RSNA Press Release

People Who Consume Ultra-Processed Foods Have Worse Muscle Health

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OAK BROOK, Ill. – Researchers found that a diet high in ultra-processed foods is associated with higher amounts of fat stored inside thigh muscles, regardless of calorie or fat intake, physical activity or sociodemographic factors in a population at risk for knee osteoarthritis. Results of the study were published today in *Radiology*, a journal of the Radiological Society of North America (RSNA). Higher amounts of intramuscular fat in the thigh could potentially increase the risk for knee osteoarthritis.

Ultra-processed foods usually have longer shelf lives and can be highly appealing and convenient. They contain a combination of sugar, fat, salt and carbohydrates which affect the brain's reward system, making it hard to stop eating. These foods include breakfast cereals, margarines/spreads, packaged snacks, hot dogs, soft drinks and energy drinks, candies and desserts, frozen pizzas, ready-to-eat meals, mass-produced packaged breads and buns, which all include synthesized ingredients.

"Over the past decades, in parallel to the rising prevalences of obesity and knee osteoarthritis, the use of natural ingredients in our diets has steadily diminished and been replaced by industrially-processed, artificially flavored, colored and chemically altered food and beverages, which are classified as ultra-processed foods," said the study's lead author, Zehra Akkaya, M.D., researcher and consultant for the Clinical & Translational Musculoskeletal Imaging group at University of California, San Francisco, Department of Radiology and Biomedical Imaging.

Dr. Akkaya and the research team set out to assess the relationship of ultra-processed food intake and intramuscular fat in the thigh.

For the study, researchers analyzed data from 615 individuals who participated in the Osteoarthritis Initiative who were not yet affected by osteoarthritis, based on imaging. The Osteoarthritis Initiative is a nationwide research study, sponsored by the National Institutes of Health, that helps researchers better understand how to prevent and treat knee osteoarthritis.

"Osteoarthritis is an increasingly prevalent and costly global health issue," Dr. Akkaya said. "It constitutes one of the largest non-cancer-related health care costs in the United States and around the world. It is highly linked to obesity and unhealthy lifestyle choice."

Of the 615 individuals, (275 men, 340 women) the average age was 60 years. On average, participants were overweight with a body mass index (BMI) of 27. Approximately 41% of the foods they consumed over the prior year were ultra-processed.

The researchers found that the more ultra-processed foods people consumed, the more intramuscular fat they had in their thigh muscles, regardless of caloric intake. On MRI, this can be seen as fatty degeneration of the muscle, where streaks of fat replace muscle fibers.

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"In addition to investigating the quality of our modern diet in relationship to thigh muscle composition, in this study, we used widely available, non-enhanced MRI, making our approach accessible and practical for routine clinical use and future studies," Dr. Akkaya said. "These MRIs do not require advanced or costly technology, which means they can be easily incorporated into standard diagnostic practices."

By exploring how ultra-processed food consumption impacts muscle composition, this study provides valuable insights into dietary influences on muscle health.

"This research underscores the vital role of nutrition in muscle quality in the context of knee osteoarthritis," Dr. Akkaya said. "Addressing obesity is a primary objective and frontline treatment for knee osteoarthritis, yet the findings from this research emphasize that dietary quality warrants greater attention, and weight loss regimens should take into account diet quality beyond caloric restriction and exercise."

Targeting modifiable lifestyle factors—mainly prevention of obesity via a healthy, balanced diet and adequate exercise—has been the mainstay of initial management for knee osteoarthritis.

In addition to other health benefits, reducing ultra-processed food consumption may help preserve muscle quality which in turn could alleviate the burden of knee osteoarthritis.

"In recent years, several researchers have shown detrimental impacts of ultra-processed food on various health outcomes but data on the relationship of ultra-processed food and body composition in the context of knee osteoarthritis is limited," Dr. Akkaya said. "This is the first study assessing ultra-processed food's impact on thigh muscle composition using MRI. By exploring how ultra-processed food consumption impacts muscle composition, this study provides valuable insights into dietary influences on muscle health."

"Ultra-processed Foods and Muscle Fat Infiltration at Thigh MRI: Data from the Osteoarthritis Initiative." Collaborating with Dr. Akkaya were Gabby B. Joseph, Ph.D., Katharina Ziegeler, M.D., Wynton M. Sims, M.D., M.P.H., John A. Lynch, Ph.D., Virginie Kreutzinger, M.D., Charles E. McCulloch, Ph.D., Nancy E. Lane, M.D., Michael C. Nevitt, Ph.D., and Thomas M. Link, M.D., Ph.D.

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For patient-friendly information on musculoskeletal MRI, visit *RadiologyInfo.org*.

Images (JPG, TIF):

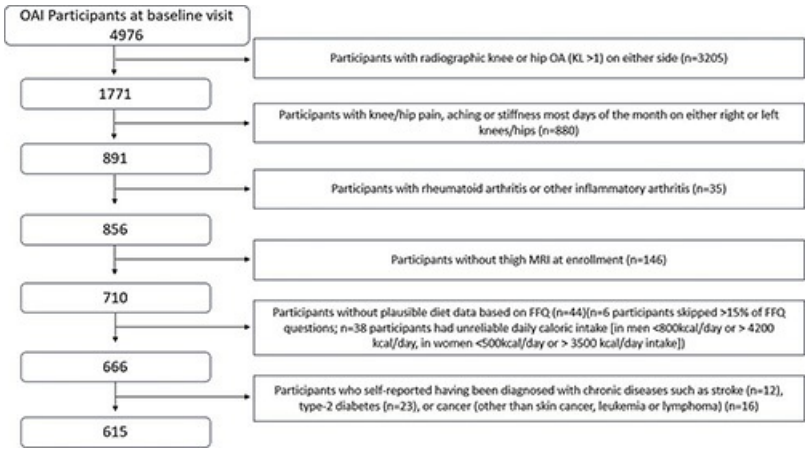


Figure 1. Selection of participants from the Osteoarthritis Initiative (OAI) (February 2004–October 2015) for inclusion in this study. Data for this cross-sectional study were from the baseline visit of OAI participants. FFQ = food frequency questionnaire, KL = Kellgren-Lawrence, OA = osteoarthritis.

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Figure 2. Representative axial T1-weighted spin-echo thigh MRI scans in **(A)** a 61-year-old female participant and **(B)** a 62-year-old female participant. Both participants were of similar age and body mass index (BMI, calculated as weight in kilograms divided by height in meters squared). Both had Physical Activity Scale for the Elderly scores above the mean score in the study. According to the World Health Organization definition, the participant in **B** qualified as having abdominal obesity (abdominal circumference ≥ 88 cm). Abdominal circumference is a measure of central obesity that captures fat distribution and serves as an indicator of cardiometabolic health. Compared with the participant in **A**, the participant in **B** had a higher proportion of ultra-processed food (UPF) in their diet (87.1% vs 29.5%) and exhibited fattier thigh muscles bilaterally, with Goutallier grade (GG) for all thigh muscles summing to 25 for the participant in **A** and 38 for the participant in **B**.

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