in-depth information about the risk variables for the study. Because the research was conducted on a small scale, the results cannot be generalized, and thus it still needs improvement and future research. Furthermore, because of the small number of respondents, the respondents' traits were less diverse.

Conclusion

The study results indicate that wearing high-heeled shoes occasionally causes pain in the lower back, and functional limitation ranges from minimal to moderate. Young women should choose comfortable shoes to maintain good foot health and avoid foot pathology.

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