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Stability analysis of complete and incomplete spinal cord injury individuals by linear and non-linear approaches

Mohammad Karimi

Isfahan University of Medical sciences, Iran

Abstract

Background*:* The individuals with spinal cord injury (SCI) missed their abilities to stand and walk and use various orthosis to enhance their abilities. Most of the research on ability of paraplegic subjects was done with use of linear method based on trajectories of center of pressure (COP). There was no research on stability of complete and incomplete SCI with use of non-linear methods. Therefore, it was aimed to evaluate the stability of SCI while standing with (complete SCI) and without an orthosis (incomplete SCI) by use of various linear and non-linear methods.

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Result: The stability of complete SCI did not different significantly based on COP excursion. However, incomplete SCI subjects were more unstable than normal. The excursions of COP were 14.16±13.72, 22.1±8.7 and 21.52±15.91 mm, respectively (p-value>0.05). The values of correlation dimension in both planes were more in SCI subjects then that of normal subjects. However approximate entropy decreased in SCI than in normal. In contrast, the mean values of approximate entropy was 0.41±0.077 for normal, 0.255±0.084 for incomplete and 0.274±0.077 (p-value<0.05).

Conclusion: THE stability of SCI subject seems to be the same as that of normal based on linear method but non-linear analysis shows that although they have known how to put their body in a good posture to have a stable position, they had no abilities to control their posture dynamically.

Keyword: stability, Spinal cord injury, Linear, Non-linear.