



9th International Interdisciplinary Congress on Renewable Energies, Industrial Maintenance, Mechatronics and Informatics

Booklets



RENIECYT - LATINDEX - Research Gate - DULCINEA - CLASE - Sudoc - HISPANA - SHERPA UNIVERSIA - Google Scholar DOI - REDIB - Mendeley - DIALNET - ROAD - ORCID - V|LEX

Title: Design and development of universal leg prostheses with size adjustment using polylactic acid (PLA)

Authors: Murillo-Rendón, Pablo Antonio, Cuate-Gomez, Diego Hernan, Garzón-Román Abel and Lugo-Quintal, Jesús Manuel

Editorial label ECORFAN: 607-8695
BCIERMMI Control Number: 2024-01
BCIERMMI Classification (2024): 241024-0001
RNA: 03-2010-032610115700-14
Pages: 10

CONAHCYT classification:
Area: Engineering
Field: Engineering
Discipline: Electronic Engineering
Subdiscipline: Design and systems

ECORFAN-México, S.C.

Park Pedregal Business. 3580,
Anillo Perif., San Jerónimo
Aculco, Álvaro Obregón,
01900 Ciudad de México, CDMX,
Phone: +52 1 55 6159 2296
Skype: ecorfan-mexico.s.c.
E-mail: contacto@ecorfan.org
Facebook: ECORFAN-México S. C.

Twitter: @EcorfanC

www.ecorfan.org

Holdings

Mexico	Colombia	Guatemala
Bolivia	Cameroon	Democratic
Spain	El Salvador	Republic
Ecuador	Taiwan	of Congo
Peru	Paraguay	Nicaragua

PRESENTATION CONTENT

Introduction

Methodology

Results

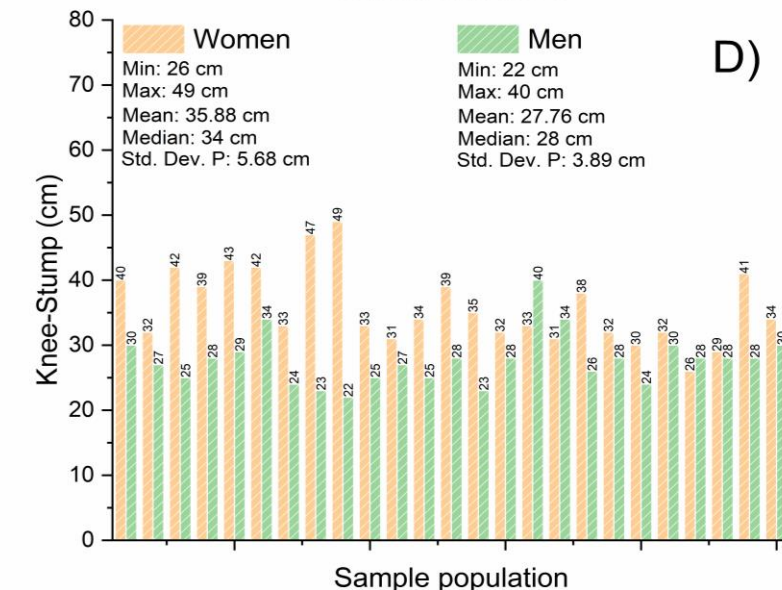
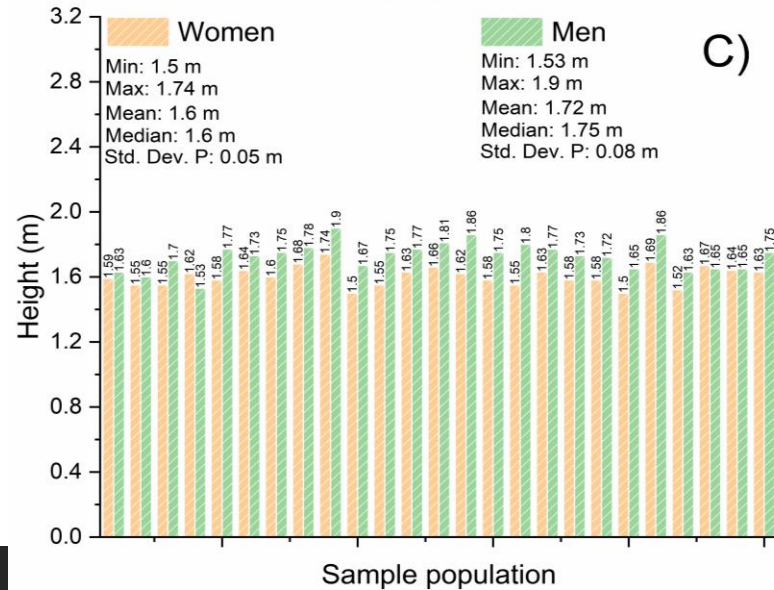
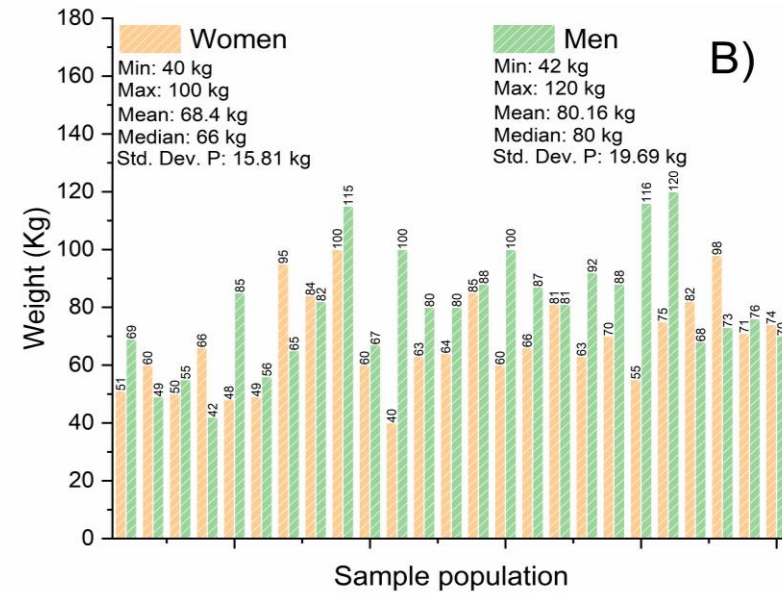
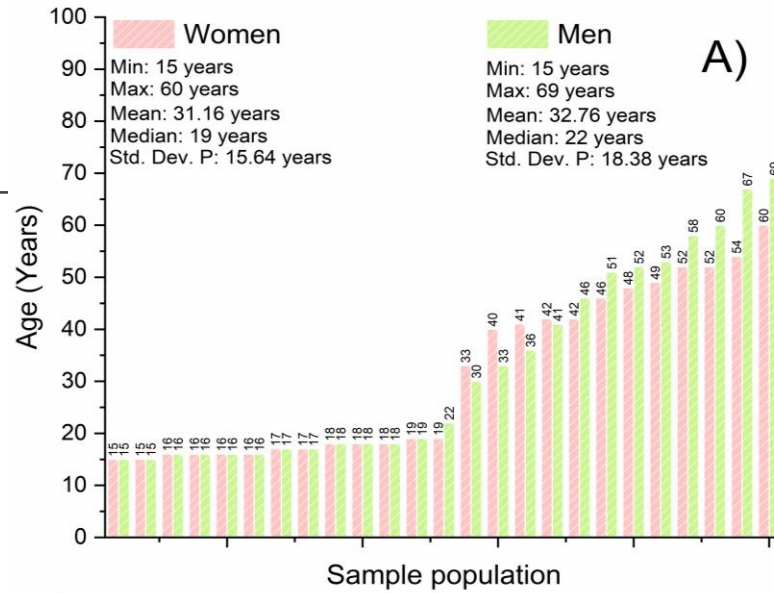
Conclusions

References

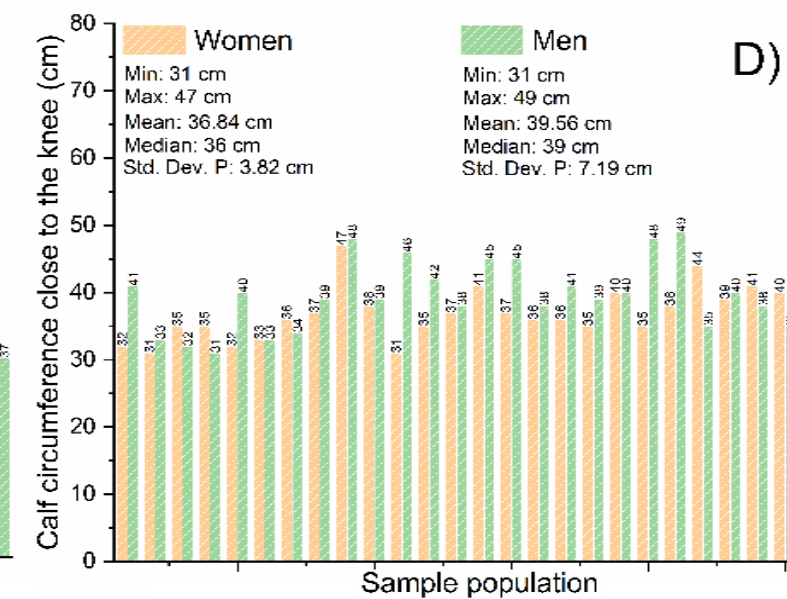
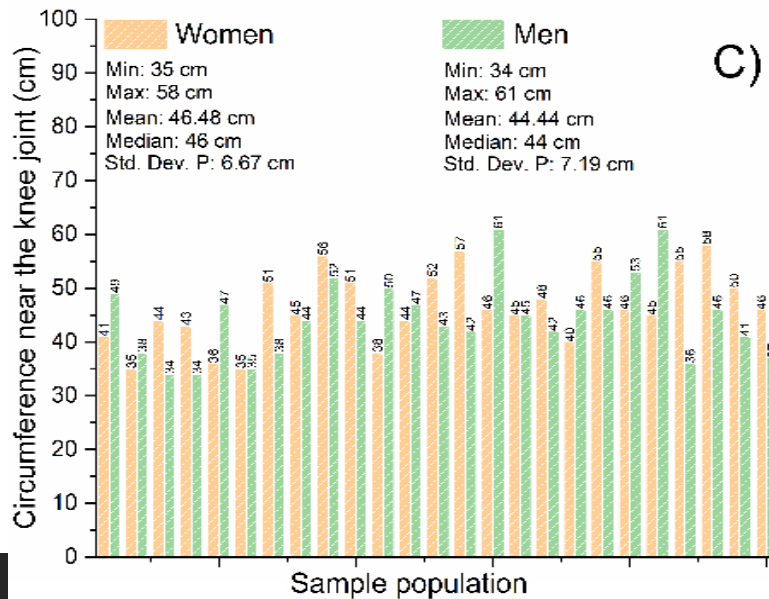
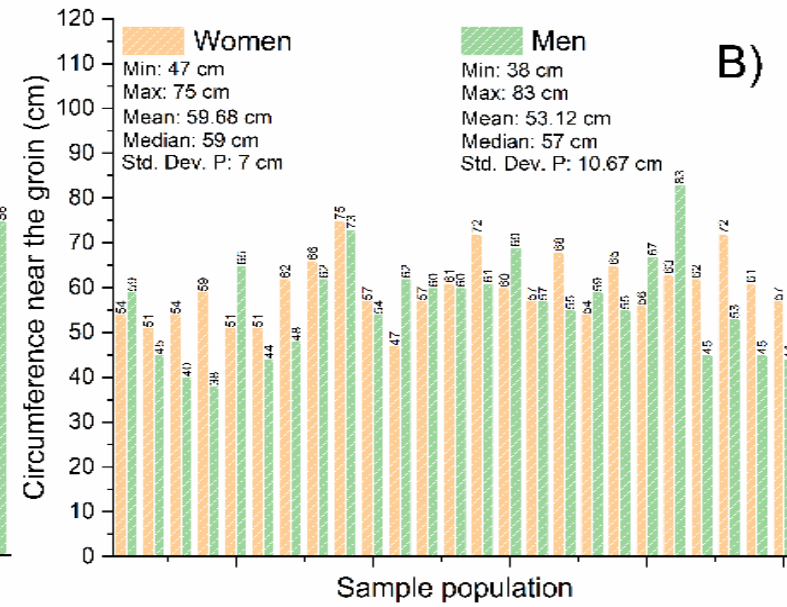
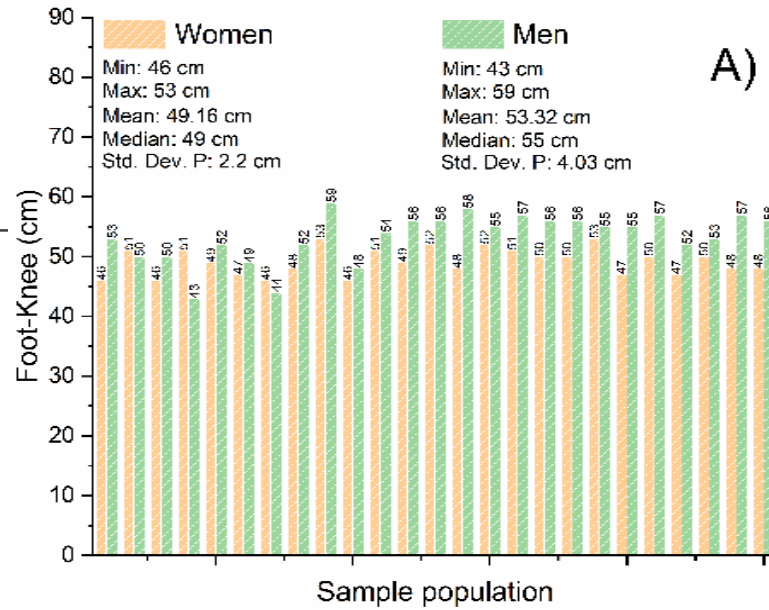
The image displays three different types of leg prosthetics. The first is an 'Above the knee' prosthesis, which is a long, dark, cylindrical limb. The second is a 'Below the knee' prosthesis, which is a shorter, dark, cylindrical limb. The third is a curved blade prosthesis, which is a dark, curved blade-like limb. Each prosthesis is shown on a person's leg, with the person wearing blue shorts and yellow sneakers. The labels 'Above the knee' and 'Below the knee' are placed below the respective prostheses.



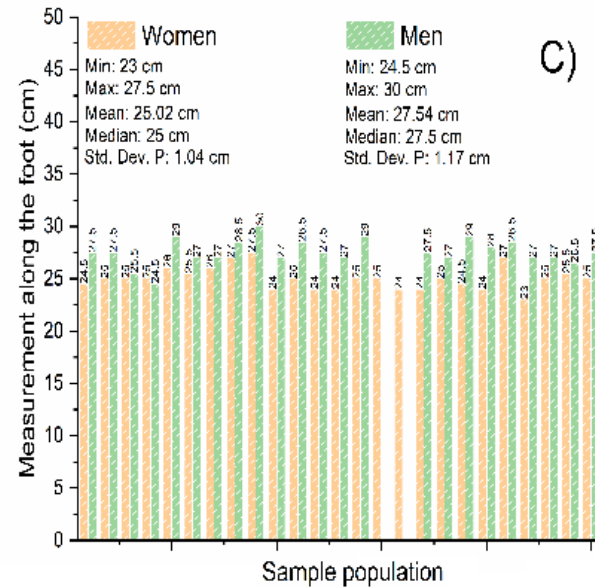
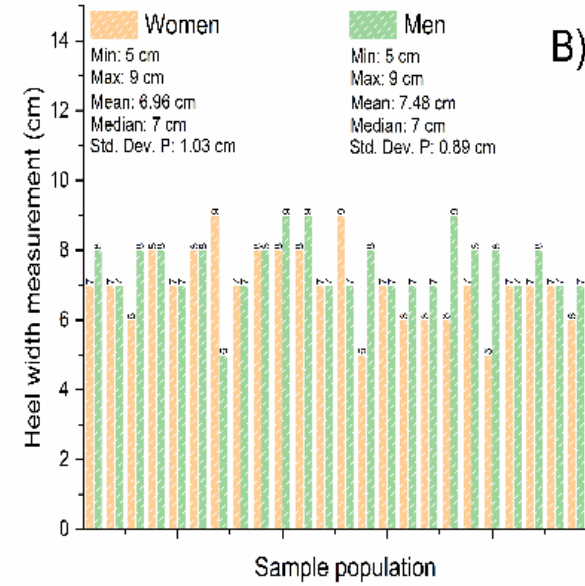
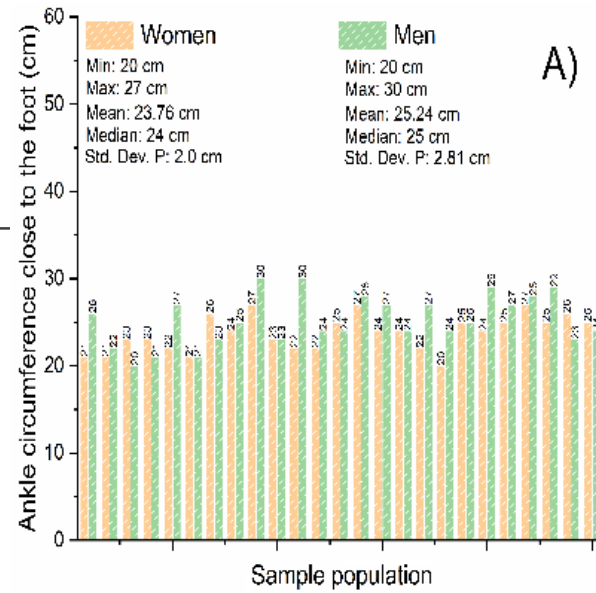
Methodology



Methodology

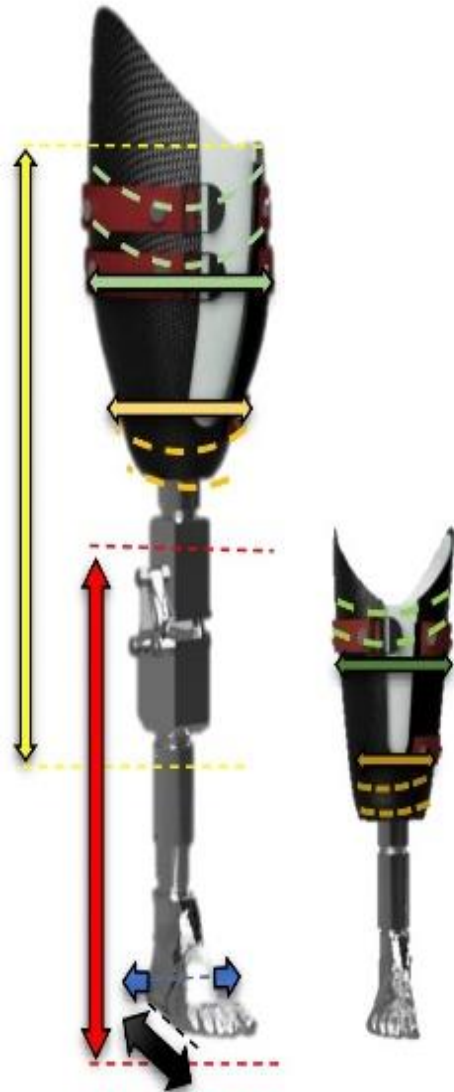


Methodology



Results

SYMBOLOLOGY



↕ Length measurement (Stump - Knee)

↕ Length measurement (Knee - Foot)

↔ Stump above knee (Circumference near to groin)

↔ Stump above knee (Circumference near the knee joint.)

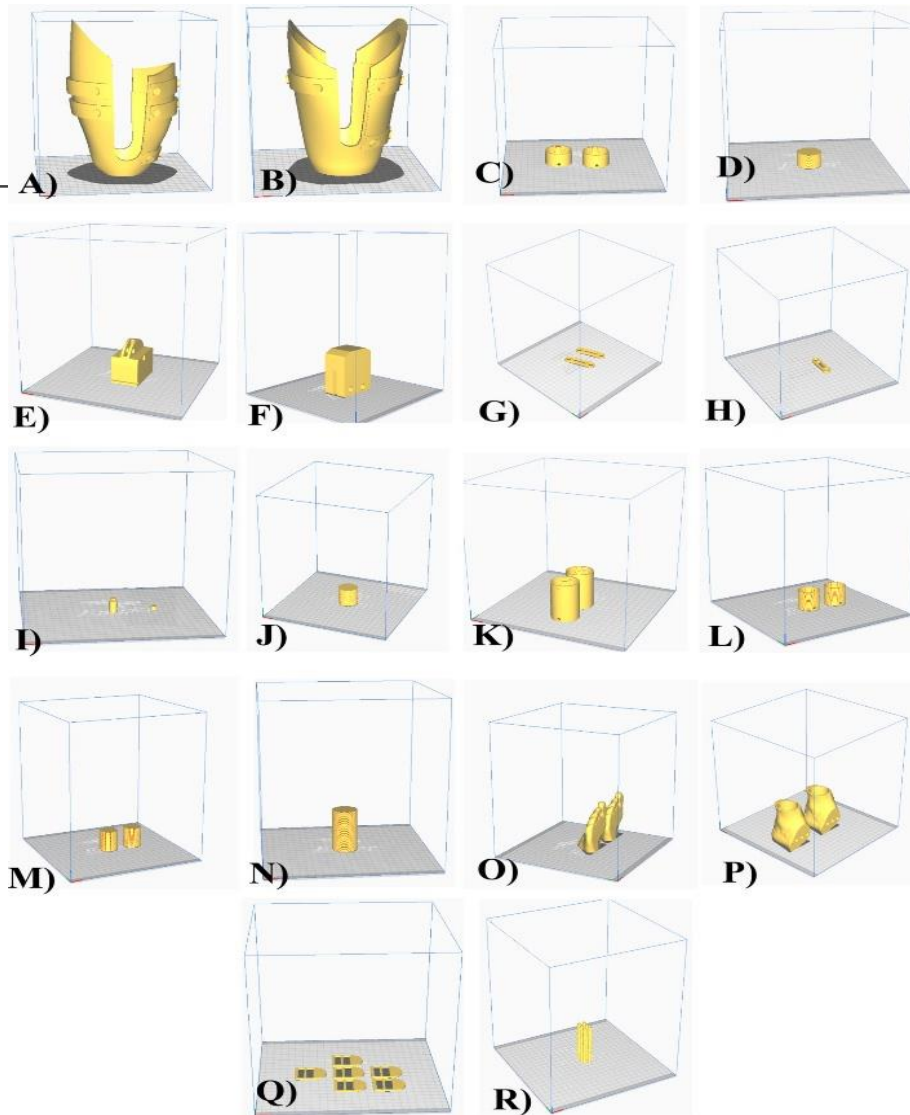
↔ Stump below knee (Calf circumference close to knee)

↔ Stump below knee (Ankle circumference close to the foot)

↔ Heel width measurement.

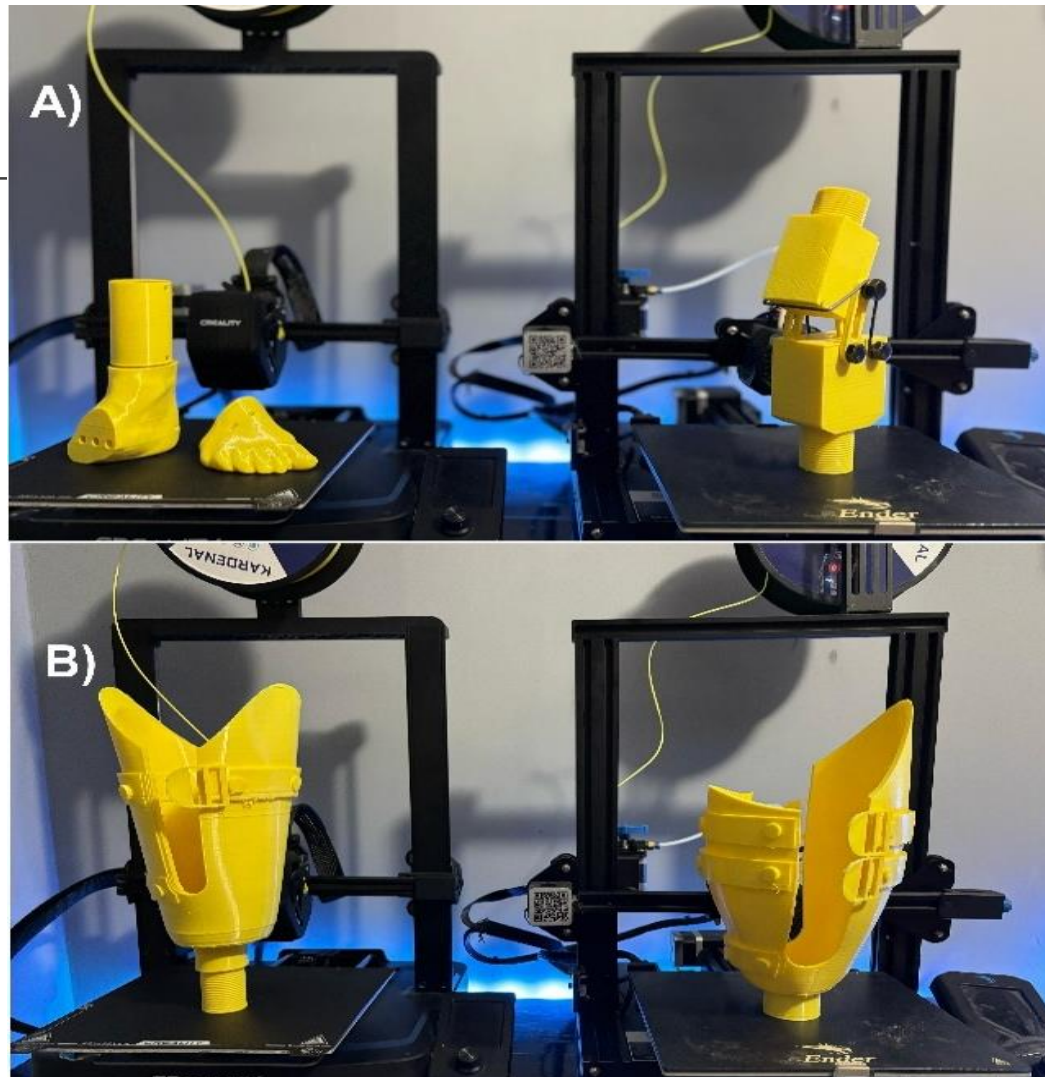
↔ Measurement along the foot.

Results



<u>Quantities</u>	<u>Pieces</u>	<u>Grams</u>
1	Socket transfemoral	263 gr
1	Socket transtibial	333 gr
2	First coupling	18 gr
1	Second coupling	11 gr
1	First part of knee	55 gr
1	Second part of knee	70 gr
2	Large anchors	5 gr
1	Small anchor	2gr
1	Swivel nut with hat	2 gr
1	Third coupling	15 gr
2	Fourth coupling	48 gr
2	Fifth coupling	12 gr
2	Sixth coupling	24 gr
1	Seventh coupling	26 gr
2	Forefoot (toes)	78 gr
2	Hindfoot (heel)	118 gr
6	Buckles	12 gr
6	Extension nuts	12 gr

Results



Conclusions

Age: The average age was 31 for W and 32 for M.

Weight: Average weight was 68.4 kg for W and 80.16 kg for M.

Height: Average height was 1.6 m for W and 1.72 m for M.

Stump to Knee Measurement: Averages were 35.88 cm for W and 27.76 cm for M.

Foot to Knee Measurement: Averages were 49.16 cm for W and 53.32 cm for M.

Stump Circumferences: Averages for the stump above the knee were 59.68 cm (W) and 53.12 cm (M), and below the knee were 36.84 cm (W) and 39.56 cm (M).

Heel Width: Average width was 6.96 cm for W and 7 cm for M.

Heel Length: Average length was 25.02 cm for W and 27.54 cm for M.



References

Grimmer, M., & Seyfarth, A. (2014). Mimicking Human-Like Leg Function in Prosthetic Limbs (pp. 105–155).

https://doi.org/10.1007/978-94-017-8932-5_5

Raschke, S. U. (2022). Limb Prostheses: Industry 1.0 to 4.0: Perspectives on Technological Advances in Prosthetic Care. *Frontiers in Rehabilitation Sciences*, 3.

<https://doi.org/10.3389/fresc.2022.854404>

Sinha, R., van den Heuvel, W. J., & Arokiasamy, P. (2011). Factors affecting quality of life in lower limb amputees. *Prosthetics & Orthotics International*, 35(1), 90–96.
<https://doi.org/10.1177/0309364610397087>

Nizamis, K., Athanasiou, A., Almpani, S., Dimitrousis, C., & Astaras, A. (2021). Converging Robotic Technologies in Targeted Neural Rehabilitation: A Review of Emerging Solutions and Challenges. *Sensors*, 21(6), 2084. <https://doi.org/10.3390/s21062084>

Rees, S., Tutton, E., Achten, J., Bruce, J., & Costa, M. L. (2019). Patient experience of long-term recovery after open fracture of the lower limb: a qualitative study using interviews in a community setting. *BMJ Open*, 9(10), e031261. <https://doi.org/10.1136/bmjopen-2019-031261>

Pasquina, P. F., Miller, M., Carvalho, A. J., Corcoran, M., Vandersea, J., Johnson, E., & Chen, Y.-T. (2014). Special Considerations for Multiple Limb Amputation. *Current Physical Medicine and Rehabilitation Reports*, 2(4), 273–289. <https://doi.org/10.1007/s40141-014-0067-9>

Murray, C. D. (2009). Understanding Adjustment and Coping to Limb Loss and Absence through Phenomenologies of Prosthesis Use. In *Amputation, Prosthesis Use, and Phantom Limb Pain* (pp. 81–99). Springer New York. https://doi.org/10.1007/978-0-387-87462-3_6



ECORFAN®

© Ecorfan-Mexico, S.C.

No part of this document covered by the Federal Copyright Law may be reproduced, transmitted or used in any form or medium, whether graphic, electronic or mechanical, including but not limited to the following: Citations in articles and comments Bibliographical, compilation of radio or electronic journalistic data. For the effects of articles 13, 162, 163 fraction I, 164 fraction I, 168, 169, 209 fraction III and other relative of the Federal Law of Copyright. Violations: Be forced to prosecute under Mexican copyright law. The use of general descriptive names, registered names, trademarks, in this publication do not imply, uniformly in the absence of a specific statement, that such names are exempt from the relevant protector in laws and regulations of Mexico and therefore free for General use of the international scientific community. BCIERMMI is part of the media of Ecorfan-Mexico, S.C., E: 94-443.F: 008- (www.ecorfan.org/ booklets)