

The Analysis of Three-Dimensional Motion of The Knee Joint

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ABSTRACT

This study was designed to determine the 3-dimensional range of motion (ROM) for human knee joint in both open-chain and close-chain lower extremity movements. Ten male college students with knee injury history and twelve without knee injury history were recruited as the subjects. Zebris system was used to measure the 3-D coordinates of the major landmarks related the knee joint. The relationship between flexion-extension angle and adduction angle for open-chain motion is not very stable. The relationship between flexion-extension angle and ad-abduction angle for close-chain motion is very smooth and stable which can be used as the index for designing the knee brace. The comparison between injured and normal knee for the injured subjects shows all parameters have no significant difference. The comparison between open-chain and close-chain motions for 22 subjects shows only the maximum ad-abduction angle has significant difference, all the other parameters have no significant difference. The correlation analysis among all parameters shows that the maximum ad-abduction angle between open-chain and close-chain motions is significantly correlated. The Q-angle is significantly correlated to the maximum ad-abduction angles for both open-chain and close-chain motions. This information could be used as an index to design a more comfortable knee brace for patient and to choose a more effective movement in the injured knee rehabilitation plan.

Keyword : Knee joint, 3-D ROM, Open-chain, Close-chain movement

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