UAB LIBRARIES
The University of Alabama at Birmingham

Inquiro, the UAB undergraduate science research journal

Volume 2015 | Number 9 Article 13

2015

The Effects of an American Diet on Health

Courtney Walker

Follow this and additional works at: https://digitalcommons.library.uab.edu/inquiro

 Part of the Higher Education Commons

Recommended Citation

Walker, Courtney (2015) "The Effects of an American Diet on Health," *Inquiro, the UAB undergraduate science research journal*: Vol. 2015: No. 9, Article 13.
Available at: https://digitalcommons.library.uab.edu/inquiro/vol2015/iss9/13

This content has been accepted for inclusion by an authorized administrator of the UAB Digital Commons, and is provided as a free open access item. All inquiries regarding this item or the UAB Digital Commons should be directed to the UAB Libraries Office of Scholarly Communication.

The Effects of an American Diet on Health

Courtney Walker

Though the potential for weight gain and cardiovascular disease are commonly known results of an unhealthy diet, the general public often does not realize that their diet can also adversely affect other aspects of health—even mental health. Additionally, the extent to which the American diet affects society as a whole brings this issue to a greater public importance. The *Dietary Guidelines for Americans* states that the average American diet consists of excess sodium, saturated fat, refined grains, and calories from solid fats and added sugars[1]. Furthermore, the guidelines state that Americans eat less vegetables, fruits, whole grains, dairy products, and oils than recommended. Almost 35% of adults in the U.S. are obese[2], and it is estimated that this statistic will increase to almost 50% within 15 years[3].

Some of the blame has been placed on fast food chains, which tend to serve foods high in calories, fats, sugars, and sodium, and low in vitamins and minerals[4]. While these restaurants may contribute to the poor diet of the average American, they are not the sole cause. Stepping into any American grocery store will make it abundantly clear why the American diet is severely lacking. Nutritious foods, like fresh fruits, vegetables, and lean meats, are often more expensive than packaged foods. Packaged foods tend to contain higher amounts of sodium, refined grains, sugar, and unhealthy oils than recommended by the *Dietary Guidelines for Americans*[1]. There are also more options when it comes to packaged foods: whole aisles are dedicated to chips alone, while healthier options are limited to a smaller section of the store.

Poor diet is predominantly associated with weight gain and obesity; however, the harmful effects do not end there. Animal and human studies indicate that an unhealthy diet can contribute to the development of many diseases, like cardiovascular disease and cancer, and can even affect the brain. In animal models, animals are often fed some type of high-fat, high-sugar diet, referred to as a Western Diet or high-fat sucrose (HFS) diet, to simulate the diet that a typical

A typical example of a grocery store aisle[5].

American consumes. For human studies, the participants often fill out questionnaires about their eating habits and are then placed in groups based on their answers.

As expected, studies in mice and rats show that those following a Western diet tend to gain more weight than those eating standard chow[6,7], although the extent of the difference between groups varies between studies; however, this variance could be caused by biological differences between mice and rats. Additionally, these studies administered diets with different fat and sugar compositions and provided varying access to running wheels for exercise.

In addition to weight gain, a Western diet also results in impaired cardiac function in mice, as indicated by changes in contraction and relaxation of the heart[6]. A Western diet has also been shown to elevate fasting insulin levels in rats and lower insulin sensitivity[7]. This result suggests that the rats on a Western diet were developing insulin resistance, which is a precursor to type two diabetes. Although these studies were conducted using rodents rather than humans, it is still important to consider the findings, since cardiovascular disease is the leading cause of death in the United States[8] and 9% of the population has diabetes[9].

Another health concern that is associated with diet is asthma. About 8% of U.S. adults have asthma, and in 2013, over 3,600 people died from asthma[10]. A study by Brigham and colleagues[11] shows that the Western diet worsens the severity of asthma, but does not have a role in causing it.

Interestingly, studies have shown that unhealthy diets affect the brain as well as the body. Diets high in saturated fats and refined carbohydrates are associated with greater incidences of depression, depressive symptoms, and anxiety[12,13]. In older adults, an unhealthy diet is associated with a smaller left hippocampus, a brain structure associated with learning, memory, and mood regulation, and is thought to play a role in depression[14]. A study in rats showed that the longer a rat consumed a diet high in fat and sugar, the greater the effect on hippocampal functioning and brain plasticity, resulting in impaired learning and memory[15]. This study showed that even short-term consumption of such a diet results in cognitive impairment in rats.

Further evidence of the impact of diet on the brain is provided by studies of diet-induced obesity and Parkinson's disease. Parkinson's disease is characterized by clumps of a protein called α-synuclein in the brain. Rotermund *et al.*[16] have shown that in mice, diet-induced obesity can increase the risk of developing these protein clumps. The study used a mouse model of Parkinson's disease, in which the mice were genetically predisposed to develop α-synuclein clumps. The mice with diet-induced obesity exhibited accelerated age of onset of protein clumps in the brainstem, onset of lethal locomotor symptoms, and onset of neurodegeneration[16].

Clearly, diet is incredibly important and can affect more than just physical size and weight – it can even affect mental health. Eating a diet high in fat and sugar, which many Americans do, can contribute to cardiac dysfunction, decrease insulin sensitivity, and worsen symptoms of asthma. Additionally, such a diet is associated with greater incidence of depression and depressive symptoms, impaired learning and memory, and greater risk of developing α-synuclein clumps, which are a hallmark of Parkinson's disease. In a day and age in which time is becoming increasingly precious, it is important to acknowledge that what is convenient is not always what is best, and that dietary choices have far-reaching effects on health. Making small changes, like choosing whole grain bread over white bread, is the first step toward lowering your risk of various health problems and leading a healthier, happier life.

References

1. U.S. Department of Health and Human Services and U.S. Department of Agriculture. *2015 - 2020 Dietary Guidelines for Americans*. 8th Edition. Available at http://health.gov/dietaryguidelines/2015/guidelines/ (2015).
2. Centers for Disease Control and Prevention. Adult obesity facts. Retrieved from http://www.cdc.gov/obesity/data/adult.html (2015).
3. Wang, Y. C., McPherson, K., Marsh, T., Gortmaker, S. L., & Brown, M. Health and economic burden of the projected obesity trends in the USA and the UK. *Lancet*, **378**(9793), 815-825 (2011).
4. Weber, K. Is fast food really that bad for you? *Inside Tracker*. Retrieved from https://www.insidetracker.com/blog/post/92630547097 (2014).
5. Taggart, P. (Photographer). Grocery store aisle [Web photo]. Retrieved from http://www.nj.com/news/index.ssf/2012/07/nyc_supermarket_adds_man_aisle.html (n.d.).
6. Carbone, S. *et al.* A high-sugar and high-fat diet impairs cardiac systolic and diastolic function in mice. *Int J Cardiol*, **198**, 66-69 (2015).
7. Marwitz, S. E., Woodie, L. N., & Blythe, S. N. Western-style diet induces insulin insensitivity and hyperactivity in adolescent male rats. *Physiol Behav*, **151**, 147-154 (2015).

8. Centers for Disease Control and Prevention. Heart disease facts and statistics. Retrieved from http://www.cdc.gov/heartdisease/statistics.htm (2015).

9. Centers for Disease Control and Prevention. 2014 National Diabetes Statistics Report. Retrieved from http://www.cdc.gov/diabetes/data/statistics/2014statisticsreport.html (2014).

10. Centers for Disease Control and Prevention. Asthma. Retrieved from http://www.cdc.gov/nchs/fastats/asthma.htm (2015).

11. Brigham, E. P. *et al*. Association between Western diet pattern and adult asthma: a focused review. *Ann Allergy Asthma Immunol*, **114**(4), 273-280 (2015).

12. Jacka, F. N. *et al*. Association of Western and traditional diets with depression and anxiety in women. *Am J Psychiatry*, **167**(3), 305-311 (2010).

13. Jacka, F. N., Mykletun, A., Berk, M., Bjelland, I., & Tell, G. S. The association between habitual diet quality and the common mental disorders in community-dwelling adults: the Hordaland Health study. *Psychosom Med*, **73**(6), 483-490 (2011).

14. Jacka, F. N., Cherbuin, N., Anstey, K. J., Sachdev, P., & Butterworth, P. Western diet is associated with a smaller hippocampus: a longitudinal investigation. *BMC Med*, **13**, 215 (2015).

15. Molteni, R., Barnard, R. J., Ying, Z., Roberts, C. K., & Gomez-Pinilla, F. A high-fat, refined sugar diet reduces hippocampal brain-derived neurotrophic factor, neuronal plasticity, and learning. *Neuroscience*, **112**(4), 803-814 (2002).

16. Rotermund, C., Truckenmuller, F. M., Schell, H., Kahle, P. J. Diet-induced obesity accelerates the onset of terminal phenotypes in alpha-synuclein transgenic mice. *J Neurochem*, **131**(6), 848-858 (2014).