The Journal of Nutrition – April 2019 Media Summaries

The following articles are being published in the April 2019 issue of *The Journal of Nutrition*, a publication of the American Society for Nutrition. Summaries of the selected articles appear below; the full text of each article is available by clicking on the links listed. Manuscripts published in *The Journal of Nutrition* are embargoed until the article appears online either as in press (Articles in Press) or as a final version. The embargoes for the following articles have expired.

Liver fat accumulation: alcohol, sugar-sweetened beverages, or both?

Healthful plant-based diets favorably change adiposity-related biomarkers

Can fish oil supplementation during pregnancy improve birth outcomes?

Liver fat accumulation: alcohol, sugar-sweetened beverages, or both?

Fatty liver disease, characterized by abnormal accumulation of fat within the liver, covers a broad spectrum of clinical concerns including a buildup of fibrous tissue, liver cirrhosis, and increased risk of end-stage liver disease. Furthermore, it has been linked to type 2 diabetes and cardiovascular disease. It is therefore important to better understand dietary factors that increase fatty deposits in the liver. Alcohol consumption is a well-established risk factor associated with fatty liver disease. However, dietary factors not related to excessive alcohol consumption can cause hepatic fat accumulation as well. Referred to as nonalcoholic fatty liver disease, energy-containing nonalcoholic beverages can also lead to the buildup of fat in the liver. Findings from a recent study conducted by Esther van Eekelen (Leiden University Medical Center, The Netherlands) and colleagues and published in the April 2019 issue of *The Journal of Nutrition* reveal that consumption of both alcoholic and sugar-sweetened beverages contributes to fatty liver disease.

The aim of this study was to compare different types of beverages — alcoholic and nonalcoholic — and their association with liver fat. Men and women aged between 45 and 65 years were asked about their consumption of alcoholic (beer, wine, liquor, and mixed drinks) and nonalcoholic (nonalcoholic beers, coffee, tea, milk, and sugar-sweetened drinks) beverages. Nonalcoholic beverages were divided into energy-containing (nonalcoholic beers, milk, and sugar-sweetened beverages) or non-energy-containing (tea and coffee without sugar or milk) beverages. All beverages were converted to standard servings and to percentage of total energy intake. Nonalcoholic beverages were summed into one variable. The same was done for all alcoholic beverages, which were then divided into subcategories (0-0.5 g alcohol per day, 0.5-5 g per day, 5-15 g per day for women and 5-30 g per day for men, and >15 g per day for women and > 30 g per day for men.

Daily consumption of alcoholic beverages was associated with increased liver fat. Replacement of alcoholic beverages with milk was associated with less liver fat, whereas replacement with sugar-sweetened beverages was equally associated with liver fat, also when an equal amount of calories of the beverages were replaced. The results of this study suggest that intake of alcohol and sugars both contribute to liver fat accumulation. However, larger increases in alcohol consumption were associated with larger increases in liver fat. Thus, it is not caloric intake *per se* that leads to liver fat accumulation, but rather the metabolic impact of both alcohol and sugar. In terms of clinical advice, replacing alcohol with sugar-sweetened beverages is not advisable.

Reference: van Eekelen E, Beulens JWJ, Geelen A, Schrauwen-Hinderling VE, Lamb HJ, de Roos, A, Rosendaal FR, de Mutsert R. Consumption of alcoholic and sugar-sweetened beverages is associated with increased liver fat content in middle-aged men and women. *Journal of Nutrition*. 2019; 149:649-58 https://doi.org/10.1093/jn/nxy313

For More Information: To contact the corresponding author, Esther van Eekelen, please send an e-mail to E.van_Eekelen@lumc.nl

Healthful plant-based diets favorably change adiposity-related biomarkers

Plant-based diets are associated with reduced risk of weight-related diseases such as type 2 diabetes, hypertension, cardiovascular disease, and certain types of cancer. Yet, it is also clear that plant foods can vary in terms of nutritional quality. Whereas some plant foods are rich in antioxidants, vitamins, minerals, and fiber, others are not. Those high in simple sugars, refined starch, and unhealthy fats are considered to be of lower nutritional value, and therefore can be detrimental to health. As such, there is growing interest in plant-based diets and their association with weight-related diseases such as type 2 diabetes, hypertension, cardiovascular disease, and certain types of cancer. Yet, questions remain as to what extent healthful plant-based diets are associated with adiposity-associated biomarkers. To better understand the relation between healthful plant-based diets, a research team lead by Megu Baden (Harvard T.H. Chan School of Public Health) and colleagues tested associations between adiposity-associated biomarkers and 3 plant-based diet indexes: an overall plant-based diet index; a healthful plant-based diet index; and an unhealthful plant-based diet index. The study results, published in the April 2019 issue of *The Journal of Nutrition,* reveal that adherence to healthful plant-based diets is associated with favorable long-term changes in adiposity-associated biomarker concentrations in women.

A total of 831 women who participated in the Nurses' Health Study II were randomly selected from those who provided 2 blood samples in 1996–1999 and 2010–2011. In addition to measuring biomarkers of adiposity, a food-frequency questionnaire was used to evaluate quality of plant-based diets at each blood collection. Healthy plant-based foods included whole grains, fruits, vegetables, nuts, legumes, vegetable oils, and tea/coffee; less healthy plant foods included fruit juices, refined grains, potatoes, sugar-sweetened beverages, and sweets/desserts. Information regarding consumption of animal foods such as animal fat, dairy, eggs, fish/seafood, meat, and miscellaneous animal-based foods was also assessed. To create an overall plant-diet index, foods in both plant food groups were given positive scores, and foods in the animal food group were given reverse scores. A similar rationale was used to differentiate between healthful versus unhealthful plant-based diets. The 18 food group scores were summed to obtain 3 plant-based diet indexes. Both cross-sectional and longitudinal associations were evaluated.

At follow-up, approximately 60% of women had increased overall plant-based diet index scores, 46% had increased healthy plant-based diet index scores, and 15.4% had increased unhealthy plant-based diet index scores. A higher healthful plant-based index score, which indicated adherence to a high-quality plant-based diet, were significantly associated with favorable profiles of biomarkers of adiposity (lower leptin, insulin, and C-reactive protein, but higher adiponectin). Higher unhealthy plant-based index scores, a measure of adherence to a low-quality plant-based diet, was significantly associated with unfavorable profiles of these biomarkers. Adiposity biomarkers improved in women with increased adherence to the healthful plant-based diet over 13 years of follow-up. The consistency between cross-sectional and longitudinal evidence strongly supports the potential benefits of a healthful plant-based diet on biomarker patterns associated with lower risk of coronary heart disease and type 2

diabetes. This study emphasizes the importance of differentiating the quality of plant food by showing that adherence to a healthful plant-based diet is associated with favorable long-term changes in adiposity-associated biomarker concentrations in women. Increasing intakes of healthy plant foods while simultaneously reducing intakes of less-healthy plant foods is essential for the prevention of cardiometabolic diseases.

Reference: Baden MY, Satija A, Hu FB, Huang T. Change in plant-based diet quality is associated with changes in plasma adiposity-associated biomarker concentrations in women. *Journal of Nutrition*. 2019; 149:676-86 https://doi.org/10.1093/jn/nxy301
Commentary: Fernandez ML. Plant-based diet quality is associated with changes in plasma adiposity biomarker concentrations in women. *Journal of Nutrition*. 2019; 149:551-52 https://doi.org/10.1093/jn/nxy317

For More Information: To contact the corresponding author, Megu Baden, please send an e-mail to mbaden@hsph.harvard.edu. To contact the corresponding author, Maria-Luz Fernandez, please send an e-mail to maria-luz.fernandez@uconn.edu.

Can fish oil supplementation during pregnancy improve birth outcomes?

Maternal nutritional status profoundly influences birth outcomes, such as duration of pregnancy and fetal growth. These 2 factors are important because both are associated with increased morbidity and impaired development in children. That is why it is particularly important for women to be aware of their nutritional needs during pregnancy. Although research has helped to identify factors that influence pregnancy-related outcomes, there is still much to learn. A recent study by Hans Bisgaard (University of Copenhagen, Denmark) and colleagues provides new information pertaining to beneficial effects of fish oil supplementation during pregnancy. The study results, published in the April 2019 issue of *The Journal of Nutrition*, suggest that supplementing pregnant women with omega-3 fatty acids during the third trimester impacts both pregnancy duration and fetal growth.

To investigate the effect of fish oil supplementation on duration of pregnancy, size for gestational age, and birth weight, researchers conducted a double-blind, randomized controlled trial. A total of 736 women were recruited for the study between weeks 22 and 26 of pregnancy. Subjects were randomly assigned to receive a daily total amount of 2.4 g of omega-3 fatty acids capsules containing a combination of EPA and DHA until 1 week after birth. Women in the control group received capsules containing 1 g olive oil for the same duration. At the conclusion of the study, 699 maternal-infant pairs were compared in terms of gestational age, fetal growth, and birth weight.

Daily supplementation with fish oil, compared with olive oil, was associated with a 2-day prolongation of pregnancy and a 97-g higher birth weight. However, the increase in birth weight was not solely attributed to the prolongation of pregnancy. Rather, increased size for gestational age was also a consequence of increased intrauterine growth. It appears that fish oil supplementation may foster fetal growth, leading to increased size for gestational age. Clinical relevance of routine supplementation of diets with omega-3 fatty acids during the third trimester of pregnancy should be further explored. Although unanswered questions such as dose-response relations and the composition of omega-3 fatty acids remain, the potential for omega-3 fatty acid supplementation during pregnancy to improve birth outcomes is promising.

Reference: Vinding RK, Stokholm J, Sevelsted A, Chawes BL, Bønnelykke K, Barman M, Jacobsson B, Bisgaard H. Fish oil supplementation in pregnancy increases gestational age, size for gestational age, and birth weight in infants: a randomized controlled trial. *Journal of Nutrition*. 2019; 149:628-34 https://doi.org/10.1093/jn/nxy204

Commentary: Makrides M. ω-3 Fatty acids in pregnancy: time for action. *Journal of Nutrition*. 2019; 149:549-50 https://doi.org/10.1093/jn/nxy309

For More Information: To contact the corresponding author, Hans Bisgaard, please send an e-mail to bisgaard@copsac.com. To contact the corresponding author of the commentary, Maria Makrides, please send an e-mail to maria.makrides@sahmri.com.