

THE BIOMECHANICAL AND METABOLIC EFFECTS OF OBESITY ON THE DEVELOPMENT AND PROGRESSION OF OSTEOARTHRITIS. K.A. Kosak, undergraduate student, and Research Advisor, L.M. Shepherd, M.P.H., R.D., Nutrition Department, College of St. Benedict, St. Joseph, MN

Background and Purpose: Osteoarthritis (OA), the most common form of arthritis, afflicts approximately 20 million people and is most prevalent in adults 65 years and older. Obesity, defined by a body mass index (BMI) $\geq 30 \text{ kg/m}^2$, is a growing epidemic including 32.9% of the US population 60 years of age and older. Obesity is a significant risk factor for the debilitating disease of OA. The purpose of this analysis was to determine what characteristics of obesity lead to OA development and progression and what methods, if any, can be used to decrease OA risk. **Results:** Biomechanical strain places excess weight on joints which increases joint torque, especially in the lower extremities. Loads placed upon the knee joint during walking are 5-6 times a person's body weight and loads placed upon the hip joint are 4 times a person's body weight. Weight loss and strengthening of the knees and ankles are effective treatments to slow down or slightly reverse the development and progression of OA due to biomechanical strain. In the knee joint, one pound of weight loss is associated with a 4-pound decrease in joint load per step, on average. The metabolic factors leptin and C-reactive protein may also be a link between obesity and OA because elevated levels of these metabolites are associated with both conditions. Leptin can be produced in chondrocytes and osteoblasts and produces nitric oxide (NO) when linked with interferon- γ and TGF β which give rise to osteophyte production. C-reactive protein (CRP) is produced in response to cytokine activity. Weight loss can also decrease OA risk in terms of metabolic factors because leptin is proportional to adipose tissue and CRP levels are proportional to osteoarthritis grade. Some obese adults may be able to decrease knee joint torques by unconsciously walking in a more upright position with less knee and hip flexion. However, this practice occurs at the expense of increased ankle plantarflexion. Very high BMI between the ages of 30-39 has the potential to increase OA risk to that of a 65 year old. The relationship of obesity and OA between genders is not consistent and cultural practices are more of a factor than ethnicity alone. **Conclusion:** Both biomechanical and metabolic factors play a role in the relationship between OA and obesity. Weight loss is an effective method for decreasing OA risk in all factors so it should be the first method used for OA treatment. As the population of individuals 65 years of age and older continues to rise and in view of the current epidemic of obesity, improvements in OA risk are imperative to the health of this generation.