MECHANICAL EVALUATION OF POLYMER COMPOSITE HIP PROTECTORS

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Abstract: Hip fractures often result in serious health implications, particularly in the geriatric population, and have been related to longterm morbidity and death. In most cases, these fractures are caused by impact loads in the area of the greater trochanter, which are produced in a fall. This work is aimed at developing hip protectors using composite materials and evaluating their effectiveness in preventing hip fractures under high impact energy (120 J). The hip protectors were developed with an inner layer of energy absorbing soft material and an outer rigid shell of fiberglass-reinforced polymer composite. According to the experimental results, all tested configurations proved to be effective at reducing the impact load to below the average fracture threshold of proximal femur. Furthermore, an addition of Ethylene Vinyl Acetate (EVA) to the impacted area of the composite shell proved to be beneficial to increase impact strength of the hip protectors. Thus, composite hip protectors proved to be a viable alternative for a mechanically efficient and cost-effective solution to prevent hip fractures.