surfaces greatly depends upon the contact pressure, sliding distance and the materials wear coefficient. For all cases the values of sliding distances and wear coefficients are much lower than the contact pressures. Therefore, one can assure that the components subjected to higher contact pressure will be subjected to lesser sliding wear. In this case, it is observed that the contact pressures are higher at all points transmitting the loads from 600N to 1500N for both hip and knee joint prostheses using PTFE-25 as acetabular and tibial liners. So the PTFE-25 should be preferred over the UHMWPE material for the acetabular and distal femur liners of hip and knee joint prostheses.

## 5. CONCLUSIONS

In this study, we developed a finite element model of the hip and knee joint prostheses by simulating the real life conditions with a view to analyze its performances during a normal walking cycle of a human being. It is observed from the above results that the Von-Mises Equivalent stress for all the plastic surfaces sliding against Co-Cr surfaces remains same under identical conditions. The Von-mises equivalent stress analysis and total deformation approaches give strength comparison between PTFE-25 and UHMWPE acetabular and tibial liners.

But, the contact pressure analysis from Figures 8(a) and (b) projects very clear comparison between these components. It has been observed from these simulations that the components made of PTFE-25 have greater contact pressure values as compared with that of the UHMWPE for both hip and knee prostheses. This indicates a lower scoring of the contacting surfaces leading to lesser abrasive wear, thereby enhancing the component life. So the novel bio-plastic material PTFE with 25 % glass composite should be preferred over the existing UHMWPE for making the acetabular cups of the Metal-on-Plastic hip prostheses for longer life.

Since it is not so easy to conduct a real life experiment for analyzing the performance of a hip prosthesis by frequently using various materials, the computer simulation becomes an alternate choice. Therefore it is strongly recommended to follow the proposed modeling and simulation approach to solve complex problems like stress analysis and wear behaviour of hip and knee joint prostheses before manufacturing the prototype in order to save valuable time and money.

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