**Association between probiotic and yogurt consumption and kidney disease: insights from NHANES**

The human body has many complex functions and regulations. The gastrointestinal tract, for example, is made up of 10-100 trillion microorganisms that influence many aspects of the body’s make up and function. Gut microbiota may play a major role in illnesses, such as chronic inflammation, diabetes mellitus, obesity, and cardiovascular disease. There is growing evidence that patients with chronic kidney disease could have improved renal function with a proper change in gut microbiota. Yogurt is said to contain at least $10^{8}$ bacterial organisms per gram, which makes it a source of probiotics and can altar the microbiota in the GI tract. These diseases are all major public health issues, which could cause the results of this study to make a difference in nutrition and public health.

The objective of this study, was to evaluate whether yogurt consumption would allow for better kidney function in frequent yogurt consumers. The study used surveys from the US National Health and Nutrition Survey (NHANES) to find the population of participants. The Food Frequency Questionnaire (FFQ, 2003-2006) and the Dietary Supplement Use 30-Day (DSQ, 1999-2012) were use to obtain information on yogurt and probiotic consumption in participants over the age of 18. Frequency of yogurt use divided consumers based on their weekly consumption. “Frequent users” were defined as eating yogurt 3 or more times a week. “Infrequent user” were defined as less than 3 times per week. Estimated glomerular filtration rate (eGFR) was found using the Chronic Kidney Disease Epidemiology formula, in order to find out how well the kidneys were functioning.

There were 41,243 adult participants in this study. There were 6853 participants in the Yogurt/Probiotic group, which had both frequent and infrequent consumers of similar age. Frequent consumers had better socioeconomic status, more females, non-African Americans, and had less occurrence of comorbidity, which is when there are two chronic diseases present in a patient. The 32,749 participants in the probiotic group were older with better socioeconomic status and were mostly females and non-African Americans. The estimated glomerular filtration rate of the kidneys were measured in each participant, with results of a combined outcome of albuminuria being <60ml/min/1.73$m^{2}$. Albuminuria is the presence of albumin in the urine, which can be an indicator of kidney disease. This means that a lower number could produce a lower risk of developing chronic kidney disease.

 The frequent yogurt/probiotic users were found to have lower odds of developing kidney problems and albuminuria than infrequent consumers. The frequent consumers also had less urinary albumin excretion than infrequent consumers, although the figure was found to be insignificant because the data did not follow a statistically normal distribution. In the probiotic users alone, there were lower odds of albuminuria than non users. Most of these findings, were found to be statistically insignificant.

There were some limitations in this study. The sample size was relatively small and unevenly distributed. This means that certain values could potentially be significant with a larger population. There may also be a healthy-user effect. This means that the consumers who are frequent users may generally have better eating habits, less dieting restrictions, and may lead an overall healthier life. Additionally, NHANES usually has healthy individuals in their studies, which could make it hard to show associations because the frequency of albuminuria and low eGFR because these would generally be low in these patients anyways. This study has some potential to be able to show an association between probiotics and kidney disease with more trials and a bigger sample size.

This NHANES study applies to public health nutrition because it is trying to associate an eating habit of yogurt with lowering the risk of some of the most prevalent chronic diseases. Cardiovascular disease is the number one cause of death in the United States and gut microbiota could potentially play a role in this disease. It also seeks out and divides a population of yogurt consumers among their frequency of use.

If a study were to prove that frequent yogurt use could lower, our risk of cardiovascular disease, obesity, chronic kidney disease, etc., then we could make public health policies that would inform the public on how to lower their risk or even prevent these diseases. This study could help to make a larger recommendation for yogurt and probiotics in the diet. The Dietary Guidelines, for example, would be a great place to inform the public on how to get their probiotics. Another example could be that nursing homes could provide daily probiotics to their patients. If the population were informed, they could begin taking probiotics as recommended and this could potentially lower their risk of developing a chronic disease. By lowering the risk of chronic diseases in the population, there could be many changes made in the public health field on policies, programs, and services.

I do not believe that there is yet a proven causality link between yogurt / probiotics and lowered risk of chronic kidney disease. This study would need to be carried out among different people, groups, and places in order to strengthen the likelihood of an effect. The sample size was also too small to show a strong causality. Additionally, the FFQ’s used in this study are also self-reported, which could leave room for under/over-exaggerated answers from participant. The major hypothesis of this study does seem plausible, however, this study would need more trials with individuals across different populations in order to increase the likelihood of its causality.

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| **TOPIC HEADINGS** | **POINTS** |
| Citation | 5 |
| Yacoub R, Kaii D, Patel SN, Simones PK, Busavavalasa D, Nadkami GN, He JC, Coca SG, Uribarri J. Association between probiotic and yogurt consumption and kidney disease: insights from NHANES. Nutr J 2015; 15:10. |  |
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| Brief Introduction (describe nutrition health problem being addressed, no more than 1 paragraph) | 5 |
| The human body has many complex functions and regulations. The gastrointestinal tract, for example, is made up of 10-100 trillion microorganisms that influence many aspects of the body’s make up and function. Gut microbiota may play a major role in illnesses, such as chronic inflammation, diabetes mellitus, obesity, and cardiovascular disease. There is growing evidence that patients with chronic kidney disease could have improved renal function with a proper change in gut microbiota. Yogurt is said to contain at least $10^{8}$ bacterial organisms per gram, which makes it a source of probiotics and can altar the microbiota in the GI tract. These diseases are all major public health issues, which could cause the results of this study to make a difference in nutrition and public health. |  |
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| Objective or hypothesis (no more than 3 sentences) | 5 |
| The objective of this study, was to evaluate whether yogurt consumption would allow for better kidney function in frequent yogurt consumers. They hypothesized that eating yogurt frequently was associated with better kidney data, such as the estimated glomerular filtration rate. |  |
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| Sample used (describe the specific group including: age, race/ethnic group, gender, income level or other special characteristic, years of NHANES) | 5 |
| There were 41,243 adult participants in this study. There were 6853 participants in the Yogurt/Probiotic group, which had both frequent and infrequent consumers of similar age. Frequent consumers had better socioeconomic status, more females, non-African Americans, and had less occurrence of comorbidity, which is when there are two chronic diseases present in a patient. The 32,749 participants in the probiotic group were older with better socioeconomic status and were mostly females and non-African Americans. |  |
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| Primary data used in the methods, e.g., eating events, nutrients, foods; describe the measures used | 10 |
| The study used surveys from the US National Health and Nutrition Survey (NHANES) to find the population of participants. The Food Frequency Questionnaire (FFQ, 2003-2006) and the Dietary Supplement Use 30-Day (DSQ, 1999-2012) were use to obtain information on yogurt and probiotic consumption in participants over the age of 18. Frequency of yogurt use divided consumers based on their weekly consumption. “Frequent users” were defined as eating yogurt 3 or more times a week. “Infrequent user” were defined as less than 3 times per week. Estimated glomerular filtration rate (eGFR) was found using the Chronic Kidney Disease Epidemiology formula, in order to find out how well the kidneys were functioning. The eGFR was measured in each participant, with results of a combined outcome of albuminuria being <60ml/min/1.73$m^{2}$. Albuminuria is the presence of albumin in the urine, which can be an indicator of kidney disease. This means that a lower number could produce a lower risk of developing chronic kidney disease. |  |
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| Summary of main results (no more than 3 paragraphs) | 10 |
| The frequent yogurt/probiotic users were found to have lower odds of developing kidney problems and albuminuria than infrequent consumers. The frequent consumers also had less urinary albumin excretion than infrequent consumers, although the figure was found to be insignificant because the data did not follow a statistically normal distribution. In the probiotic users alone, there were lower odds of albuminuria than non users. Most of these findings, were found to be statistically insignificant. There were some limitations in this study. The sample size was relatively small and unevenly distributed. This means that certain values could potentially be significant with a larger population. There may also be a healthy-user effect. This means that the consumers who are frequent users may generally have better eating habits, less dieting restrictions, and may lead an overall healthier life. Additionally, NHANES usually has healthy individuals in their studies, which could make it hard to show associations because the frequency of albuminuria and low eGFR because these would generally be low in these patients anyways. This study has some potential to be able to show an association between probiotics and kidney disease with more trials and a bigger sample size. |  |
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| Application to public health nutrition practice (no more than 3 paragraphs) | 10 |
| (how could the information be used in a program, policy, or service? Why is the information relevant? What does the knowledge gained mean for the population?)  |  |
| This NHANES study applies to public health nutrition because it is trying to associate an eating habit of yogurt with lowering the risk of some of the most prevalent chronic diseases. Cardiovascular disease is the number one cause of death in the United States and gut microbiota could potentially play a role in this disease. It also seeks out and divides a population of yogurt consumers among their frequency of use. If a study were to prove that frequent yogurt use could lower, our risk of cardiovascular disease, obesity, chronic kidney disease, etc., then we could make public health policies that would inform the public on how to lower their risk or even prevent these diseases. This study could help to make a larger recommendation for yogurt and probiotics in the diet. The Dietary Guidelines, for example, would be a great place to inform the public on how to get their probiotics. Another example could be that nursing homes could provide daily probiotics to their patients. If the population were informed, they could begin taking probiotics as recommended and this could potentially lower their risk of developing a chronic disease. By lowering the risk of chronic diseases in the population, there could be many changes made in the public health field on policies, programs, and services. |  |
| Using the criteria for assessing causation on page 55 / 8 in your book as a guide, discuss the evidence for or against a causal link between an exposure and an outcome considering the study you selected. | 10 |
| I do not believe that there is yet a proven causality link between yogurt / probiotics and lowered risk of chronic kidney disease. This study would need to be carried out among different people, groups, and places in order to strengthen the likelihood of an effect. The sample size was also too small to show a strong causality. Additionally, the FFQ’s used in this study are also self-reported, which could leave room for under/over-exaggerated answers from participant. The major hypothesis of this study does seem plausible, however, this study would need more trials with individuals across different populations in order to increase the likelihood of its causality.  |  |