A Systematic Review of kinematic models used in foot & ankle biomechanics

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INTRODUCTION

Over the past decade our understanding of foot function has increased significantly[1,2]. Our understanding of foot and ankle biomechanics appears to be directly correlated to advances in models used to assess and quantify kinematic parameters in gait. These advances in models in turn lead to greater detail in the data. However, we must consider that the level of complexity is determined by the question or task being analysed. This systematic review aims to provide a critical appraisal of commonly used marker sets and foot models to assess foot and ankle kinematics in a wide variety of clinical and research purposes.

METHODS

An electronic search of the following databases was performed in March 2010: MEDLINE (1950), Embase (1980), Cinhahl (1982), ISI Web of Science (1900), Scopus and SportDISCUS. The search strategy used was **"**foot model* AND human* AND kinematic* AND (gait* OR ergonomic* OR automotive*)". The secondary snowball method was applied to identify literature not identified during the electronic database searching process.

Titles and abstracts of identified articles were assessed by a single reviewer (CB). Articles were only included if they were published in the English language, were full text and original publications. Further, only 3-Dimensional kinematic models were included. No reviews of the literature were included. Data was extracted based on standardised protocol. The quality of studies were assessed by two reviewers CB and DT based on a modification of the method established by Peters et al 2010.

RESULTS

The flowchart (Figure 1) below displays the search process. The initial search identified 287 articles. Inclusion/exclusion criteria were applied by one examiner CB. This process excluded 224 articles. A secondary snowball search identified a further 4 articles. 27 orginal articles were included in the final review.

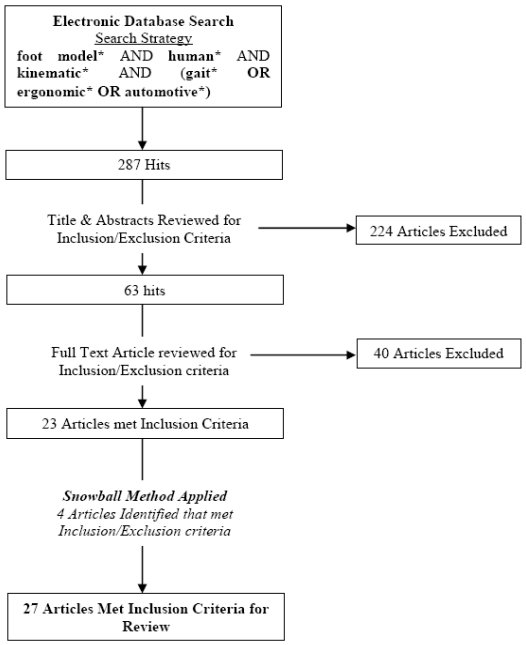

Figure 1 – Flowchart of Systematic Search Process

DISCUSSION

This paper presents an systematic overview of current techniques used in analysing foot and ankle kinematics in clinic and research throughout the world. It remains important that biomechanists understand that the level of complexity is determined by the question/task to be analysed. So for simple clinical questions there is no need to consider the foot as complex functional units.

REFERENCES

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