

Controlling the obesity epidemic is important for maintaining musculoskeletal health

A D Woolf, F C Breedveld, T K Kvien

Obesity: the risks on musculoskeletal health

OBESITY—THE GROWING EPIDEMIC

Awareness of the importance of obesity and an urgency for action in view of the increasing numbers of people of excess weight at all ages is increasing. The focus is on the effect of obesity on conditions with high morbidity and mortality—for example, coronary heart disease, ischaemic stroke, type 2 diabetes and cancers,¹ whereas the effect on osteoarthritis, back pain and other musculoskeletal problems² is underappreciated. Although obesity is recognised as contributing to the burden of osteoarthritis,¹ the potential benefits for musculoskeletal health of maintaining an ideal body weight are not recognised.³ There is strong evidence that obesity is a major determinant of osteoarthritis. Consequently, maintaining an ideal body weight at all ages is a major recommendation of the European Action Towards Better Musculoskeletal Health Report⁴ and of the American College of Rheumatology and European League Against Rheumatism guidelines for osteoarthritis.^{5–7}

Obesity is a major concern in Europe as Europe has one of the highest body mass indices (BMIs (weight (kg)/(height² (m²))) of all regions under the World Health Organization, with 400 million adults estimated to be overweight and 130 million to be obese.^{6–8} The prevalence of obesity has risen threefold or more in many European countries since the 1980s. The main contributors to this increase are unhealthy diets and physical inactivity. In view of the actions being taken to combat this epidemic of obesity, there is a need for better recognition of the effect of obesity on the musculoskeletal problems. The forthcoming World Health Organization European Region Ministerial Conference on Counteracting Obesity is a forum to ensure the development of an integrated strategy that considers all the effects of obesity and the problems of controlling and reducing obesity in a physically inactive and ageing population.

What is the evidence of the role of obesity in osteoarthritis, and what should be the recommendations for how lifestyle measures such as exercise and weight

control can be used to reduce the burden of musculoskeletal problems?

OBESITY AND OSTEOARTHRITIS

Obesity is a major risk factor for the occurrence, progression and effect of osteoarthritis—the fifth leading cause of loss of healthy life in high-income countries.² Osteoarthritis of the knee makes a major contribution to this. The risk for osteoarthritis of the knee was increased almost fourfold in obese women and 4.8-fold in obese men whose BMI was in the range 30–35 compared with those whose BMI was <25 in the first National Health and Nutrition Examination survey.⁹ The risk for osteoarthritis of the knee is increased by approximately 15% for each additional kg/m² increase in BMI >27. Other studies have found similar associations, although some have shown the risk to be greater in women.

Obesity has been found to precede osteoarthritis of the knee and is therefore not just a consequence of reduced mobility, although this will also contribute. People who are overweight in their mid-30s have been shown to be at increased risk of developing osteoarthritis of the knee when in their 70s,¹⁰ and longitudinal population studies have shown that initial weight correlates with risk of future development of osteoarthritis, both in the tibiofemoral and patellofemoral compartments.¹¹ Obese people are particularly at risk of bilateral osteoarthritis of the knee.

The progression of osteoarthritis of the knee is also increased with obesity,¹² and obesity is a risk factor for progression from unilateral to bilateral osteoarthritis of the knee.¹³

Obesity is also a risk factor for the occurrence of osteoarthritis of the hip, most consistently found for symptomatic disease and not just radiological changes,¹⁴ but the association is not as strong as for osteoarthritis of the knee. It may be that obesity induces symptoms in people with osteoarthritis of the hip or that the weakness of association is a result of difficulties with the radiographic identification of early changes. Interestingly, a weak association between

obesity and osteoarthritis of the hand has also been shown in some studies.¹⁵

The primary mechanism for osteoarthritis in obesity is the effect of overloading the hip and knee joints during weight-bearing activities. Metabolic factors associated with obesity may also have a role, which may explain the association with osteoarthritis of the hand.

WEIGHT REDUCTION AND OSTEOARTHRITIS

Obesity clearly contributes to the effect of osteoarthritis by increasing the incidence, progression and loss of activities, and participation, but can weight reduction reduce the burden? Evidence comes from epidemiological and a limited number of interventional studies.

The Framingham study has shown that a decrease in BMI of ≥ 2 units in women over the previous 10 years decreased the odds of developing osteoarthritis of the knee by over 50% (odds ratio (OR) 0.46, 95% confidence interval (CI) 0.24 to 0.86).¹⁶ The risk of osteoarthritis of the knee in women with increased baseline BMI also decreased by almost 60% with ≥ 2 units of BMI loss. In women free of disease at baseline, a higher BMI increased the risk of osteoarthritis (OR 1.6 (per 5-unit increase), 95% CI 1.2 to 2.2), and weight change was directly correlated with risk of osteoarthritis (OR 1.4 (per 10-pound change in weight), 95% CI 1.1 to 1.8).¹⁷

Few therapeutic trials have examined the effect of weight loss in osteoarthritis of the knee. Knee pain was less often reported after gastric stapling (14% of subjects *v* 54% of subjects before this procedure), with a mean weight loss of 45 kg in an uncontrolled study.¹⁸ Huang *et al*¹⁹ found that patients with osteoarthritis of the knee and obesity who were allocated to receive a weight reduction intervention (including weekly auricular acupuncture, diet control and aerobic exercise) with or without ultrasound, and transcutaneous electric stimulation treatment successfully lost weight and had greater pain reduction and improvement in Lequesne index than patients who received only ultrasound and transcutaneous electric stimulation. The weight loss and the speed of ambulation were less in those with more severe osteoarthritis, suggesting that reduced physical activity probably has a role in excess weight and difficulty in weight reduction. A further short-term non-randomised trial has shown the benefits of diet and exercise in overweight Japanese women with osteoarthritis of the knee.²⁰ Messier *et al*²¹ compared exercise and weight reduction with exercise alone in older patients with osteoarthritis of the knee and found that both groups lost weight and had marked improvement in pain and disability. This group of researchers subsequently

reported the first large randomised clinical trial, Anti-Inflammatory Prevention Trial, assessing the symptomatic benefit of weight loss and exercise separately or in combination in overweight and obese sedentary older people with disabling osteoarthritis of the knee over 18 months.²² The average weight loss was 5.7% in the diet and exercise group, and 4.9% in the diet alone group, in contrast with 1.2% in the group just educated about following a healthy lifestyle. Diet in combination with exercise was most effective in improving self-reported measures of function and pain, whereas diet alone had a benefit on self-reported physical function (Western Ontario and Mcmasters University Osteoarthritis Index). This study not only shows the benefit of weight reduction and exercise but also highlights the need for supervision rather than just education.

Although there is an epidemiological association between osteoarthritis of the hip and obesity,¹⁴ there is no randomised controlled trial evidence of a benefit of weight loss in patients with osteoarthritis of the hip.⁷

OBESITY AND OSTEOARTHRITIS—THE RECOMMENDATIONS

Clearly, there is a strong association between obesity and osteoarthritis of the lower limbs, and evidence that avoidance of obesity or reduction in weight will reduce the incidence, progression and effect, in particular, of osteoarthritis of the knee. Stronger evidence is still needed of the long-term benefits and feasibility of this approach, but there is sufficient evidence and expert opinion that weight reduction is recommended in the European Action Towards Better Musculoskeletal Health Report,⁴ as well as in the American College of Rheumatology and European League Against Rheumatism recommendations for management of osteoarthritis.⁵⁻⁷ Exercise is also effective in the management of osteoarthritis.²³ Clearly, it is most effective to combine weight reduction with exercise, and therefore this combined approach needs to be encouraged and facilitated. Many patients with lower limb osteoarthritis are concerned about undertaking exercise in case it worsens their condition, or if they are unable to exercise due to aggravation of symptoms. People with such concerns will need explanation with reassurance and good pain management.

THE CHALLENGE

Obesity is a major threat to many aspects of health, including musculoskeletal aspects. Preventing obesity along with encouraging physical activities and maintaining physical function are important strategies. Recognising the mutual benefits of this strategy for several

non-communicable diseases will also enable the development of better ways of implementing them. We need to focus on how to improve diets and physical activity to control obesity and improve the quality of life.

Public health strategies need to focus on healthy people, including children, but focus should also be directed to people who already have joint problems and limited physical function due to lower limb joint diseases. People of all ages should be the target population, but people are most likely to change their behaviour with the occurrence of a trigger event such as the first episode of knee pain. Such an event may be an opportunity for a proactive approach to improve lifestyle. Further, healthcare providers should raise their awareness about obesity when considering secondary and tertiary preventive measures in patients with joint diseases. It is essential to have a single message about the importance of diet, weight and level of physical activity for all the different conditions they may benefit. "United we stand, divided we fall". Thus, providers of healthcare in the field of musculoskeletal diseases must work with public health physicians, cardiologists, oncologists, diabetologists and health promoters, along with health policy makers, to ensure that changing lifestyle factors improves all aspects of health.

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Authors' affiliations

A D Woolf, Department of Rheumatology, Royal Cornwall Hospital, Truro, UK

T K Kvien, Department of Rheumatology, Diakonhjemmet Hospital, Oslo, Norway

F Breedveld, Department of Rheumatology, Leiden University Medical Centre, The Netherlands

Correspondence to: A D Woolf, Rheumatology Unit, Royal Cornwall Hospital, Truro TR1 3LJ, UK; anthony.woolf@btopenworld.com

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