



**INFLUENCE OF PROSTHESIS STEM TAPERS IN
CEMENTLESS HIP ARTHROPLASTY**

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ABSTRACT

Cementless hip arthroplasty is categorized when the surface of the metal parts is porous, and looks like coral and its bond to the femur without any cement between stem and cortical bone. The design of hip prosthesis is believed to be an important factor to minimize the aseptic loosening problems and to encourage long term stability. The objectives of this project are to develop finite element model of intact femur and Total Hip Replacement and to study the stress distribution of cementless hip arthroplasty in different design of taper of prosthesis stem. This project is assumed to be static analysis and represent stair climbing analysis for cementless hip arthroplasty. The different design of the prosthesis stem are straight, single taper and double taper and based on PERFECTA design. The prosthesis is design to be a generic "high stiffness" and bio compatibility material that is Titanium alloy Ti-6Al-4V. The femur model is fixed at the bottom while 800N and 1250N are applied to the femur that represents the hip contact and abductor muscle, respectively. The effects of stress distribution of the cementless hip arthroplasty are described with respect to von mises stress of the analysis. Result shows 45.2MPa, 38.0MPa and 36.4MPa for straight, single and double taper, respectively. Double taper of prosthesis stem produce the best results compare to the other design. Further study on different taper design such as Tri taper are suggested to clarify the effect of the prosthesis tapers.

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