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BENEFITS OF GENIUM MICROPROCESSOR CONTROLLED KNEE ON AMBULATION, MOBILITY, ACTIVITIES OF DAILY LIVING AND QUALITY OF LIFE: A SYSTEMATIC REVIEW

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INTRODUCTION

Several years ago, a new microprocessor controlled knee (MPK), Genium, was introduced containing sensors, algorithms and technical solutions that enable a range of new functions to lower limb amputees. We conducted a systematic review to evaluate the effect of the knee on ambulation, mobility, activities of daily living (ADLs) and quality of life (QoL).

METHODS

The systematic review was conducted according to the Prisma Guidelines and recommendations of the State-of-Science Evidence Report Guidelines of the AAOP. Three reviewers conducted the quality assessment independently.

RESULTS

Twelve articles were included in the review and reported of active subjects transitioning from C-Leg to Genium. The overall validity of the evidence was mostly medium and high (Figure 1). Common validity concerns included lack of blinding, incomplete reporting (fatigue & learning effect, attrition rate), effect size calculation, etc. Nine articles focused on ambulation, in particular on level walking, stairs and ramps [1-9]. Biomechanical analysis reported of more physiological and symmetrical gait as well as reduction of loading and compensatory motion on sound side. Four square step test, Amputee Mobility Predictor and step activity derived functional level assessing the mobility were significantly improved[6]. Four publications addressing ADLs reported of significant improvements with values closer to able-bodies subjects (i.e. domains upper-and lower-body strength, balance, coordination, endurance)[6,9,11,12]. Two articles reported of significant effect of Genium on QoL[6,10].

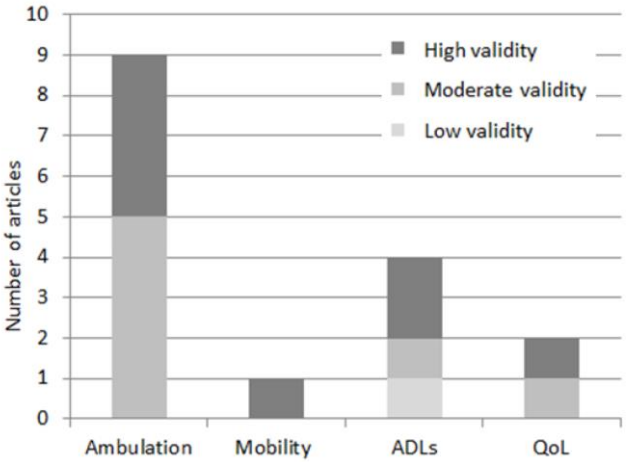

Figure 1. Number and quality of evidence across categories.

CONCLUSION

Quality of evidence is predominantly moderate and high. Genium resulted in more physiological gait, more evenly distributed loading and reduction in compensatory movements. Significant improvements are reported in mobility, QoL and especially safety and ability to conduct ADLs.

SIGNIFICANCE

Additional benefits could be observed with Genium in above knee amputees when compared to standard MPKs. Gait optimization could be relevant considering the long-term risk of secondary physical conditions in the prosthetic wearers.

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DISCLOSURE

M Mileusnic, L Rettinger and A Hahn are affiliated with Otto Bock Healthcare Products.