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ABSTRACT

The Prediction of the Size of the Femoral Component used in Knee Replacement Surgery in Relation to Patient's Height, Weight, Body Mass Index (BMI), Gender, and Age

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Background: Degenerative knee osteoarthritis is a common medical condition worldwide. Recent research projects proved that Total knee Replacement (TKR) is a successful surgery for treating osteoarthritis after failure of non-surgical interventions to restore the function of the joint and improve patient's quality of life.

The selection of the size of the femoral component is significant to get equal flextion-extention gaps which is also important to get pain free range of motion and stability.

The availability of stock is of paramount importance for the surgeon before starting the surgery to allow accurate sizing for the patient intra-operatively. We tried to predict the femoral size pre-operatively by analyzing the association between BMI, gender, age, and the actual size used in the operation.

Objectives: To study the association between size of femoral component used in total knee replacement surgery in relation to the patient's height, weight, body mass index, gender, and age, to allow accurate sizing for the patient in the operation room and to improve pre-operative planning for the availability of implant sizes.

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Methods: A retrospective review was performed on a group of 385 patients who underwent TKR surgery between 2019 and 2020. Patient demographics included weight, height, BMI, gender, age, and the actual femoral size used in the operation were obtained from the medical records of Jordan University Hospital (JUH). SPSS (Statistical Package for the Social Sciences) version 28.0 (Chicago, USA) was used for data analysis. Pearson Chi-square test was utilized to investigate the association between type of femoral component and gender of patients. Spearman's rank correlation was used to analyze femoral component size and continuous measures (e.g., weight).

Results: The mean age of the study sample being 68 years (ranging from 26 and 92 years). 88.6% of the sample were females, and 11.4% were males with mean BMI of 31. We found a significant positive correlation between gender, height, weight, and the used femoral component size (P-value < 0.001, <0.001, <0.025, respectively); however, BMI and age were not statistically correlated to the femoral component size (P-value = 0.625, 0.138, respectively).

Conclusions: According to the results, we concluded that the chosen size of femoral component used in the surgery is highly associated with the height, weight, and gender of patients. But not with their BMI and age. These predictive variables can help improve pre-operative planning for the availability of implant sizes and implant supply chain efficiency.

Research Keywords: TKR; BMI; Femoral Component; Femoral Size; Knee Osteoarthritis.