

IMPACT OF HIGH HEEL FOOTWEAR USES ON POSTURAL BALANCE IN HEALTHY YOUNG ADULT FEMALES: A CROSS-SECTIONAL STUDY

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ABSTRACT

Aim: The aim of the study was to determine the effect of high heel use on balance among adult females and to evaluate the association between high heel usage characteristics and balance impairment. **Methodology:** A cross-sectional survey study was conducted among **110 adult females** aged **18 years and above** who had been using high-heeled footwear for more than six months. Participants were selected based on inclusion and exclusion criteria using convenient sampling. Data were collected through a structured questionnaire and a Balance Confidence Scale distributed via Google Forms. Information regarding demographic characteristics, frequency of high heel use, heel height, duration of use, balance confidence, and balance-related problems was obtained. The collected data were analyzed using percentage analysis, descriptive statistics, and Spearman's rank correlation coefficient. **Result:** The majority of participants were **18–20 years** of age (60.9%). Most participants reported wearing high heels **occasionally (50.0%)**, preferred heel heights of **less than 3 cm (44.5%)**, and wore high heels for **3–6 hours per day (33.3%)**. Many participants experienced occasional unsteadiness and moderate reductions in balance confidence while performing daily activities in high heels. Spearman's correlation analysis demonstrated that the **duration of high heel use was significantly associated with balance impairment ($\rho = 0.200$, $p = 0.036$)**, whereas the frequency of use and heel height showed no statistically significant association with balance impairment. **Conclusion:** The findings suggest that prolonged use of high-heeled footwear may adversely affect balance among adult females. Although heel height and frequency of use were not significantly associated with balance impairment, longer daily duration of wearing high heels was related to greater balance difficulties. The study emphasizes the importance of increasing awareness regarding safe footwear practices to reduce balance impairment and the potential risk of falls.

KEYWORDS: High heels, Balance, Adult females, Proprioception, Balance confidence, Postural stability, Spearman correlation, Survey study.

INTRODUCTION

High-heeled shoes are a common type of footwear in which the heel is elevated above the toes, making the wearer appears taller.^[1] They are widely associated with fashion, femininity, and professional appearance, and are frequently worn by women across different age groups.^[2] Their popularity is influenced by cultural norms, workplace expectations, and social standards of beauty.^[3]

High heels shift the body's center of gravity forward, increasing pressure on the forefoot and altering lower-limb alignment, which can adversely affect posture and

balance.^[4] Balance is a complex function that depends on the integration of the visual, vestibular, and proprioceptive systems.^[5] Proprioception, the body's ability to sense joint position and movement, plays a vital role in maintaining postural stability and coordinated movement.^[6]

Previous research has consistently shown that increasing heel height and prolonged duration of high-heel use negatively affect posture, gait, and balance.^[7] Furthermore, balance training has been reported to

improve postural control and reduce injury risk among frequent high-heel users.^[8]

METHODOLOGY

The present study was a survey study conducted to assess the effect of high heel use on balance among adult females. A total of 110 adult females aged 18 years and above who regularly wore high-heeled footwear participated in the study. The participants were selected from RIMT University and RIMT Hospital using a convenient sampling technique. Data were collected using a structured survey questionnaire after obtaining informed consent from all participants.

The inclusion criteria included adult females aged 18 years to above 26 years who had been using high-heeled footwear for more than six months. The exclusion

criteria included females with a history of ankle injury, any fracture, or those who had been using high heels for less than six months, as these conditions could influence balance and affect the study findings. The collected data were analyzed using descriptive statistics, percentage analysis, and Spearman's rank correlation to evaluate the relationship between high heel use and balance.

RESULT

A total of **110 adult females** participated in the present study to evaluate the effect of high heel use on balance. Participants completed a structured questionnaire that assessed demographic characteristics, high heel usage patterns, perceived balance problems, and balance confidence. The collected data were analyzed using descriptive statistics, percentage analysis, and Spearman's rank correlation coefficient.

Demographic Profile of Participants

S. no.	Age	Frequency	Percentage
1	18-20	67	60.9%
2	21-23	35	31.8%
3	24-26	7	6.4%
4	Above 26	1	0.9%

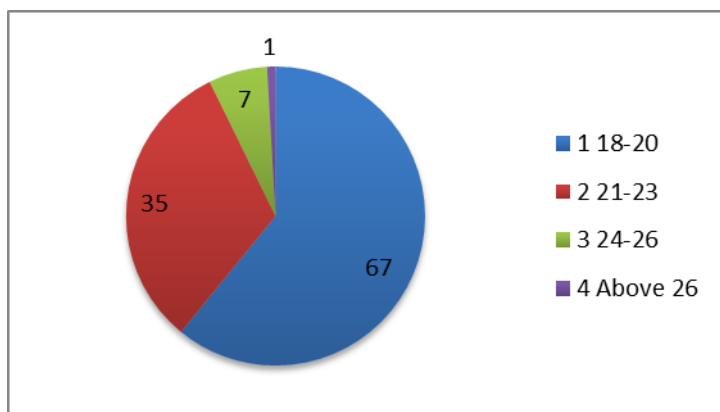


Fig: Age wise Distribution of Participants.

This table illustrates the majority belonged to the 18–20 years age group (67, 60.9%), followed by the 21–23 years age group (35, 31.8%). A smaller proportion of participants were in the 24–26 years age group (7, 6.4%), while only 1 participant (0.9%) was above 26 years of

age. The findings indicate that most respondents were young adult females between 18 and 23 years, representing the predominant age group in the study population.

High Heel Usage Characteristics

S. No.	Usage	Frequency	Percentage
1.	Daily	5	4.5%
2.	3-4 times per week	21	19.1%
3.	Occasionally	55	50%
4.	Rarely	29	26.4%

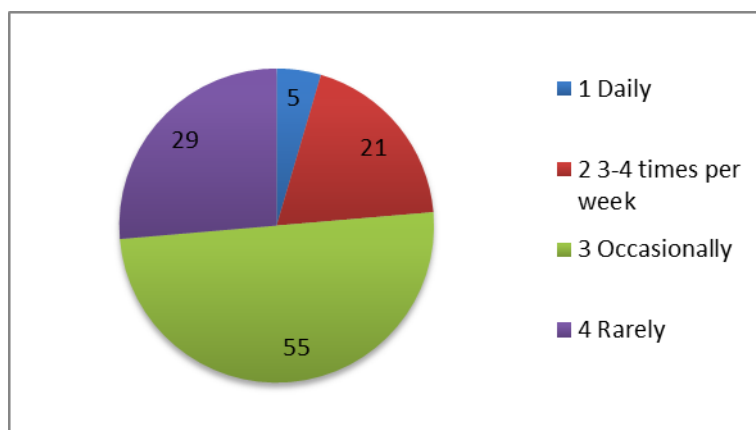


Fig: Usage of Heel Height.

This table illustrates the majority reported wearing high heels occasionally (55, 50.0%), followed by those who wore high heels rarely (29, 26.4%). Participants who wore high heels 3–4 times per week (21, 19.1%) constituted a smaller proportion, while only 5

participants (4.5%) reported wearing high heels daily. These findings indicate that high-heel use was generally occasional among the participants, with relatively few women reporting frequent or daily use of high-heeled footwear.

Daily Duration of Heel Height.

S. no.	Duration	Frequency	Percentage
1.	Less than 1 hour	19	17.6%
2.	1-3 hours	30	27.8%
3.	3-6 hours	36	33.3%
4.	More than 6 hours	23	21.3%

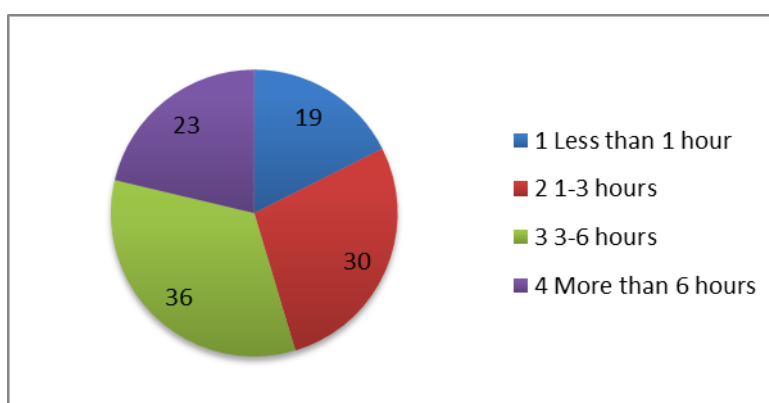


Fig: duration of Heel Height on Daily Basis of Participants.

Out of 110 participants, the highest proportion reported wearing high heels for 3–6 hours per day (36, 33.3%), followed by 1–3 hours (30, 27.8%), more than 6 hours (23, 21.3%), and less than 1 hour (19, 17.6%). These

findings indicate that most participants wore high heels for a moderate duration of 3–6 hours daily, suggesting substantial exposure to high-heeled footwear among the study population.

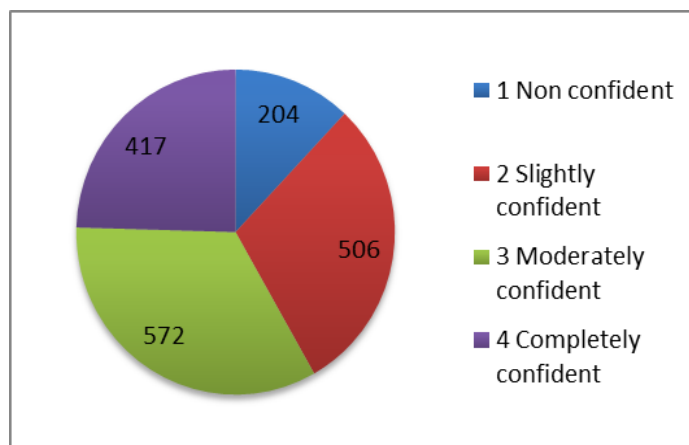
Summary

Items	Not confident	Slightly confident	Moderately confident	Complete confident
Walking around the house	11	33	37	28
Walk up or down stairs	12	28	47	22
Bend over and pick up a slipper from the front of a closet floor	11	33	31	34
Reach for a small can off a shelf at eye level	12	26	42	27
Stand on your tip toes and reach for something above your head	33	23	41	12
Stand on a chair and reach for something	9	41	33	25

Sweep the floor	12	32	35	29
Walk outside the house to a car parked in the driveway	8	34	37	29
Get into or out of a car	8	25	37	39
Walk across a parking lot to the mall	9	28	38	34
Walk up or down a ramp	9	37	36	24
Walk in a crowded mall where people rapidly walk past you	9	40	42	18
Bumped into by people as you walk through the mall	16	30	32	31
Step onto or off of an escalator while you are holding onto a railing	8	42	33	25
Step onto or off an escalator while holding onto parcels such that you cannot hold onto the railing	12	52	22	22
Walk outside an icy sidewalks	25	37	29	17
Total =	204	506	572	417

- Non confident participants = 204 (12%)
- Slightly confident participants = 506 (29%)
- Moderately confident = 572 (33%)
- Completely confident participants = 417 (24%)

S no.	Participants confidence	Total	Percentage
1.	Non confident	204	12%
2.	Slightly confident	506	29%
3.	Moderately confident	572	33%
4.	Completely confident	417	24%



The findings showed that many participants experienced occasional unsteadiness while standing in high heels, reduced awareness of foot position, and moderate confidence while performing daily activities. Confidence was generally lower during more challenging activities such as using stairs, ramps, escalators, and walking on slippery surfaces. Correlation analysis indicated that the frequency of high-heel use and heel

height had little influence on balance issues, whereas longer duration of wearing high heels was associated with greater balance problems. Overall, the study suggests that high-heeled footwear may negatively affect balance, proprioception, and postural stability, increasing the risk of falls and difficulties during everyday activities.

Correlation Between High Heel Characteristic and Balance Issues.

Variable	Spearman's rho (ρ)	p-value	Interpretation
Frequency of High Heel Use	0.025	0.799	Negligible positive correlation
Heel Height	0.131	0.173	Weak positive correlation
Duration of High Heel Use	0.2	0.036*	positive correlation

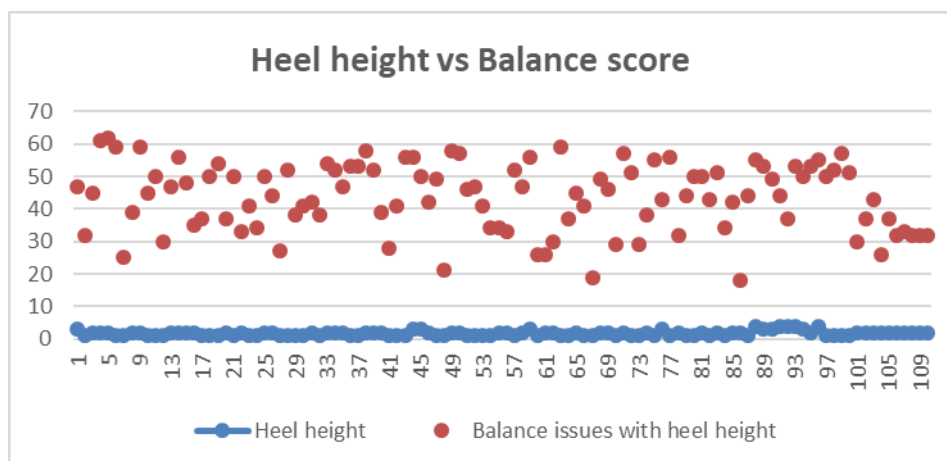


Fig: Heel Height and Balance Score Correlation Scatter Plot.

This table illustrates the relationship between heel height and balance score among the participants. The scatter plot shows a wide dispersion of data points with no clear trend, indicating a weak positive correlation between heel height and balance score. This suggests that

increases in heel height were not strongly associated with changes in balance score among the participants. This interpretation is consistent with Spearman correlation result ($\rho = 0.131$, $p = 0.173$), which indicates a weak, non-significant positive correlation.

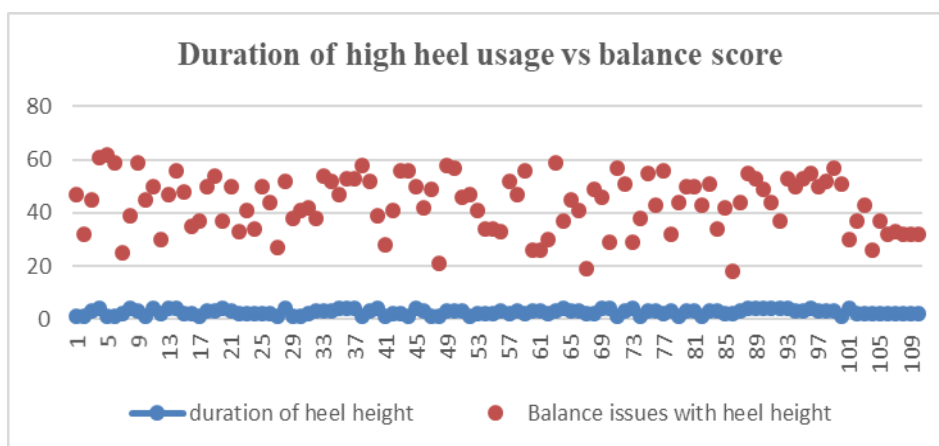


Fig: Height and Balance Score Correlation Scatter Plot.

This table illustrates the relationship between duration of high heel usage and balance score among the participants. The scatter plot shows a slight upward trend, indicating a positive correlation between the duration of high heel use and balance issues. Participants

who reported longer durations of high heel use tended to have greater balance problems. This finding is consistent with the Spearman correlation result ($\rho = 0.200$, $p = 0.036$), which indicates a statistically significant positive correlation.

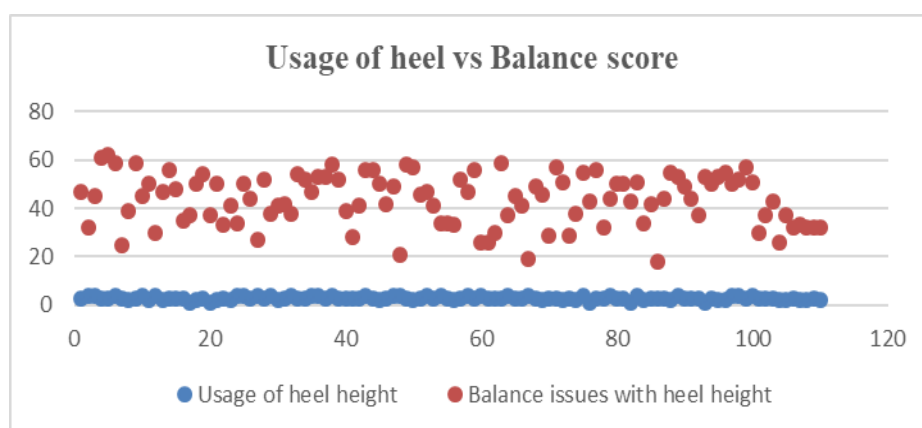


Fig: High Heel Usage and Balance Score Correlation Scatter Plot.

This table illustrates the relationship between frequency of high heel use and balance score among the participants. The scatter plot shows a widely dispersed pattern of data points with no clear upward or downward trend, indicating a negligible positive correlation between frequency of high heel use and balance issues. This suggests that the frequency of wearing high heels had little to no influence on balance scores. The finding is consistent with the Spearman correlation result ($p = 0.025$, $p = 0.799$), which indicates a non-significant correlation.

DISCUSSION

The aim of this study was to assess the effect of high-heel use on balance among adult females and to determine whether the frequency, heel height, and duration of high-heel use are associated with balance impairment. In terms of demographic characteristics, the majority of participants were 18-20 years old (60.9%), followed by 21-23 years old (31.8%), indicating that the most respondents were 18-20 years old adult females who frequently use high-heeled footwear for day to day activities. The findings suggest that high-heel use is most common among young females and may influence postural stability and balance during daily activities.

Overall, the findings indicate that most participants preferred lower heel heights (less than 5 cm) and wore high-heeled footwear for a moderate duration of 1–6 hours per day. The use of higher heels (>5 cm) was relatively uncommon, while a considerable proportion of participants reported wearing heels for several hours daily. These results suggest that the study population generally had moderate exposure to high-heeled footwear in terms of both heel height and duration of use. The correlation analysis revealed that duration of high heel use demonstrated a statistically significant positive correlation with balance issues ($p = 0.200$, $p = 0.036$), indicating that participants who wore high heels for longer durations tended to experience greater balance impairment.

Vina Dwi Hapsari and colleagues (2016) reported that increasing heel height negatively affected standing balance and functional mobility. Other previous studies also consistently demonstrate that higher heel heights negatively impact both static and dynamic balance, as well as gait efficiency in healthy women.^[9,10] Previous studies shown that high-heeled shoes can alter posture, increase lumbar curvature, and enhance perceived attractiveness, but are also associated with negative musculoskeletal outcomes such as foot deformities, knee osteoarthritis, and changes in muscle-tendon properties.^[11]

Otten (2018) also concluded that chronic high-heel use causes adaptations in gait, muscle activity, and postural control. These adaptations may initially compensate for instability, but over time may contribute to balance impairments and increased risk of falls. Therefore, the

significant association between duration of high-heel use and balance issues observed in the present study aligns with existing evidence suggesting that prolonged exposure, rather than frequency alone, may be a more important factor affecting balance.^[12] Overall, the findings indicate that prolonged use of high-heeled footwear may contribute to balance-related problems, highlighting the importance of limiting the duration of wear to maintain better postural stability and balance.

CONCLUSION

The present study concluded that duration of high heel use was significantly associated with balance issues and longer period of wearing high heel may negatively affect the balance.

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