Construct validity of the octopus stratification algorithm for allocating patients with knee osteoarthritis into clinically relevant subgroups

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CONSTRUCT VALIDITY OF THE OCTOPUS STRATIFICATION ALGORITHM FOR ALLOCATING PATIENTS WITH KNEE OSTEOARTHRITIS INTO CLINICALLY RELEVANT SUBGROUPS

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Background: We recently developed a model of stratified exercise therapy [1], consisting of (i) a stratification algorithm allocating patients with knee osteoarthritis (OA) into clinically relevant subgroups, and (ii) subgroup-specific exercise therapy. More specifically, in our model we distinguish the following subgroups with proposed underlying phenotypes: 'high muscle strength subgroup' representing a post-traumatic phenotype, 'low muscle strength subgroup' representing an age-induced phenotype and 'obesity subgroup' representing a metabolic phenotype.
Objectives: In the present study, we aimed to validate the construct of this algorithm, focusing on 3 research questions: (i) are the proportions of patients in each subgroup similar across cohorts?; (ii) are the characteristics of each of the subgroups in line with their proposed underlying phenotypes?; (iii) are the effects of usual exercise therapy in the 3 subgroups in line with the proposed effect sizes?
Methods: Data from five studies (four trials and one cross-sectional cohort) were used to validate the construct of our algorithm by 63 a priori formulated hypotheses regarding the research questions.
Results: Baseline data from a total of 1,211 patients with knee OA were analyzed for the first and second research question, and follow-up data from 584 patients who were part of an exercise arm within a trial for the third research question. In total, the vast majority (73%) of the hypotheses were confirmed. Regarding our first research question, we found similar proportions in each of the three subgroups across cohorts, especially for three cohorts. Regarding our second research question, subgroup characteristics were almost completely in line with the proposed underlying phenotypes. Regarding our third research question, unexpectedly, usual exercise therapy resulted in similar, moderate to large effect sizes for knee pain and physical function for all three subgroups.
Conclusion: This study suggests that our algorithm might be a valid instrument to allocate patients with knee OA into clinically relevant subgroups, as most of our a priori hypotheses could be confirmed. On the other hand, subgroups did not differ substantially in effects of usual exercise therapy, contrary to our expectation. An ongoing trial [1] will assess whether this algorithm accompanied by subgroup-specific exercise therapy improves clinical and economic outcomes.

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