An “orthotic brace” is a specific type of orthosis that focuses on providing support, stability, or correction to a particular part of the body, typically a joint or limb. Orthotic braces are commonly used for conditions affecting the spine, knees, ankles, wrists, and other joints. In the context of spinal support, a brace designed for the spine is often called a “spinal orthosis.” In summary, while all orthotic braces are orthoses, not all orthoses are braces. “Orthosis” is a broader term encompassing various supportive devices, while an “orthotic brace” specifically refers to a device designed to support and stabilize a specific part of the body, often a joint or limb. The terminology used may vary among healthcare professionals and may depend on the specific focus and purpose of the device being discussed.

Orthotic braces play a key role in the correction of spinal deformities. The effectiveness of these devices depends on the design and distribution of corrective forces transmitted through the corset shell.

Objective: The present study aimed to reduce the weight of the orthosis and improve its functionality while maintaining its corrective function.

Methods: The distribution of corrective forces transmitted by the orthosis was evaluated using the finite element method (FEM). Areas of the orthosis, which had minimal impact on the overall stiffness, were identified and material from these areas was removed. The modified orthosis shell was subjected to minor adjustments to maintain its corrective stiffness.

Results: With the modifications made, a 39% reduction in the weight of the orthosis was achieved, while maintaining its corrective stiffness. This indicates that the corrective function was largely preserved.

Conclusion: The study provides a novel approach to orthosis design demonstrating that optimizing the structure using the distribution of maximum principal stress trajectories can significantly improve the functionality of the brace. The proposed method offers potential advances in the design of various types of orthoses, contributing to developments in the field [1)].

1)
Grycuk S, Mrozek P. Numerical modelling of an orthopedic brace with increased functional characteristics for the treatment of idiopathic scoliosis. Technol Health Care. 2023 Oct 26. doi: 10.3233/THC-235013. Epub ahead of print. PMID: 37955072.