
An Observational Study between Effect of Rubber and Leather Shoes on Young Adult

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ABSTRACT

Background: Inappropriate footwear selection can lead to musculoskeletal disorders, pain, and foot-related complications, particularly among individuals engaged in prolonged standing activities. Understanding the comparative effects of different footwear materials is essential for promoting foot health and preventing long-term disabilities. **Objective:** This study aimed to compare leather and rubber footwear to determine which material provides better comfort, support, and overall foot health outcomes for individuals who stand for extended periods. **Methods:** A survey-based research design was conducted with 60 participants aged 18-30 years from Moradabad City, Uttar Pradesh. Participants were required to stand for at least 6 hours daily and had worn their current footwear for 6-8 years. The validated Foot Health Status Questionnaire (FHSQ) was used to assess foot health parameters including pain levels, functional limitations, and overall comfort. Statistical analysis was performed using SPSS version 22.0. **Results:** Significant differences were observed between leather and rubber footwear across multiple health parameters. Leather footwear users demonstrated better overall foot health outcomes (mean score: 77.50) compared to rubber footwear users (mean score: 81.10). Participants wearing rubber shoes reported higher levels of foot pain,

greater functional limitations in work activities, and more significant interference with social interactions due to discomfort. **Conclusion:** Leather footwear is superior to rubber footwear in terms of comfort, pain reduction, and overall foot health outcomes. Leather shoes effectively decrease stress burden on lower limbs, reducing the risk of musculoskeletal disorders and future foot-related disabilities. These findings provide evidence-based support for recommending leather footwear, particularly for occupations involving prolonged standing.

Introduction-

Existing literature demonstrates that footwear selection significantly impacts athletic performance, enhances biomechanical efficiency, and reduces injury risk. (1) Research examining systematically modified footwear characteristics reveals their effects on biomechanics, injury prevention, performance outcomes, and user preferences across different skill levels.(1) Optimal footwear choices depend on demographic factors such as age and gender to improve biomechanical function and prevent musculoskeletal disorders.(2)

A study investigating rubber sole materials in athletes aged 20-25 years found that this material provides adequate flexibility and appropriate stretch characteristics (4). However, poorly fitting shoes can lead to pain, discomfort, and difficulties during prolonged activities. Professional footwear guidance is commonly integrated into effective treatment protocols, though specific recommendations remain limited in current literature. Research indicates that inappropriate footwear choices increase the risk of allergic reactions and infections in the foot area. (3)Studies show that leather footwear has a higher propensity for causing dermatitis. Additional investigations reveal that wearing unsuitable shoes affects gait patterns and contributes to muscle weakness.(2)

Evidence suggests that individuals in occupations requiring prolonged standing and walking—including healthcare workers, underground miners, teachers, and military personnel—frequently report ankle instability and reduced foot clearance when wearing inappropriate footwear. (7) Military boots, despite expert design for foot protection during duties and training, may increase foot injury risk due to midsole material and thickness variations, potentially affecting performance.(3) Previous research characterizes unstable footwear as causing discomfort, lower back pain, swelling, fatigue, and venous blood pooling within two hours of prolonged standing, leading to various health complications. The current study



utilized the Foot Health Status Questionnaire (FHSQ), a validated Spanish tool with demonstrated concurrent validity for assessing foot problems.

The primary objective was to identify and compare leather and rubber footwear to determine which provides superior comfort for individuals. The purpose was to analyze how different footwear choices affect stress distribution on the foot, thereby reducing the impact that leads to future musculoskeletal disorders. This study aims to provide beneficial outcomes for individual footwear selection decisions.

PROCEDURE AND MATERAIL-

Study type: Survey research

Sample Size: 60

Sampling method: Random sampling

Study duration: 2 months

Study settings: In or around Moradabad City, (Uttar Pradesh)

INCLUSION CRITERIA:-

- Age group: 18-30
- Both male and female.
- Prolonged Standing hour-6 hours
- Shoes choice should be 6-8 year

EXCLUSION CRITERIA: -

- Lower limb injury foot pain and discomfort
- Post traumatic or double crush injury
- Any history of head injury, brain damage or neurological conditions.
- Any history of chronic endocrine condition
- Acute any injury over the foot
- Skin condition

INSTRUMENTS USED: -

1. Evaluation sheet (FHSQ)
2. Pen/Paper
3. Computer/ Laptop



PROCEDURE

Participants were recruited from Teerthanker Mahaveer University, Moradabad, and surrounding areas following strict inclusion and exclusion criteria.

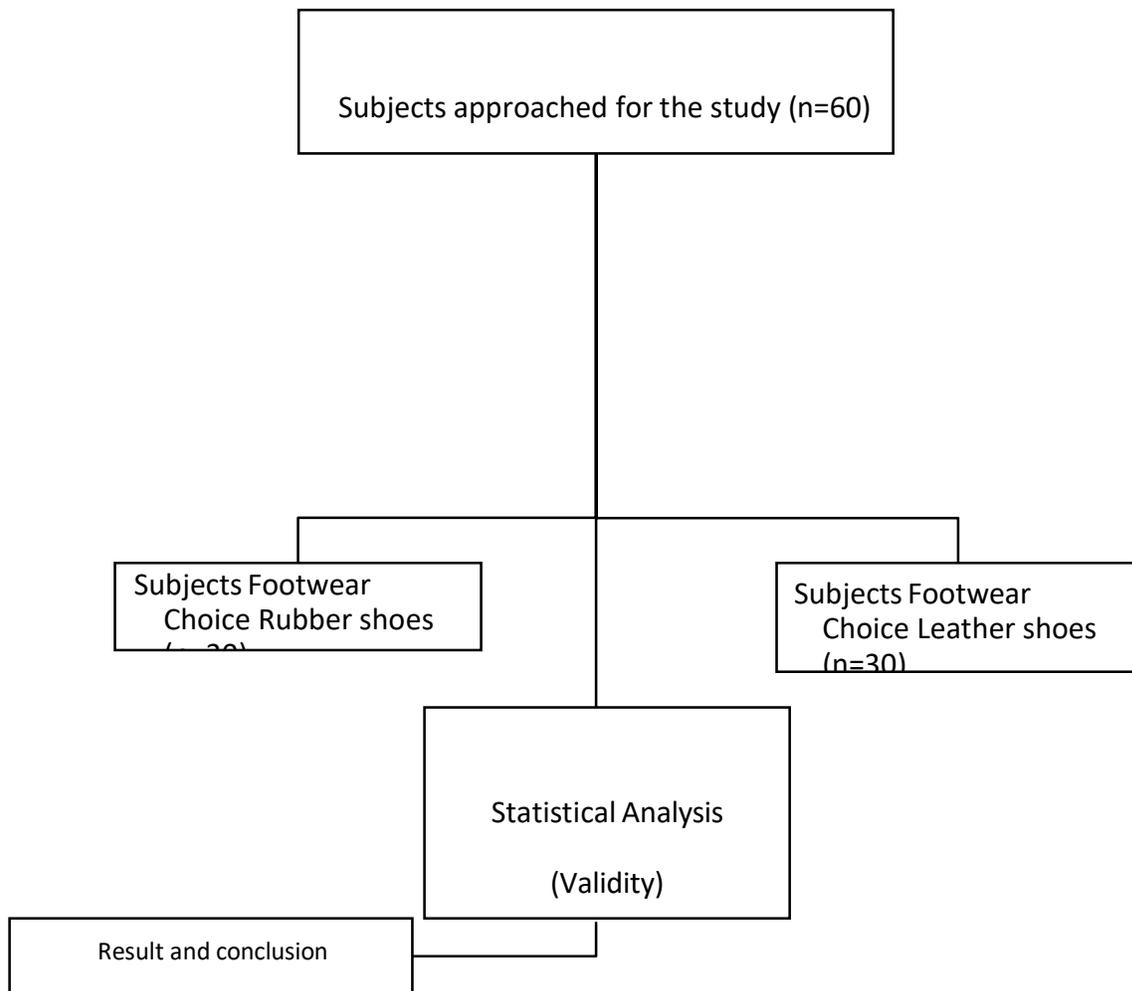
Sixty participants aged 18-30 years were enrolled after receiving detailed explanations about the study procedures.

Informed consent was obtained from all participants, outlining their roles and rights as research subjects.

Following consent acquisition, participants completed the FHSQ to calculate their total scores.

Participants were instructed to avoid vigorous activities prior to questionnaire completion.

FLOW CHART





RESULT-

Data analysis by using soft version 22.0, with quantitative variables described through descriptive statistics including means and standard deviations. Statistical significance was established at $p < 0.05$.

RUBBER FOOTWEAR GROUP

Descriptive statistics revealed a mean age of 29.53 years (SD = 2.345) among rubber footwear users. The overall foot health score averaged 81.10 (SD = 26.721), indicating various levels of foot health concerns across different questionnaire domains.

LEATHER FOOTWEAR GROUP

Participants using leather footwear had a mean age of 24.80 years (SD = 2.759). The overall foot health score averaged 77.50 (SD = 22.323), suggesting better foot health outcomes compared to rubber footwear users.

COMPARATIVE ANALYSIS

Statistical analysis across multiple health parameters revealed significant differences between footwear types:

Pain Assessment: Leather footwear users reported lower pain levels compared to rubber footwear users across various assessment categories.

Functional Limitations: Rubber footwear was associated with greater limitations in work activities and daily functioning.

Overall Foot Health: Participants wearing leather shoes demonstrated superior overall foot health outcomes.

Social and Physical Impact: Rubber footwear users experienced more significant interference with social interactions and daily activities due to discomfort-related issues.

RUBBER					
Descriptive Statistics					
					Std.



	N	Minimum	Maximum	Mean	Deviation
AGE	30	23	33	29.53	2.345
GENDER	0				
OCCUPATION	0				
Q1	30	1	5	2.43	1.165
Q2	30	1	4	2.23	.858
Q3	30	0	4	2.03	.928
Q4	30	0	3	1.57	.728
Q5	30	1	3	1.77	.728
Q6	30	1	4	1.60	.814
Q7	30	1	3	1.50	.572
Q8	30	1	4	1.70	.877
Q9	30	1	5	3.00	.910
Q10	30	1	5	3.03	1.033
Q11	30	1	5	3.60	1.248
Q12	30	2	4	3.20	.805
Q13	30	1	4	2.97	.765
Q14	30	1	3	2.03	.414
Q15a	30	1	3	2.13	.681
Q15b	30	2	3	2.50	.509
Q15c	30	2	3	2.90	.305
Q15d	30	2	3	2.60	.498
Q15e	30	2	3	2.90	.305
Q15f	29	1	3	2.90	.409
Q15g	30	1	3	2.33	.606
Q15h	30	1	3	2.63	.556
Q15i	30	1	4	2.77	.679
Q16	30	1	5	2.13	1.137
Q17a	30	1	5	3.50	1.106
Q17b	30	1	5	3.07	1.258
Q17c	30	1	5	3.47	1.279



Q17d	30	1	5	2.67	1.446
Q18	30	1	4	1.90	.885
Q19a	30	1	3	2.13	.860
Q19b	30	1	3	2.00	.743
Q19c	30	1	3	2.23	.728
Q19d	30	1	3	1.67	.884
Valid N (listwise)	0				
AVERAGE				81.10	26.721

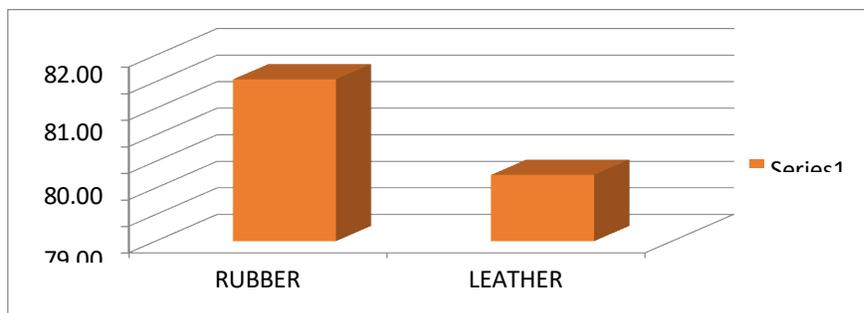
TABLE-1 Descriptive statistics depicts that the mean of Rubber shoes. With a SD 81.10

LEATHER						
Descriptive Statistics						
		N	Minimum	Maximum	Mean	Std. Deviation
AGE		30	20	33	24.80	2.759
GENDER		0				
OCCUPATION		0				
Q1		30	1	4	2.33	1.155
Q10		30	0	5	2.17	1.234
Q11		30	1	5	3.17	1.341
Q12		30	1	5	2.53	1.106
Q13		30	1	4	2.60	.968
Q14		30	1	2	1.47	.507
Q15a		30	1	3	2.70	.535
Q15b		30	1	3	2.77	.504
Q15c		30	1	3	2.90	.403
Q15d		30	1	2	1.27	.450
Q15e		30	2	3	2.63	.490
Q15f		30	2	3	2.63	.490



Q15g		30	2	3	2.67	.479
Q15h		30	2	3	2.70	.466
Q15i		30	2	3	2.93	.254
Q16		30	1	2	1.03	.183
Q17a		30	4	5	4.43	.504
Q17b		30	1	4	3.47	1.137
Q17c		30	3	5	4.03	.320
Q17d		30	1	4	1.50	.938
Q18		30	1	3	1.10	.403
Q19a		30	2	3	2.97	.183
Q19b		30	1	1	1.00	0.000
Q19c		30	2	3	2.90	.305
Q19d		30	1	2	1.03	.183
Q2		30	1	5	2.23	.898
Q3		30	1	5	2.10	.923
Q4		30	1	5	2.00	1.050
Q5		30	1	4	1.73	.785
Q6		30	1	4	1.97	.999
Q7		30	1	4	2.03	.999
Q8		30	1	5	2.03	1.159
Q9		30	1	4	2.47	.973
Valid N (listwise)		0				
AVERAGE					77.50	22.323

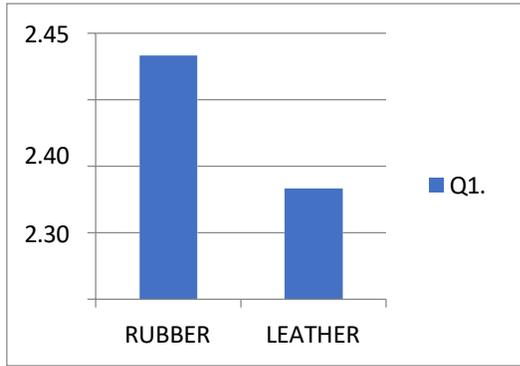
TABLE-2 Descriptive statistics depicts that the mean of Leather shoes. With a SD 77.50





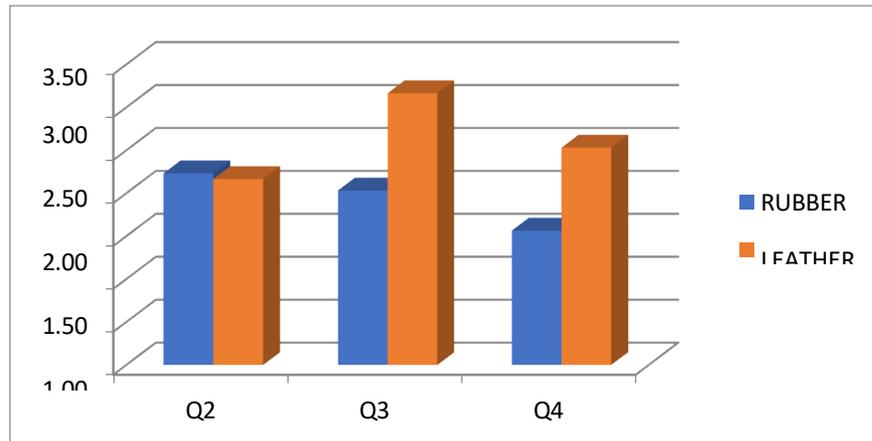
RUBBER (LEVEL OF PAIN)	81.10
LEATHER (LEVEL OF PAIN)	77.50

Graph-I and Table-3 suggested the level of pain of leather shoes less than rubber shoes with mean deviation.



	Q1.
RUBBER	2.43
LEATHER	2.33

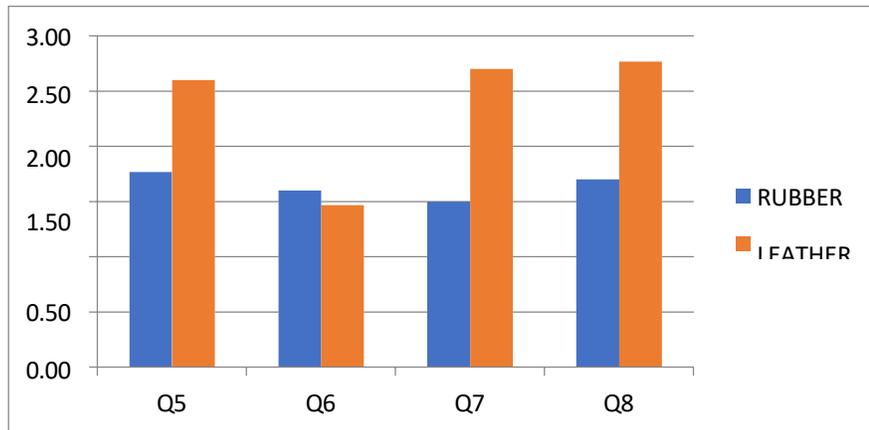
Graph-II and Table-4 suggested the level of foot pain during the past week.



	Q2	Q3	Q4
RUBBER	2.23	2.03	1.57
LEATHER	2.17	3.17	2.53

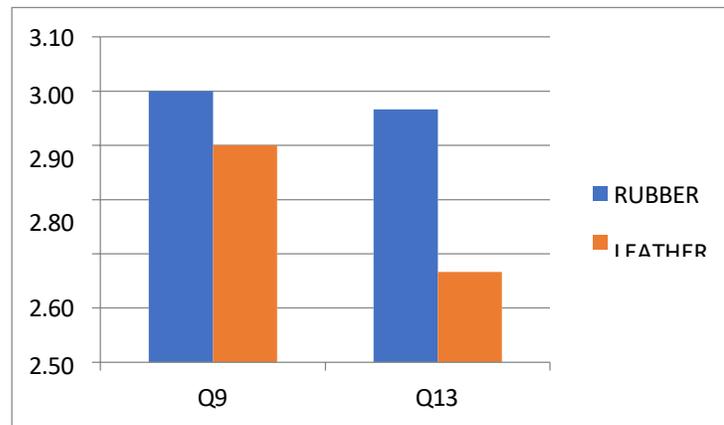


Graph-III and Table 5 suggested the FOOT ACHE (during last week)



	Q5	Q6	Q7	Q8
RUBBER	1.77	1.60	1.50	1.70
LEATHER	2.60	1.47	2.70	2.77

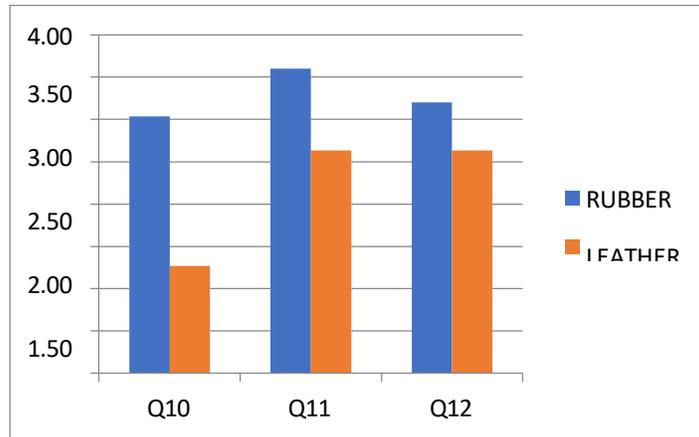
Graph-IV and Table 6 suggested the FOOT HEALTH LIMITED IN WORK ACTIVITIES



	Q9	Q13
RUBBER	3.00	2.97
LEATHER	2.90	2.67

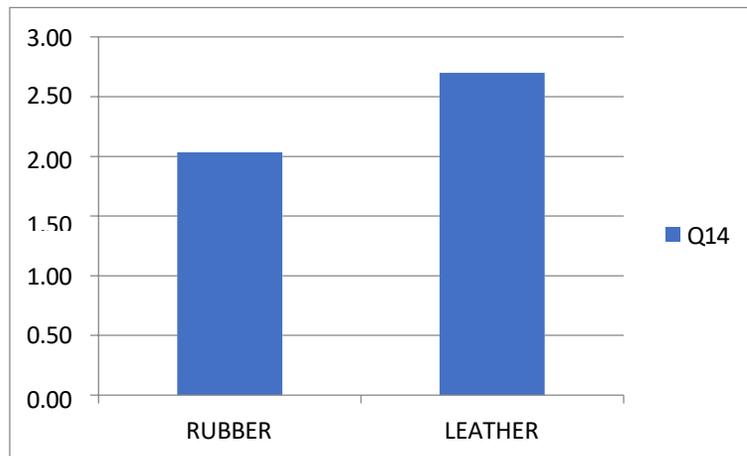


Graph-V and Table 7 suggested the OVERALL FOOT HEALTH



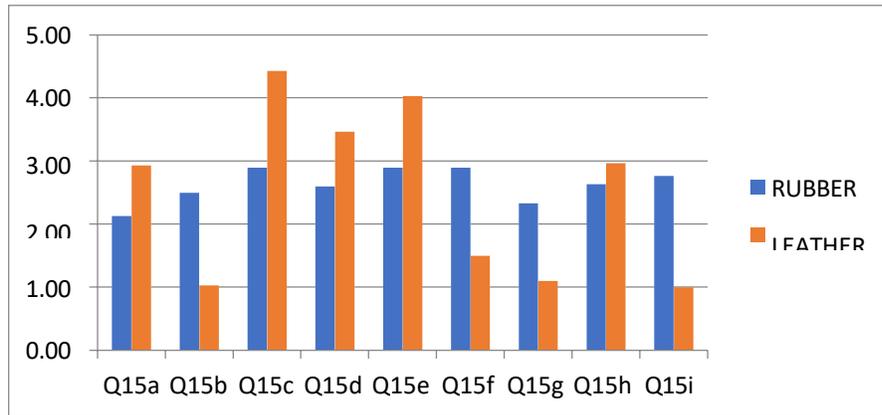
	Q10	Q11	Q12
RUBBER	3.03	3.60	3.20
LEATHER	1.27	2.63	2.63

Graph-VI and Table 8 suggested CHOOSE OF SHOES THAT DO NOT HURT FOOT



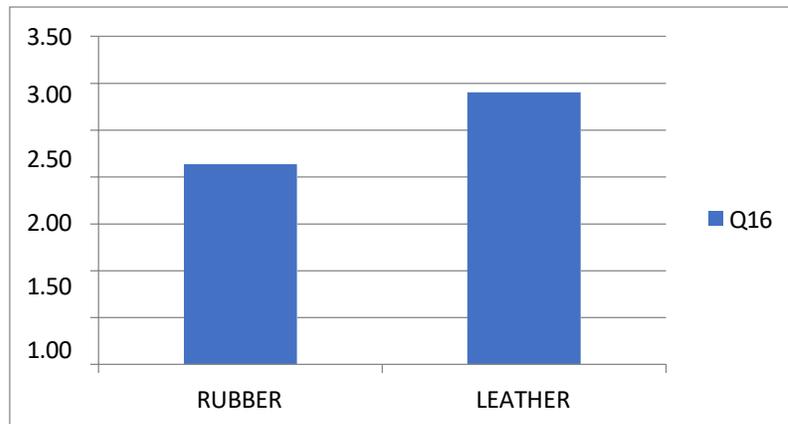
	Q14
RUBBER	2.03
LEATHER	2.70

Graph-VII and Table 9 suggested the RATE INDIVIDUAL HEALTH



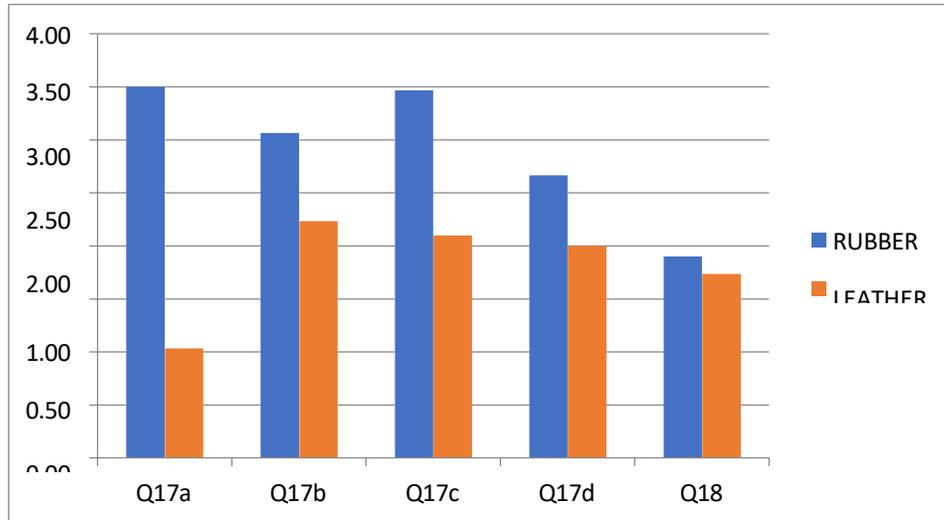
	Q15a	Q15b	Q15c	Q15d	Q15e	Q15f	Q15g	Q15h	Q15i
RUBBER	2.13	2.50	2.90	2.60	2.90	2.90	2.33	2.63	2.77
LEATHER	2.93	1.03	4.43	3.47	4.03	1.50	1.10	2.97	1.00

Graph-VIII and Table 10 suggested the QUESTION RELATED HEALTH THAT LIMIT THE ACTIVITIES



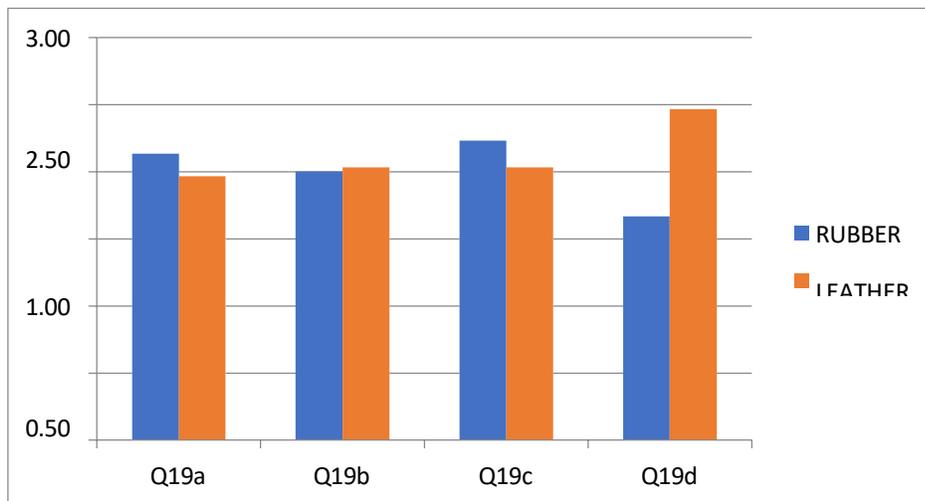
	Q16
RUBBER	2.13
LEATHER	2.90

Graph-IX and Table 11 suggested the QUESTION RELATED TO PHYSICAL HEALTH OR EMOTIONAL PROBLEMS INTERFERED WITH SOCIAL INTERACTION



	Q17a	Q17b	Q17c	Q17d	Q18
RUBBER	3.50	3.07	3.47	2.67	1.90
LEATHER	1.03	2.23	2.10	2.00	1.73

Graph-X and Table 12 suggested the QUESTION RELATED TO HEALTH (PAST 4 WEEK)



	Q19a	Q19b	Q19c	Q19d
RUBBER	2.13	2.00	2.23	1.67
LEATHER	1.97	2.03	2.03	2.47



DISCUSSION-

The study's primary objective was to identify injuries and problems associated with leather and rubber footwear to determine which provides superior comfort. Results indicate that rubber footwear causes more pain than leather footwear, with rubber shoes influencing physical activity and injury risk compared to leather shoes during prolonged use.

Consistent with Robin Orr's review study, occupational footwear choice significantly influences physical task performance and injury risk, depending on footwear type and environmental conditions. Current study findings support this, showing rubber shoes are more problematic than leather shoes according to FHSQ analysis, particularly regarding physical health and emotional problems interfering with social interaction and work activities. Chen TL-W's research concludes that sports shoes with closed-toe designs may provide better injury prevention than flip-flops due to their constraints on joint motion and loading. Our comparative analysis between rubber and leather shoes shows that rubber footwear overall foot health is inferior to leather footwear.

Research indicates that inappropriate occupational footwear can cause direct injuries to feet and related bone structures, as well as mechanisms associated with injury causation. Consistent observations include altered gait mechanics with different occupational footwear types and decreased ankle joint flexibility. Eliza F. Chakravarty's study examining running shoe effects on lower extremity joints concluded that contact force is affected by shoe compliance, a potentially valuable design characteristic that increases joint torque.

Current study results demonstrate that leather footwear is superior to rubber footwear as it reduces stress burden on lower limbs, preventing musculoskeletal problems and potential future foot injuries. The research establishes that leather shoes provide better comfort and support for individuals compared to rubber shoes.

CONCLUSIONS-

The study concludes that appropriate footwear selection can decrease stress burden on lower limbs, reducing musculoskeletal problems and future foot disabilities. This research identifies significant differences between leather and rubber footwear, confirming that leather shoes provide superior comfort and support for individuals engaged in prolonged standing activities.

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