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Guest-editorial

Many problems of occupational ergonomics are now better understood because of biomechanical research. Biomechanics has attracted the attention of ergonomists for many reasons, notably its association with work requirements and assessment of human physical capabilities. This special issue of *Occupational Ergonomics* comprises five papers and aims to present the multidisciplinary components of the biomechanical consideration in ergonomics.

The first paper reveals the background of future ergonomic research which takes into account changes in work globalization and workforce demographics. The changes involve a greater variety of jobs and of those performing the work. This creates a need to match the demands of the workplace with the individual capabilities of workers. This necessitates an anatomically detail-oriented approach from future biomechanical analyses, illuminating the individual strength capabilities.

The second paper addresses human perception about biomechanical task demands by determining how nurses perceive biomechanical task loads and injury risk in their working environment. It reveals the interrelationship between nursing activities and task demands, working conditions, and perceived risk of musculoskeletal injury. Human perception regarding biomechanical task demands is a factor which is not yet included in biomechanical analyses. This necessitates initiating human strength perception studies with particular attention given to individual measurable differences.

Application of biomechanics in ergonomics is commonly used at the whole body level and there are many intriguing biomechanical questions about modeling. Most of the studies relate to the upper extremities and spine; thus, the three papers presented in this special issue explore some topics of current interest in modeling the musculoskeletal system of the upper extremity and spine.

In previous studies, as well as some current human body models used in biomechanical analyses, the lower or upper extremities and their components are considered as rigid bodies. Until recently, the bone has been considered to be self-optimizing material with the objective to adapt to existing load stresses. The joints are complex biomechanical structures and the shape of bony articulations may play an important role in strength analysis. There is a concept that biomechanical models should be individualized and adapted to a specific subject. This requires presenting individual features quantitatively in analytical strength analyses, which were addressed in a third paper of this special issue.

Biomechanical analysis of a human joint should include not only muscles but also capsule ligaments and bones. The presented study in this issue, as a fourth paper, relates to differences of muscle tension and fatigue, based on surface EMG measurements, between an intermittent and constant load, which confirms this approach.

The last paper presents many modeling concepts of the spine, which are difficult to discuss in the length of a typical journal article, so this collection offers a unique opportunity to present the fine points of modeling issues as required in understanding of low back work-related injuries.

While the papers may not be a completely representative sample of current biomechanical considerations in the field of occupational ergonomics and safety, in looking at the topics of these papers and the methodologies they employ, we can conclude that the nature of matching demands of the workplace with the individual capabilities of workers is still not resolved. This special issue creates an opportunity to consider the newest biomechanical approaches of musculoskeletal modeling and implant them in workplace design. Thus, occupational ergonomics and safety issues require a biomechanical consideration of

the complex geometric nature of the human joints with the demands of the workplace in order to explain the mechanism of musculoskeletal disorders and optimize performance taking strength into account.

I hope these papers will serve as unique reference works for the occupational ergonomics community. I want to thank the authors of this special issue for their contributions and Professor Biman Das for his editorial assistance in the preparation of this special issue.

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