



# Time to First Abrasion: A Comparative Evaluation of Flip Flop Strap Designs on Preserved Fetal Pig Skin and Implications for Dorsal Foot Health

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## Background

In developing countries, flip flops are widely used due to their affordability and adaptability to various terrains. However, the prolonged use of flip flops with traditional straight edge straps can cause friction-induced skin abrasions, leading to dorsal foot ulcers. These ulcers are a significant health concern, particularly in areas with limited access to healthcare. While most research focuses on plantar foot ulcers, dorsal ulcers remain understudied despite comprising a substantial proportion of foot ulcer cases.

## Research Question

This study aims to investigate the potential of a novel rolled inner seam (RIS) flip flop strap design in reducing the incidence of skin abrasions when compared to the traditional strap design.

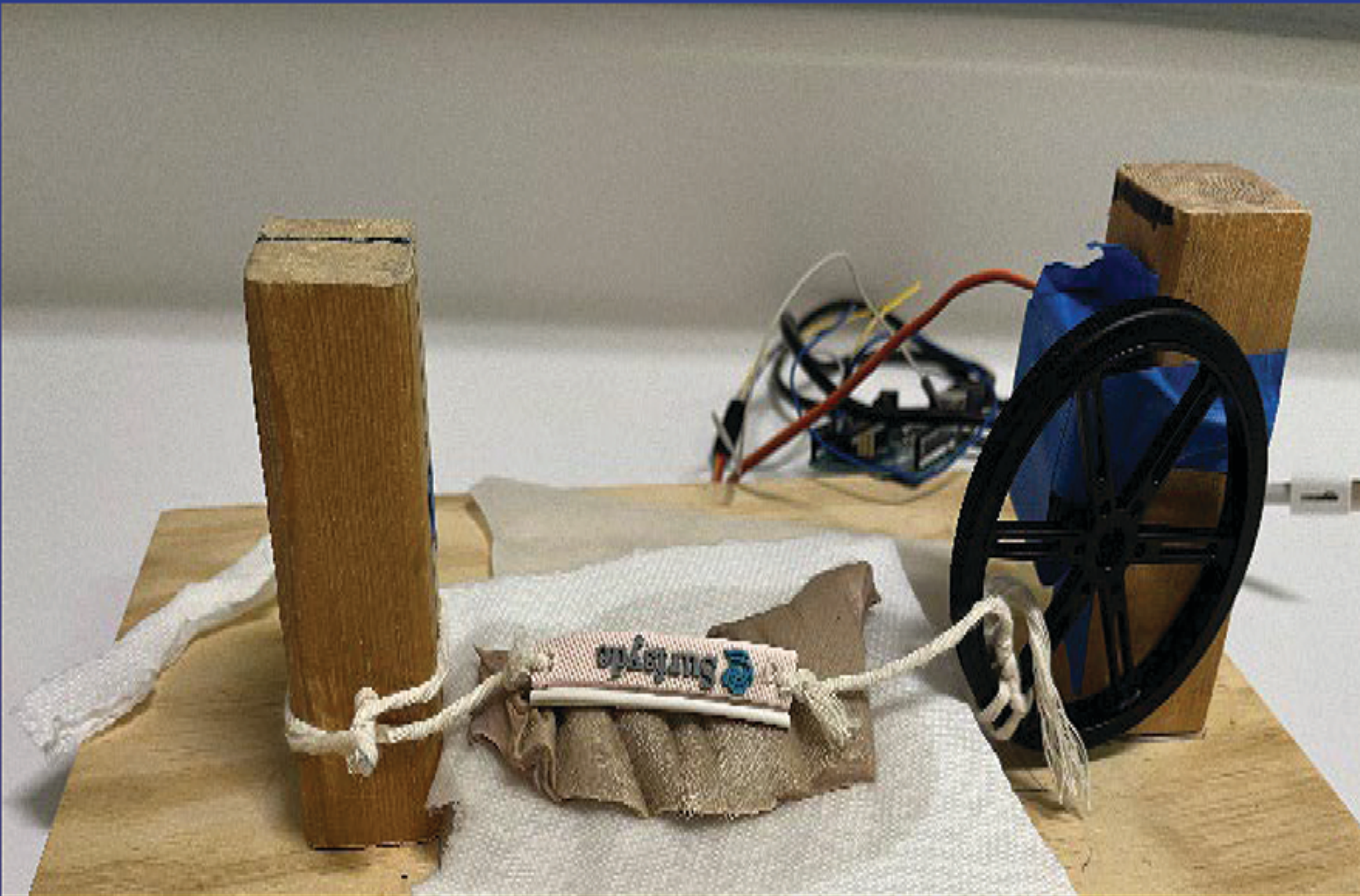
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## Methods

Utilizing preserved fetal pig skin as a surrogate for human skin due to its similar histological and biomechanical properties, we conducted an experimental comparison between the traditional and RIS strap designs. A custom apparatus mimicking the frictional force of walking was employed. The onset of abrasions was observed across three trials for each strap design, and a paired t-test was used for statistical analysis.

## Results

The RIS design demonstrated a statistically significant delay in abrasion onset ( $p < 0.05$ ), with abrasions occurring after a longer duration of frictional force application compared to the traditional design. The mean time to abrasion onset for the standard design was 38.67 minutes, while the RIS design showed a mean of 63.67 minutes.

## Future Directions

Further research with a larger sample size and human trials is essential to validate these preliminary findings in real-world scenarios and to determine the long-term benefits of the RIS strap design.

## Acknowledgements

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Trial	Standard Design (minutes)	RIS Design (minutes)
1	38	64
2	32	68
3	46	59

## Conclusion

The findings indicate that the RIS design potentially reduces the risk of skin abrasions and, consequently, the risk of dorsal foot ulcers. This study suggests a need for rethinking flip flop strap designs to improve foot health outcomes in economically disadvantaged regions.

