

The relation between hip impact velocity and hip impact force differs between sideways fall techniques.

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Fall techniques that reduce fall severity may decrease the risk of hip fractures. A fundamental variable for fall severity is impact force, but impact velocity is also used. The purpose of the study was to determine whether impact velocity is valid to determine differences in fall severity between different techniques. Five young adults with martial arts (MA) experience performed sideways falls from kneeling height using three techniques: Block with arm (Block) and MA techniques with and without use of the arm to break the fall. In addition, one subject also performed MA falls from standing height. Linear regression analysis showed a moderate relation between hip impact velocity and force, which was depended on technique. In falls with comparable impact velocities, forces in MA falls were lower than forces in Block falls. Hence, differences in impact force could not be predicted by velocity. In conclusion, hip impact velocity may be useful to make an approximate prediction of impact force within fall techniques. However, to determine differences between techniques it was not always a valid predictor. When direct impact force measurements are not possible, methods combining impact velocity with energy estimates before and after impact might be more valid.