Finite element analysis of conceptual lumbar spine for different lifting position

ABSTRACT

The Lower-back pain (LBP) which is caused by lifting loads manually is one of the common issues faced by industrial workers. The objective of this paper is to determined the maximum stress and displacement on human lumbar by using computer aided engineering (CAE) software called Msc. Patran/Nastran. The 3D modeling of the lumbar spine from transferring data points of 3D scanner is reconstructed. The stress used for lifting loads from 20 to 60 kg is ranging between 2.52 to 74.1 MPa. The results showed that the end plate at 5th lumbar is experiencing the maximum stress development. This analysis is relevant to the industries especially manufacturing sector in order to provide a direction for ergonomists in the modification of jobs for workers who perform manual lifting. In order to gain a higher precision, it is suggested in the future that the lumbar spine is to be built based directly on a loaded CT scan and biodynamic loading situation with vibration and impact.

Keyword: Human finite element analysis; Maximum stress (von mises); Lumbar spine model