

# Osteoarthritis – a role for weight management in rheumatology practice: an update

H. Bliddal, P. Christensen, B. F. Riecke, J. Aaboe, R. Frederiksen, E. Bartels and R. Christensen

The Parker Institute, Copenhagen University  
Hospital Frederiksberg, Denmark

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Address for correspondence: Professor H  
Bliddal, The Parker Institute, Frederiksberg  
Hospital, DK-2000 Copenhagen F, Denmark.  
E-mail: hb@frh.regionh.dk

## Summary

Osteoarthritis (OA) and obesity are related diseases, which occur in a large proportion of the population. Epidemiological evidence show that weight is of great importance for the development of OA in the knee, and to some extent also in hip and finger joints. Once acquired, the OA contributes to further weight problems by decreasing the daily activity level. Weight loss will be beneficial for the knee and experimental data point at a highly significant effect on knee function and recent results even point at a positive effect on the cartilage of the knee joint. Recommending patients with a combination of knee OA and obesity to lose at least 5% body weight, and aim for 10% is predicted to correspond to 26% improvement in physical function. A programme for this weight loss has been tested with good results applying an initial formula diet with maintenance therapy in groups during follow-up.

**Keywords:** Knee, osteoarthritis, obesity, weight loss.

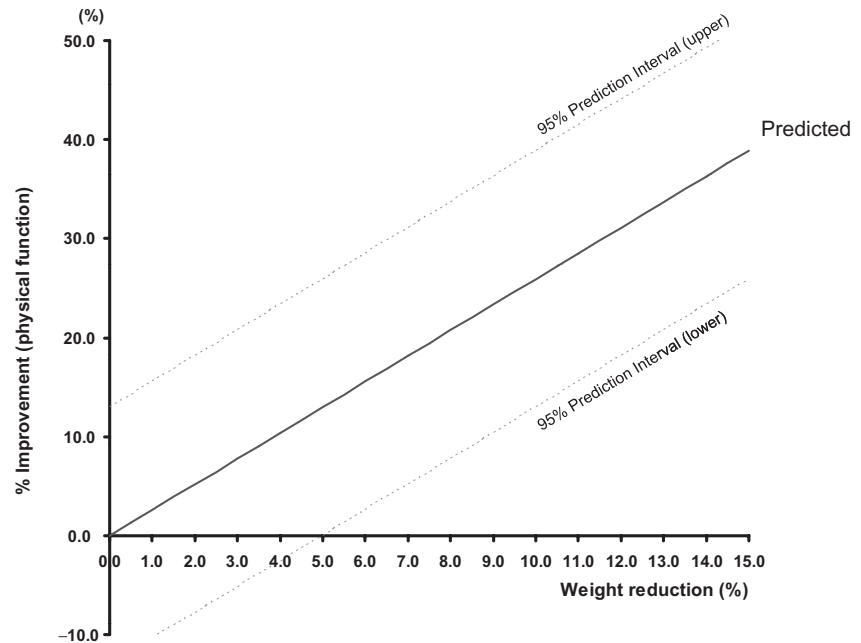
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## Introduction

Osteoarthritis (OA) is the most common type of arthritis, affecting at least 20 million Americans, a number that is expected to double over the next two decades (1,2). More than 10% of persons 55 years of age or older are considered to have symptomatic OA, primarily of the knees (3). Epidemiological data suggests that obesity is very important for the development of knee OA, the knee being a weight bearing joint (4). The increasing average weight of the population causes severe problems for general health and it also affects the joints; trends with time in populations show a tendency towards deterioration of both with increasing age and weight (2,5). Obesity and knee OA share pathogenetic phenotypes and the development of one disease increases the risk of the other and may trigger the onset of a vicious circle (6). The typical patient is an elderly woman, significantly overweight, and trapped in a negative pattern of continual weight gains and pain, accompanied, in turn, by decreasing activity and functional capacity.

## Treatment of obesity in patients with osteoarthritis

There is now evidence that by treating effectively the obesity of patients who also have OA, functional status is dramatically improved (6); the short-term results are equal to that of a joint replacement (7). As a consequence encouragement to lose weight and maintain weight at a lower level in overweight patients with lower limb OA is strongly recommended by the *Osteoarthritis Research Society International* (OARSI) guidelines (8). A meta-regression analysis indicated that disability in obese knee OA patients could be significantly improved when weight was reduced over 5.1%, or at the rate of 0.24% reduction per week (9). The empirical evidence for the predicted improvement in patients' self-reported disability, following weight loss was previously described in terms of the standardized mean difference (SMD) (9). Using the conversion proposed by Bliddal and Christensen (10), the predicted SMD values into can be converted into the expected percentage improvement.



**Figure 1** Predicted clinical improvement as a function of weight reduction, based on a random-effects meta-regression analysis model, with standardized mean differences converted into % improvement.

In Fig. 1, the expected clinical improvement in terms of physical function is expressed as the predicted improvement in OA disability, with the corresponding upper and lower 95% prediction intervals (PI). As illustrated by the lower 95% PI, patients should be encouraged to lose at least 5% body weight before expecting an clinical improvement in disability; i.e. our model predicts (9), that, a 10% weight loss would correspond to around 26% symptom relief (25.9% [95% PI: 13.0–38.9%]).

The mechanisms responsible for improvements in function and pain in patients with knee OA consequent to long-term intensive dietary weight loss and exercise interventions in obese adults remain to be fully clarified (6,7,11). Reductions in joint loads (12) and inflammatory cytokines (13), each thought to exacerbate joint destruction, are potential pathways. Preliminary data suggest that a significant weight reduction may even slow down loss and increase quality of cartilage in the knee joints (14).

### Weight loss in obese patients with knee osteoarthritis: a pragmatic trial

We conducted a randomized biphasic trial with a primary period of weight loss induced by the use of a low-energy diet strategy (15) followed by a period of weight maintenance. The first phase of the study consisted of an 8-week weight reduction programme where the participants were randomized to either an all-provided very low-energy diet with 415–554 kcal day<sup>-1</sup> or a low-energy diet with 810 kcal day<sup>-1</sup> in a supervised dietary programme (products provided by *The Cambridge Weight Plan*) and another 8 weeks' fixed energy diet programme using 1200 kcal

incorporating two Cambridge Diet products daily. Participants attended the nutrition unit at the Parker Institute weekly. In the second phase, lasting 12 months, patients were randomized to continuous dietary instruction, supervised knee-exercise, or a control group. The intervention groups had 52 diet education sessions or knee-exercise sessions over 1 year. The trial was designed to obtain data on the magnitude of the clinical effect in obese knee OA patients of a dietary (6) or knee-exercise maintenance vs control (having no attention in the subsequent 1-year follow-up), and to obtain relative efficacy and safety data on these two recommended treatments in a single study, enabling a more informed decision-making in the future (16). In the diet group, more than 60% of the participants had a 10% weight loss after the first three months of participation (15). The dietary programme was well tolerated with a minimum of side effects and adverse events. During the first phase with formula diet, no event of cholecystitis was reported.

### Conclusions

In obese individuals, knee OA makes it even more difficult to achieve and maintain a weight loss because of restrictions in movement and exercise. While knee OA exercise programmes may be too 'rough' a treatment in the more severe cases of knee OA, an arthritic knee is no excuse for not losing weight, and a dietary programme is of major importance for losing weight and maintaining a weight loss in patients with concomitant knee OA and obesity.

## Conflicts of Interest Statement

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## Author contributions

All authors contributed to the preparation of the manuscript.

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