

## Percentage Contribution of Lower Limb Moments to Vertical Ground Reaction Force in Normal Walking

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**Abstract :** Patients suffering from gait disturbances are referred by having muscle group dysfunctions. There is a need for more studies investigating the contribution of muscle moments of the lower limb to the vertical ground reaction force using 3D gait analysis system. The purpose of this study was to investigate how the hip, knee and ankle moments in the sagittal plane contribute to the vertical ground reaction force in healthy subjects during normal speed of walking. Forty healthy male individuals volunteered to participate in this study. They were filmed using six high speed (120 Hz) Pro-Reflex Infrared cameras (Qualisys) while walking on an AMTI force platform. The data collected were the percentage contribution of the moments of the hip, knee and ankle joints in the sagittal plane at the instant of occurrence of the first peak, second peak, and the trough of the vertical ground reaction force. The results revealed that at the first peak of the ground reaction force (loading response), the highest contribution was generated from the knee extension moment, followed by the hip extension moment. Knee flexion and ankle plantar flexion moments produced high contribution to the trough of the ground reaction force (midstance) with approximately equal values. The second peak of the ground reaction force was mainly produced by the ankle plantar flexion moment. Conclusion: Hip and knee flexion and extension moments and ankle plantar flexion moment play important roles in the supporting phase of normal walking.

**Keywords :** gait analysis, ground reaction force, moment contribution, normal walking

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