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BACKGROUND AND OBJECTIVES

Children with below-knee (BK) amputation face unique rehabilitation challenges due to continuous growth [1]. Limited access to prosthetic care, particularly in low-resource environments (LREs), results in prolonged use of poorly fitting prostheses [2], potentially affecting children's residual limb health, pain, and musculoskeletal development. This study provides an overview of prosthetic fit issues due to growth, documents pain in the residual limb and other locations and identifies gait adaptations associated with outgrown prostheses.

RESULTS

Casefile analysis of 19 children highlighted significant prosthetic fit issues, including tightness from residual limb volume increases up to 60% and prosthetic shortening up to 2 cm compared to the intact limb [1,2]. Gait analysis with 7 children showed pronounced compensatory patterns used to cope with poor prosthetic fit, including hyper-flexion of intact limb's joints. Pain was reported not only at the residual limb but also at secondary locations such as knee, hip, and lower back.

Example of poorly fitting prostheses due to growth: socket tightness and prosthesis shortness.

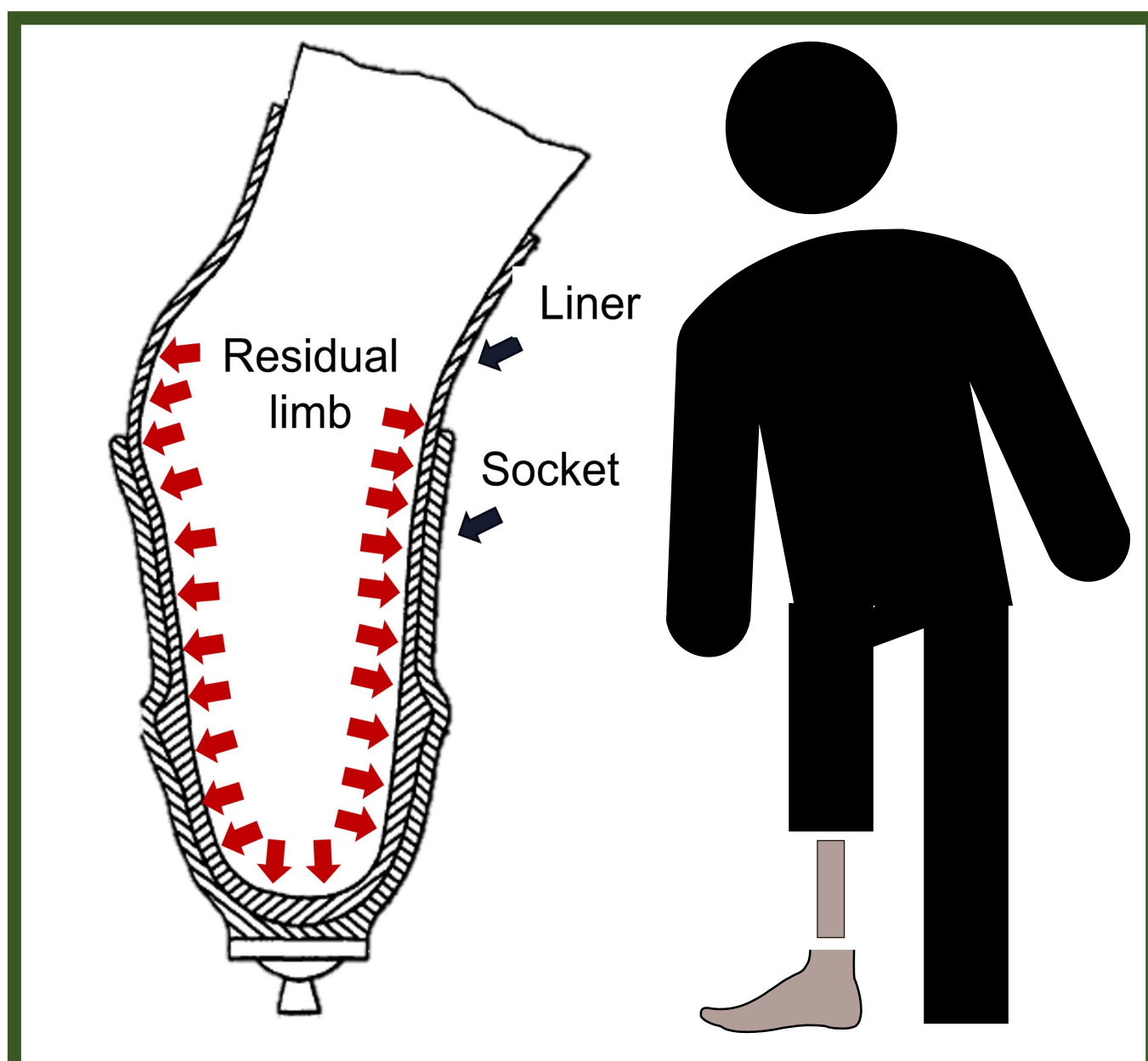
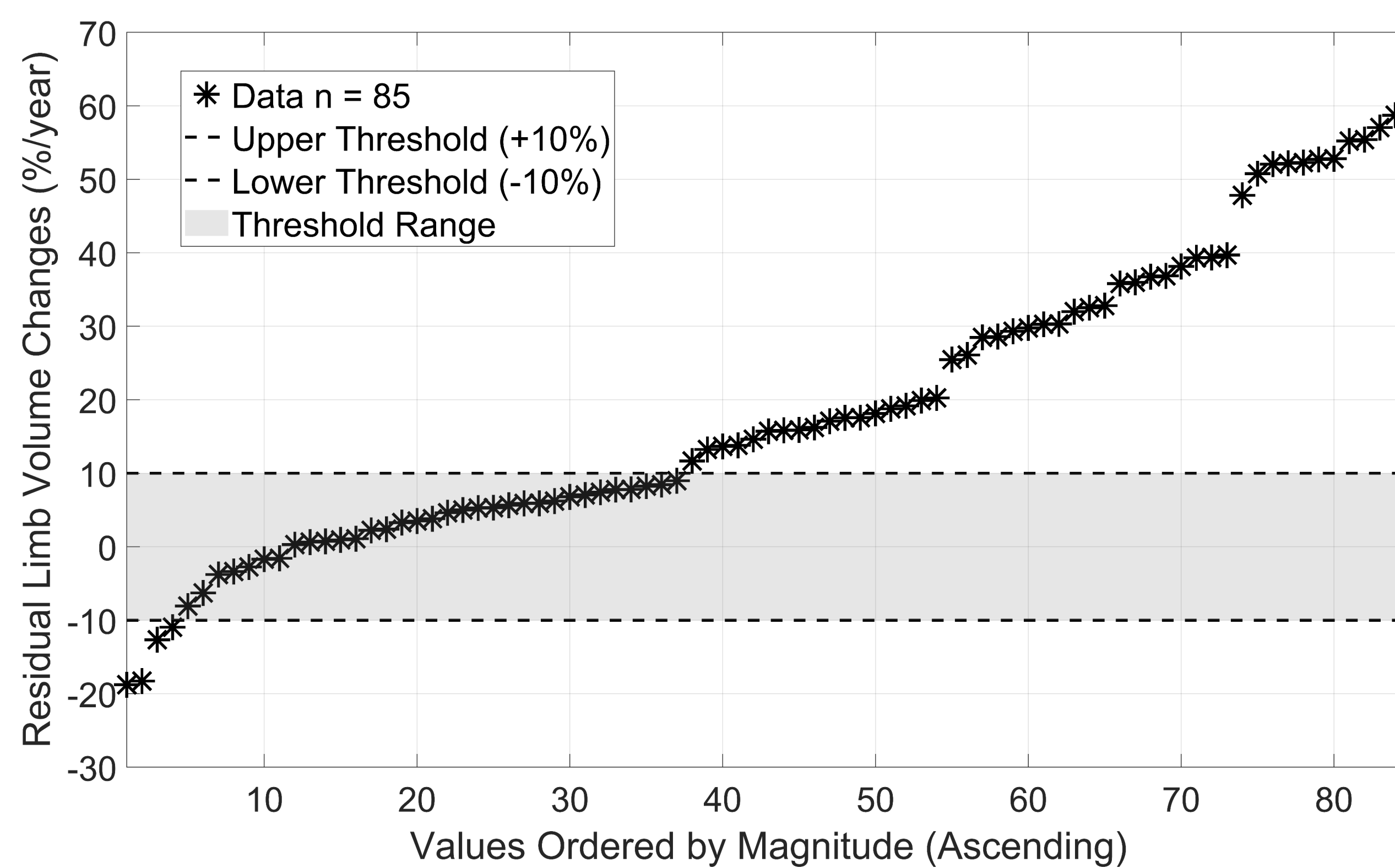
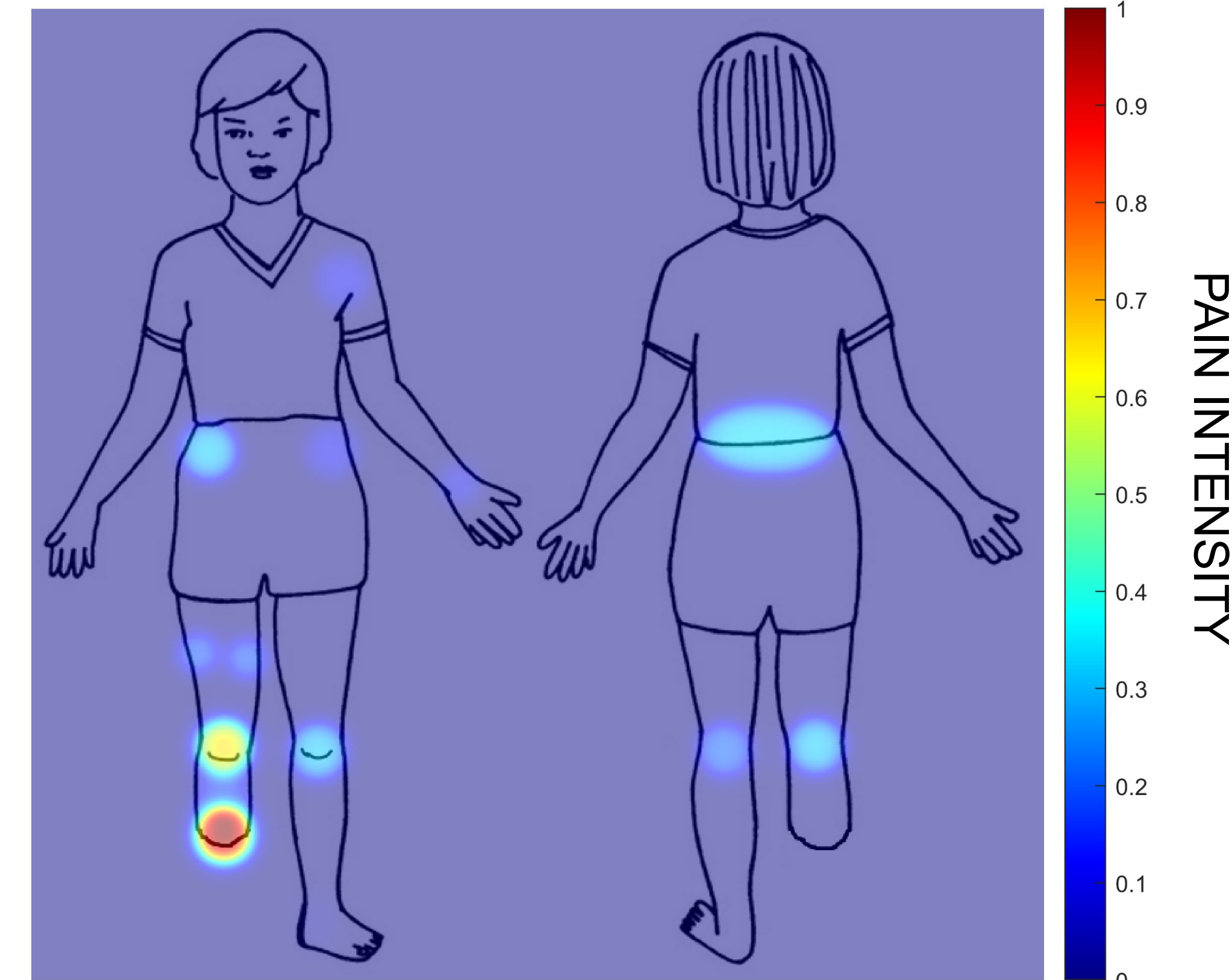


Image 1: Type of poorly fitting prostheses

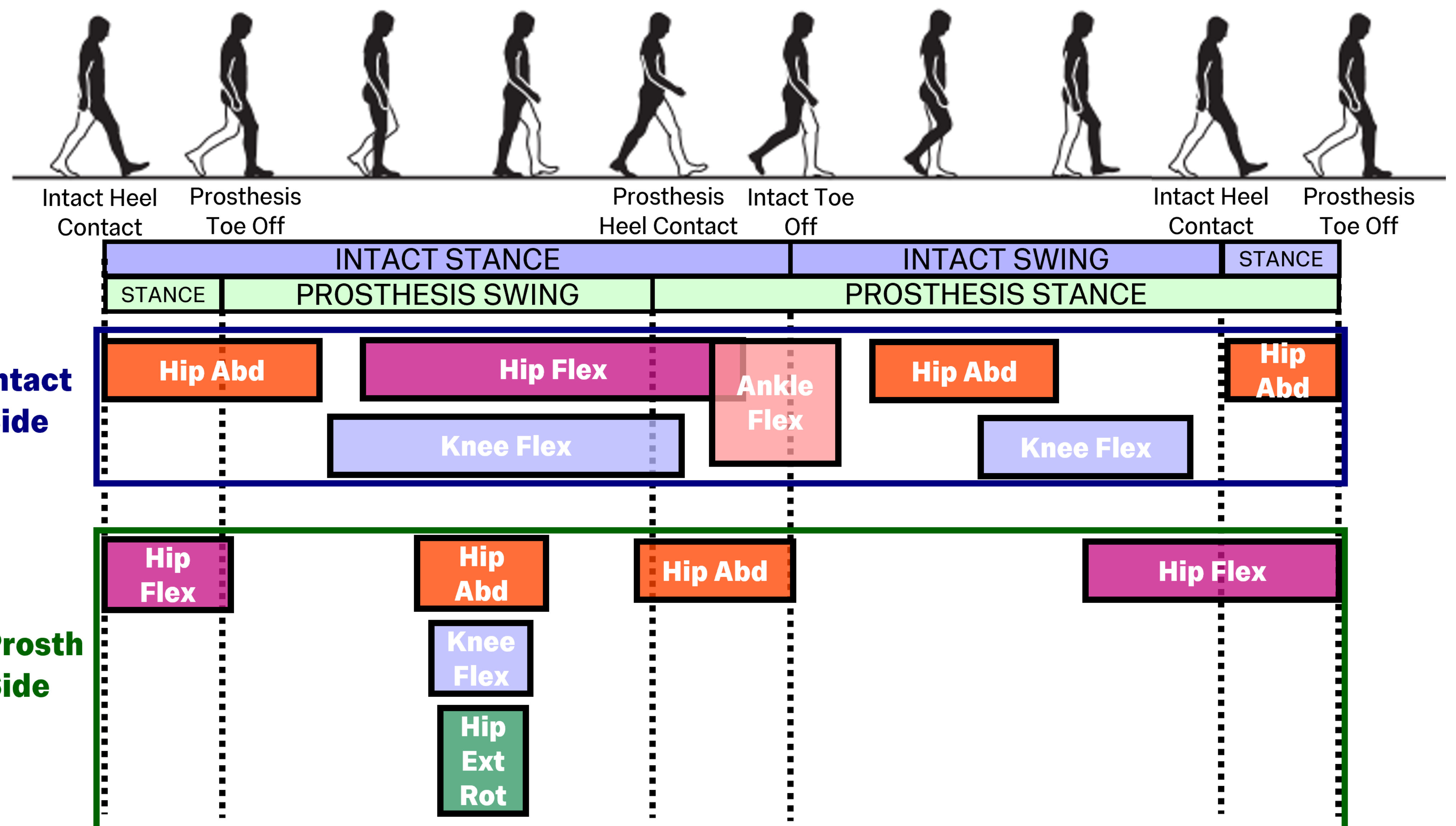
The volume of residual limb increased significantly (up to 60%/year) before prosthesis replacement [2]



Severe pain caused by poorly fitting prostheses and compensatory movements



Compensatory strategies arising from inadequate prosthetic fit, observed in comparison to peers



CONCLUSION

This study provides actionable evidence for humanitarian rehabilitation strategies. Children face substantial challenges related to prosthetic fit, significantly impacting their pain and musculoskeletal function. The limited sample size and geographic scope restrict the generalizability of the findings. However, the findings highlight the urgent need for adjustable prostheses to prevent pain and preserve function, and targeted rehabilitation approaches - particularly for children in conflict-affected regions, where access to timely prosthetic care is severely limited.

METHODS

Clinical casefiles from Cambodia (representative LRE) were analysed to quantify growth-related prosthetic issues (tightness, shortness). In the UK, gait analysis using a motion capture system was conducted when children required a new prosthesis due to growth. Analysis identified compensatory gait patterns compared to typically developing peers, associated with poorly fitting prostheses. Children's feedback on prosthetic comfort and pain locations was also collected.

ETHICS STATEMENT

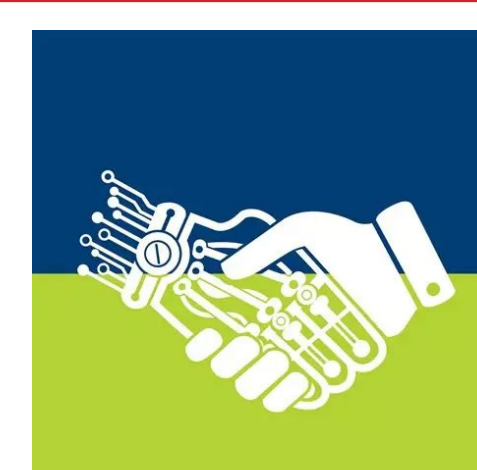
Ethical approvals were obtained from the National Ethics Committee for Health Research of Cambodia (NECHR_24), Wales Research Ethics Committee (21/WA/0027), and Imperial College London Ethics Committee (ICREC_6662629).

References

- [1] Ghidini et al., *Disabil Rehabil* 2025
- [2] Ghidini et al., *Prosthet Orthot Int* 2025



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