

Free Paper Session

Prosthetics: Lower Limb Transtibial – Gait

1.1.4.a

Effects of Balance Support on Energy Cost of Walking in People with a Lower Limb Prosthesis

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BACKGROUND

People with a lower limb prosthesis expend more metabolic energy when walking compared to able-bodied peers. The magnitude of this increase varies with cause and level of amputation.[1] Factors that could explain this higher energy cost (EC) of walking are not fully understood. Lower limb amputees (LLA) experience deterioration of balance control following amputation, which might negatively influence their EC during walking.

AIM

The main objective of this study was to examine the effect of balance support on EC during treadmill walking in LLA with different levels and cause of amputation.

METHOD

Twenty-five persons with a unilateral lower limb amputation participated. Level of amputation: 16 transtibial, 2 knee-disarticulation, 7 transfemoral. Cause of amputation: 9 vascular, 16 non-vascular. Age: 58.14 years. Participants performed two walking trials for approximately 5 minutes on an instrumented treadmill, in random order, once without support and once while holding one handrail on the contralateral side. In both conditions they walked at their comfortable walking speed established without handrail support. Metabolic energy cost was assessed through respirometry. The effect of handrail support was tested using two separate ANOVA's with level amputation and cause of amputation as between subjects' factors.

RESULTS

The main effect of handrail support on energy cost for the entire sample was borderline significant ($p=0.051$). With handrail support energy cost was on average 5% lower. There was no interaction effect of handrail support with level of amputation. However, a significant interaction effect of support and cause of amputation was found ($p=0.028$). With support energy cost decreased by 11% in people with a vascular cause of amputation and only 1% in those with non-vascular cause.

DISCUSSION AND CONCLUSION

Reduced balance control might explain part of the increased energy cost in people with a lower limb amputation, specifically in those with an amputation due to vascular problems. Improving balance control should be taken into consideration when striving to reduce the metabolic cost of walking in this population.

REFERENCES

[1] Waters RL, Mulroy S, Gait Posture 1999; 9(3):207-31.