



**Daffodil**  
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# **FOOD SELECTION AND AVERSION PATTERNS IN CHRONIC KIDNEY DISEASE PATIENTS**

**A PROJECT REPORT**

**BY**

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Submitted to the Department of Nutrition and Food Engineering in the partial fulfillment of  
B.Sc. in Nutrition and Food Engineering

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## APPROVAL

This Project titled “**Food Selection and Aversion Patterns in Chronic Kidney Disease Patients**”, submitted by **Mst. Sirajam Munira** to the Department of Nutrition and Food Engineering, Daffodil International University, has been accepted as satisfactory for the partial fulfillment of the requirements for the degree of B.Sc. in Nutrition and Food Engineering and approved as to its style and contents.

## EXAMINING COMMITTEE

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## DECLARATION

We hereby declare that this project has been done by us under the supervision of **Name: Mr. Md. Shamsur Rahman, Lecturer (Senior Scale)**, Department of Nutrition and Food Engineering, Daffodil International University. We also declare that neither this project nor any part of this project has been submitted elsewhere for the award of any degree or diploma.

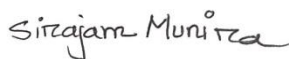
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## ABSTRACT

The main aim is to investigate the dietary aversion and food selection of CKD (chronic kidney disease) patients which will help adjust dietary plans to incorporate preferred foods that ensure patients get a range of nutrients without sacrificing the health of their kidneys and are also appropriate for the management of CKD. This study included 50 CKD patients who were chosen from the National Kidney Foundation and Research Institute, and 50 healthy individuals (control) were chosen from different places. The 15 foods were grouped to contrast personal preferences, details on eating restrictions, and food aversions. Using analysis of variance, the preference ratings of the CKD and control groups were compared. Patients with CKD reported reduced enjoyment from red meat ( $P = .02$ ), sour food ( $P = .008$ ), fried food ( $P = .001$ ), drinks ( $P = <.001$ ), fish, and fruits ( $p = .006$ ) compared to control participants. The most unpopular food group for both the control and CKD samples was beverages. 64% of CKD (chronic kidney disease) patients reported experiencing taste aversions. We draw the conclusion that patient's dietary selection and aversion are influenced by chronic renal failure. Making better and more pleasurable food plans for CKD patients will be made easier, with knowledge about their preferences.

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# CHAPTER 1

## INTRODUCTION

### 1.1 Introduction

Healthcare priorities are altering due to increased life expectancy, with a focus on non-communicable chronic diseases (NCDs) and providing care for elderly adults. Nearly all non-communicable diseases (NCDs), such as CKD, are more prevalent in older persons. At least 30% of older adults have CKD or are at risk of developing it. These disorders have the potential to significantly worsen nutritional status with malnutrition-protein energy wasting (PEW) or be linked to it. The risk of nutritional status impairment, specifically a progressive loss of gradual decrease of function and bulk in the skeletal muscles (sarcopenia), is also independently linked to aging. Notably, being overweight and obese, which are common in older adults, can accelerate the development of CKD and also hasten the onset of sarcopenia. In any therapeutic setting, there is a great chance of frailty, dependence, and a worse quality of life as one ages because of the strong correlations between PEW, malnutrition, and sarcopenia and increased mortality and morbidity. As a result, patients, families, and healthcare systems bear a heavy burden (Piccoli et al, 2023). Patients with Chronic Kidney Disease (CKD) often experience decreased appetite, changes in dietary preferences, and even an intolerance to specific foods (Armstrong et al, 2010). A number of factors, such as taste alterations, extremely restrictive diets, nausea, and vomiting associated with uremia, contribute to patients with chronic renal disease not consuming an appropriate amount of food (Dobell et al, 1993). The regulation of appetite and aversion is also mediated by several physiological systems, including the vagal system, the brain which integrates impulses in the hypothalamus area, the gastrointestinal tract, adipose tissue with leptin, and a powerful appetite inhibitor (Chazot, 2009). This generally leads to inadequate nutrition (Armstrong et al, 2010), anemia, depression (Dobell et al, 1993), malnourishment, wasted protein energy, and unfavorable consequences (Ariffin et al, 2016). Treating CKD with multidisciplinary care can reduce its side effects (Pereira et al, 2023). On this subject, relatively few research has been published, and the results of the few that have been published have been conflicting. As a result, it is very difficult to have a deeper understanding of food preferences and/or food aversion as they may have an impact on CKD patients. To determine whether substantial changes in the chemosensory modalities of taste, food preferences, aversion, and restriction are indicative of CKD and whether these changes might be measured and linked to renal function, we set out to investigate this (Armstrong et al, 2010).

## **1.2 Objective**

1. To investigate the dietary aversion patterns of CKD (chronic kidney disease) patients.
2. To find out the preferences of different food groups.
3. Compare the aversion and food preference of CKD patients with healthy controls.

## CHAPTER 2

### LITERATURE REVIEW

#### 2.1 Literature Review

According to a meta-analysis, the findings of the nine included research, with a combined total of 225,206 participants, revealed that the frequency of CKD among the population of Bangladeshi was 22.48% overall, greater than the CKD prevalence worldwide (Banik and Gosh, 2021). Most people who are diagnosed with CKD will undertake therapy, and those who do so report a wide range of symptoms, including pain, exhaustion, breathing problems, appetite loss, nausea, and unintentional loss of weight (Coa et al, 2015). These symptoms can make it difficult for a person to complete their therapy and may have a detrimental influence on their level of well-being both before and after therapy. CKD is frequently accompanied by decreased appetite, changes in food preferences, and occasionally an allergy to specific foods. Food aversion and poor appetite in CKD may be influenced by olfactory and gustatory alterations (Chewcharat et al, 2022). Food aversions can also result in a shift in eating habits, an insufficient or improper calorie intake, or a nutritionally deficient diet. By influencing both food selection and calorie intake, distorted flavor can have an impact on nutritional status. The beginning and ending of eating are both influenced by taste. Food aversion and preference can have a detrimental effect on food intake during a period of healing and recuperation in addition to influencing meal choices. Moreover, alterations in food consumption and, consequently, nutritional status, may have an adverse effect on the rate of wound healing, the duration of hospital stay, and rehabilitation (Keith et al, 2010). Jordan and Spiegel evaluated the effects of oral versus intragastric feeding on human satiety and intake cessation. When only intragastric feeding was used, they discovered that participants had good control over their intake; however, when oral feeding was introduced, the subjects' consumption rose. The impact of oral stimulation was cited as the cause of this alteration. Nisbett discovered that hunger made people more accepting of delicious meals. Most of the research on taste in humans has been on taste impairment brought on by illness (Burge et al, 1995). To guide the creation of dietary treatments that reduce symptoms while receiving therapy and enhance the quality of life, it is important to comprehend the interaction between food and treatment across a broader, more varied sample of CKD patients (Coa et al, 2015).

## **CHAPTER 3**

### **MATERIALS AND METHODS**

#### **3.1 Sample Selection**

A case-control (unmatched) study was conducted from November to January 2023 among CKD and healthy control people. During the study period, the controls were confirmed not to have CKD. The cases consisted of all patients with confirmed CKD who had follow-up appointments at the hospital. Greater than three months of glomerular filtration rate (GFR)  $<60$  mL/min/1.73  $m^2$  patients were considered as CKD. Patients with CKD were at least 18 years old. Pregnant ladies and patients in critical condition were not allowed during this survey. A total of 100 patients were examined: 50 individuals with CKD receiving regular treatment and 50 healthy individuals. Based on their willingness to participate in interviews throughout the study, these patients were chosen.

#### **3.2 Implementing the Questionnaires**

While visiting a hospital, I conducted interviews with all the CKD patients, having them fill out my questionnaires. The same criteria are used for healthy individuals at different places in Dhaka. All participants were given verbal instructions before filling out the questionnaires. They stated that their responses should be taken as a broad assessment of every item of food and that the survey's objective wasn't to evaluate their adherence to a diet. The participants answered about recent changes in their taste and food aversions. Additionally, they scored their overall degree of appetite (poor, normal, good). The questionnaire also contained a list of 15 food items that participants were asked to assess on a nine-point hedonic scale according to how pleasant they thought they were.

#### **3.3 Statistical Analysis**

SPSS version 22 software was used for all analyses. Utilizing the Mann-Whitney U-Test, compare the hedonic rating of two distinct samples based on dependent variables. mean  $\pm$  standard deviation was used to report continuous variables. Applying the test of Chi-square, the aversion and restricted food of a subject group are compared.

## CHAPTER 4

### RESULT AND DISCUSSION

#### 4.1 Data Analysis and Result

##### 4.1.1 Demographic Information

**Table 1** represents a summary of the clinical and demographic information for each of the two subject groups. Both participants included 72% males, 28% females, and at least 18 years old. Regarding the age distribution, a discernible difference was observed between the control group and the combined renal individuals. The average BMI for CKD and control people was  $24.54 \pm .47$  and  $22.90 \pm .53$ , respectively, and 66% of CKD and 60% of control people were within the appropriate weight range.

**Table 1: Clinical and Demographic Information for the Two Groups**

| Characteristics                      | CKD<br>N=50 | Percentage<br>(%) | Control<br>N=50 | Percentage<br>(%) |
|--------------------------------------|-------------|-------------------|-----------------|-------------------|
| Sex                                  |             |                   |                 |                   |
| Man                                  | 36          | 72%               | 36              | 72%               |
| Woman                                | 14          | 28%               | 14              | 28%               |
| Age                                  |             |                   |                 |                   |
| 18-59                                | 29          | 58%               | 45              | 90%               |
| 60 and Older                         | 21          | 42%               | 5               | 10%               |
| BMI                                  |             |                   |                 |                   |
| <18.5                                | 0           | 0%                | 6               | 12%               |
| 18.5-24.9                            | 33          | 66%               | 30              | 60%               |
| >24.9                                | 17          | 34%               | 14              | 28%               |
| Mean     ±     Standard<br>Deviation | 24.5±3.32   |                   | 22.90±3.75      |                   |
| CKD =Chronic Kidney Disease          |             |                   |                 |                   |

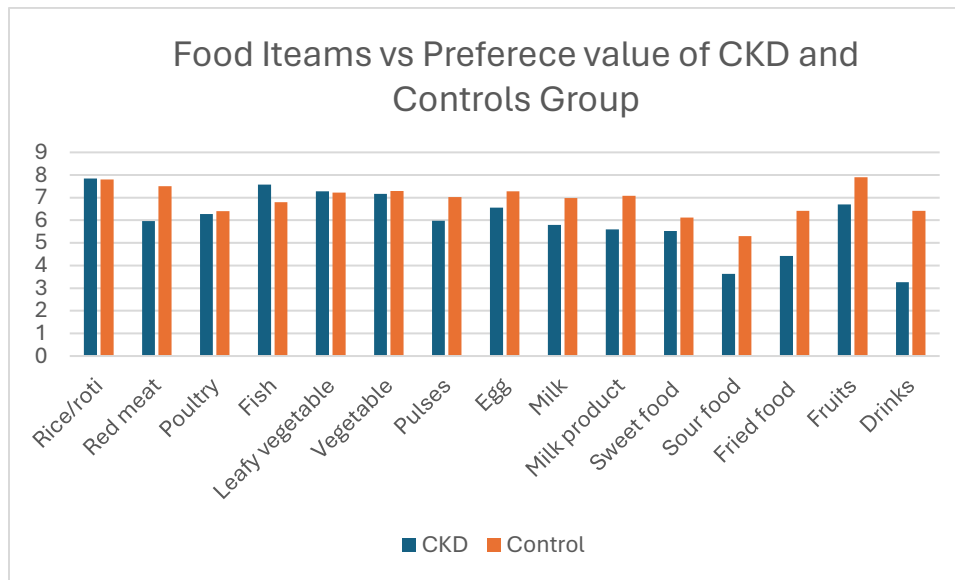
#### 4.1.2 Food Preference Level for Different Groups

**Table 2** contains the average hedonic scores for each food item. In general, patients receiving treatment for CKD given food products were lower ranked Compared to the control group. Red meat, fish, sour food, fried food, fruits, and drinks were the dietary classes for which there were significant ( $P<.05$ ) variations amongst patients with CKD and control individuals. For the food classes where there were statistically significant differences between the subject groups, the ratings of hedonic preferences for food (mean  $\pm$  standard deviation) are shown in the table.

**Table 2: Rating of Hedonic Preferences for Food (Mean  $\pm$  Standard deviation) Grouped According to Food Classes**

| Food Groups                                                                                                                                                                                                                                                                                                                                                                                                                  | CKD                          | Control                      |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|------------------------------|
| Rice/Ruti                                                                                                                                                                                                                                                                                                                                                                                                                    | 7.84 $\pm$ 1.79 <sup>A</sup> | 7.8 $\pm$ 1.39 <sup>A</sup>  |
| Red meat                                                                                                                                                                                                                                                                                                                                                                                                                     | 5.96 $\pm$ 2.97 <sup>A</sup> | 7.5 $\pm$ 2.09 <sup>B</sup>  |
| Poultry                                                                                                                                                                                                                                                                                                                                                                                                                      | 6.28 $\pm$ 2.58 <sup>A</sup> | 6.4 $\pm$ 2.18 <sup>A</sup>  |
| Fish                                                                                                                                                                                                                                                                                                                                                                                                                         | 7.58 $\pm$ 1.86 <sup>A</sup> | 6.8 $\pm$ 1.82 <sup>B</sup>  |
| Leafy vegetable                                                                                                                                                                                                                                                                                                                                                                                                              | 7.28 $\pm$ 1.66 <sup>A</sup> | 7.22 $\pm$ 1.61 <sup>A</sup> |
| Vegetable                                                                                                                                                                                                                                                                                                                                                                                                                    | 7.16 $\pm$ 1.89 <sup>A</sup> | 7.3 $\pm$ 1.78 <sup>A</sup>  |
| Pulses                                                                                                                                                                                                                                                                                                                                                                                                                       | 5.98 $\pm$ 2.71 <sup>A</sup> | 7.02 $\pm$ 1.95 <sup>A</sup> |
| Egg                                                                                                                                                                                                                                                                                                                                                                                                                          | 6.56 $\pm$ 2.48 <sup>A</sup> | 7.28 $\pm$ 1.64 <sup>A</sup> |
| Milk                                                                                                                                                                                                                                                                                                                                                                                                                         | 5.8 $\pm$ 3.02 <sup>A</sup>  | 6.98 $\pm$ 2.18 <sup>A</sup> |
| Milk product                                                                                                                                                                                                                                                                                                                                                                                                                 | 5.6 $\pm$ 3.08 <sup>A</sup>  | 7.08 $\pm$ 1.87 <sup>A</sup> |
| Sweet food                                                                                                                                                                                                                                                                                                                                                                                                                   | 5.52 $\pm$ 3.06 <sup>A</sup> | 6.12 $\pm$ 2.38 <sup>A</sup> |
| Sour food                                                                                                                                                                                                                                                                                                                                                                                                                    | 3.63 $\pm$ 3.15 <sup>A</sup> | 5.30 $\pm$ 2.77 <sup>B</sup> |
| Fried food                                                                                                                                                                                                                                                                                                                                                                                                                   | 4.42 $\pm$ 3.02 <sup>A</sup> | 6.42 $\pm$ 2.54 <sup>B</sup> |
| Fruits                                                                                                                                                                                                                                                                                                                                                                                                                       | 6.7 $\pm$ 2.31 <sup>A</sup>  | 7.9 $\pm$ .97 <sup>B</sup>   |
| Drinks                                                                                                                                                                                                                                                                                                                                                                                                                       | 3.26 $\pm$ 2.94 <sup>A</sup> | 6.42 $\pm$ 2.64 <sup>B</sup> |
| <p>A hedonic rating of 9 = like extremely; 5 = neither like nor dislike: 1 = dislike extremely<br/> The same significant letter along with the row indicates that the two groups are not significantly different from one another.</p> <p>The different significant letter along with the row indicates that the two groups are significantly different from one another. Where (<math>p&lt;0.05</math>) is the p-value.</p> |                              |                              |

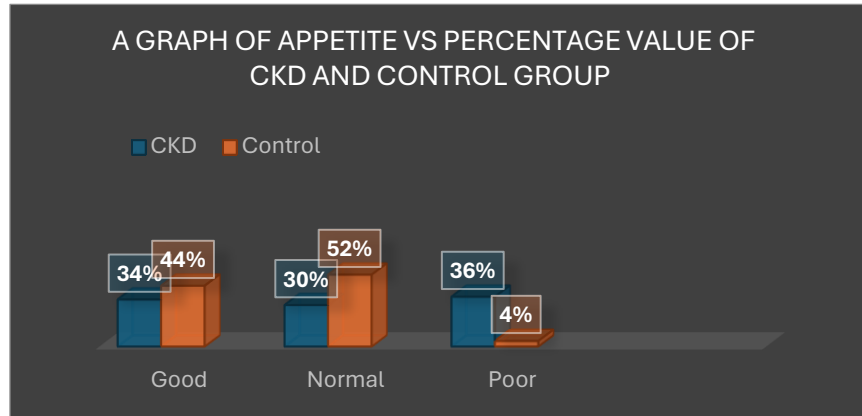
**Figure 1** provides a list of food items with the greatest and smallest hedonic scores for both subject groups. These results show that, on average, CKD patients evaluated food products less favorably than did control participants. Most of the food items were rated top by both subject groups. Although drinks, sour food, and fried food products were the lowest ranked food class for the CKD. On the other hand, there is no less preference for food items for the control group.



**Figure 1: Food Preference for CKD and Control Groups**

#### 4.1.3 Food Habit Information

The following is a summary of the most significant data gathered from the food habit surveys. 48% of CKD patients said their taste has changed because of meditation and other factors. Patients with chronic renal disease reported a lower appetite when compared to controls; A total of 34% of patients and 44% of controls reported having good appetites, whereas 30% of patients and 52% of controls reported having normal appetites. In contrast, only 4% of controls and 36% of patients reported having poor appetites. **(Figure 2)**



**Figure 2: Appetite of CKD and Control Group**

**Table 3** represents an overview of the data about food restrictions and taste aversions resulting from various factors, including meditation. Compared to healthy controls, Significant ( $P < 0.05$ ) variations were seen in food aversion for rice/ruti, milk products, and drinks. There were also discernible variations in food restriction between the two groups. The food groups are vegetables, pulses, milk, milk products, drinks, eggs, and sweet food, and the significant value is ( $p < 0.05$ ). 64% of CKD patients and 48% of control participants both reported experiencing taste aversions. 96% of CKD patients and only 24% of control participants restrict the selected food items.

**Table 3: Food Aversion and Food Restriction for CKD and Control Groups**

| Food groups  | Food Aversion |                 |               | Food Restriction |                 |               |
|--------------|---------------|-----------------|---------------|------------------|-----------------|---------------|
|              | CKD<br>N=50   | Control<br>N=50 | P value       | CKD<br>N=50      | Control<br>N=50 | P value       |
| Rice/Ruti    | 4             | 0               | <b>0.041</b>  | 1                | 0               | 0.500         |
| Red meat     | 6             | 2               | 0.140         | 34               | 8               | <b>0.0001</b> |
| Poultry      | 8             | 8               | 1             | 6                | 1               | 0.056         |
| Fish         | 6             | 4               | 0.505         | 1                | 1               | 0.753         |
| Vegetable    | 6             | 2               | 0.134         | 10               | 0               | <b>0.001</b>  |
| Pulses       | 6             | 2               | 0.134         | 33               | 0               | <b>0.0001</b> |
| Milk         | 7             | 5               | 0.380         | 9                | 0               | <b>0.004</b>  |
| Milk product | 8             | 2               | <b>0.046</b>  | 10               | 1               | <b>0.002</b>  |
| Drinks       | 17            | 1               | <b>0.0001</b> | 32               | 2               | <b>0.0001</b> |
| Egg          | 5             | 3               | 0.661         | 8                | 2               | <b>0.046</b>  |
| Sweet food   | 9             | 6               | 0.228         | 22               | 3               | <b>0.0001</b> |
| Total        | 32            | 24              |               | 48               | 12              |               |
| Percentage   | 64%           | 48%             |               | 96%              | 24%             |               |

## 4.2 Discussion

This study looks at the dietary preferences and aversions of patients with chronic renal failure. Significantly, we discovered that compared to control participants, patients with CKD typically rated food items: especially high-protein foods—less favorably. Fatigue, despair, and a lack of interest in food or cooking were the other key reasons that patients indicated as having a negative impact on their nutritional intake (Dobell et al, 1993).

Taste changes are common in a significant quantity of patients with CKD (Dobell et al, 1993). Our findings unequivocally show that taste function and food preference are related. A little over 48% of the CKD patients experienced food taste impairments. There was minimal effect on the patient's nutritional condition (as determined by BMI) Despite these modifications in flavor, which may have an impact on food satisfaction (Armstrong et al, 2010). Taste alterations were substantially linked to nausea, anorexia, vomiting, constipation, soreness or dry mouth, and a greater score for the severity of GI symptoms in the patients receiving conservative treatment. Anorexia and nausea were substantially correlated with taste changes in the patients. The greater percentage of individuals who reported taste abnormalities who were also found to be malnourished and have lower albumin levels was a significant discovery (Dawson et al, 2021).

Food aversions were widespread in patients with chronic renal illness, which is consistent with a previous finding (Deems et al, 1993). The aversions could be a physiological or psychological reaction to the illness. The aversions don't seem to be a universal reaction to all food items, regardless of the underlying reason. It is evident that certain foods, especially beverages, have a far higher potential to cause aversions than other foods. Our investigation revealed a startling conclusion: CKD found cereal goods to be more enjoyable. Patients with CKD rated all individual foods in this class as more enjoyable, apart from rice/ruti and vegetables. End-stage renal patients frequently do not get enough nutrients when their meal tastes less good, even when anorexia is not present. A progressive loss of weight is a result of inadequate consumption of food, and this loss of weight may be the primary cause of morbidity and death in patients receiving renal treatment. There was a lot of diversity among the subject groups, even though choices for the following food groups are eggs, vegetables, red meats, fish, poultry, and sweet foods varied greatly. The need for dietitians to provide customized patient treatment plans is demonstrated by this variety (Dobell et al, 1993).

Patients with CKD have been observed to have decreased preferences for some foods than control. The dietary alterations we saw are consistent with the aversion to foods high in protein, beverages, acidic foods, and fried foods that were noted. Patients with CKD have decreased consumption of iron, iodine, and vitamin B12 because of their changed dietary preferences. It's possible that CKD patients' lower-than-normal iron intake contributed to their low hemoglobin levels. (Enig et al, 1987). But given the potential drawbacks of protein consumption in patients with CKD, a decrease in taste for foods high in protein may be advantageous. Future studies should examine whether dietary preference changes seen in the lab correspond to changes in

dietary choices made in daily life, as well as how much these changes are typical of various forms of CKD. Changes in chemo sensation, appetite, and food preferences in chronic renal disease may be explained by a number of physiological processes (Deems et al, 1993).

While many studies have investigated the elements influencing dietary compliance, dietary compliance, relatively few factors are investigated that influence dietary habits. The most often mentioned factor influencing dietary consumption was decreased interest in cooking or food. Chronic fatigue and depression were other major contributing factors; these conditions are closely linked to a decline in motivation and interest. The patients and their family's realization of the irreversibility of last-stage renal illness is devastating. This group of patients frequently has heightened levels of sadness as a result of chronic stress that they deal with virtually every day. It is also commonly known that depression has a significant impact on eating behavior compliance. Therefore, giving individuals with chronic renal failure an appropriate and acceptable diet won't guarantee a change in their nutritional status If these causative elements are not taken into consideration (Dobell et al, 1993).

The importance of nutrition management in CKD patients requires optimal nutritional management to maintain overall health, maintain kidney function, and fulfill therapeutic objectives. A recent study highlighted the prevalence of nutritional abnormalities, suboptimal intake, signs of inadequate nutrition, and malnutrition among individuals visiting clinics for pre-dialysis evaluation. These nutritional challenges become more pronounced as renal function declines. Abnormalities in mineral and vitamin status, such as retention as well as inadequacy, are more prevalent in CKD individuals and are associated with increased rates of morbidity and death. For instance, inadequate vitamin D levels are associated with an increased risk of folic acid deficiency contributing to anemia, cardiovascular disease (CVD), and elevated homocysteine levels while recombinant erythrocyte which is used to treat anemia, becomes less effective in addressing iron deficiency. Healthcare providers need to address the nutritional needs of CKD patients comprehensively. By designing individualized nutrition plans, focusing on optimizing vitamin and mineral levels, and promoting healthy dietary habits, the progression of CKD and associated complications can be managed effectively. CKD patients can lessen their symptom load and enhance their standard of living by taking care of these problems at an early stage. In summary, effective dietary management is important to the general health of CKD patients by addressing nutritional challenges (Chan et al, 2014).

## **CHAPTER 5**

### **CONCLUSION**

#### **5.1 Conclusion**

It can be concluded that Dietary selection and aversion of individuals with chronic renal failure are influenced by containing this disease. Patients with CKD appear to have larger taste aversion than healthy people. When compared to controls, people with CKD tended to prefer beverages, sweet and sour meals less. Additionally, CKD patients appeared to drink less intensely than controls. Making better and more pleasurable food plans for these patients will be made easier with knowledge about their preferences. This knowledge will also help adjust dietary plans to incorporate preferred foods that ensure patients get a range of nutrients without sacrificing the health of their kidneys and are also appropriate regarding the management of CKD. The primary limitation of this research is the small sample size, which results in low statistical power, a higher error rate, and less accurate information.

## References

- Ariffin, N. M., Naing, L., Pisharam, J., Khalil, M. M., Tamin, N., Chong, V. H., & Tan, J. (2016). Appetite and gastrointestinal symptoms in end stage renal disease patients. *J Clin Exp Nephrol*, 1(6), 0-0.
- Armstrong, J. E., Laing, D. G., Wilkes, F. J., & Kainer, G. (2010). Smell and taste function in children with chronic kidney disease. *Pediatric Nephrology*, 25, 1497-1504.
- Burge, J. C., Schaumburg, J. Z., Choban, P. S., DiSILVESTRO, R. A., & Flancbaum, L. (1995). Changes in patients' taste acuity after Roux-en-Y gastric bypass for clinically severe obesity. *Journal of the American Dietetic Association*, 95(6), 666-670.
- Banik, S., & Ghosh, A. (2021). Prevalence of chronic kidney disease in Bangladesh: a systematic review and meta-analysis. *International Urology and Nephrology*, 53, 713-718.
- Chan, M., Kelly, J., Batterham, M., & Tapsell, L. (2014). A high prevalence of abnormal nutrition parameters found in predialysis end-stage kidney disease: is it a result of uremia or poor eating habits?. *Journal of Renal Nutrition*, 24(5), 292-302.
- Chazot, C. (2009, January). Why are chronic kidney disease patients anorexic and what can be done about it?. In *Seminars in nephrology* (Vol. 29, No. 1, pp. 15-23). WB Saunders.
- Chewcharat, A., Phipps, E. A., Bhatia, K., Kalim, S., Allegretti, A. S., Sise, M. E., ... & Nigwekar, S. U. (2022). The association between olfactory and gustatory dysfunction and chronic kidney disease. *BMC nephrology*, 23(1), 36.
- Coa, K. I., Epstein, J. B., Ettinger, D., Jatoi, A., McManus, K., Platek, M. E., ... & Moskowitz, B. (2015). The impact of cancer treatment on the diets and food preferences of patients receiving outpatient treatment. *Nutrition and cancer*, 67(2), 339-353.
- Dawson, J., Brennan, F. P., Hoffman, A., Josland, E., Li, K. C., Smyth, A., & Brown, M. A. (2021). Prevalence of taste changes and association with other nutrition-related symptoms in end-stage kidney disease patients. *Journal of Renal Nutrition*, 31(1), 80-84.
- Deems, R. O., Friedman, M. I., Friedman, L. S., Munoz, S. J., & Maddrey, W. C. (1993). Chemosensory function, food preferences and appetite in human liver disease. *Appetite*, 20(3), 209-216.
- Dobell, E., Chan, M., Williams, P., & Allman, M. (1993). Food preferences and food habits of patients with chronic renal failure undergoing dialysis. *Journal of the American Dietetic Association*, 93(10), 1129-1135.
- Enig, B., Petersen, H. N., Smith, D. F., & Larsen, B. (1987). Food preferences, nutrient intake and nutritional status in cancer patients. *Acta Oncologica*, 26(4), 301-305.

Keith, M., Mokbel, R., San Emeterio, M., Song, J., & Errett, L. (2010). Evaluation of taste sensitivity in patients undergoing coronary artery bypass graft surgery. *Journal of the American Dietetic Association*, 110(7), 1072-1077.

Pereira, A. D. A., Reis, E. S. D., Guilarducci, M. J., Oliveira, J. S. E., & Gomes, J. M. G. (2023). Food Aversion during Cancer Treatment: A Systematic Review. *Nutrition and Cancer*, 75(2), 389-401.

Piccoli, G. B., Cederholm, T., Avesani, C. M., Bakker, S. J., Bellizzi, V., Cuerda, C., ... & Barazzoni, R. (2023). Nutritional status and the risk of malnutrition in older adults with chronic kidney disease—implications for low protein intake and nutritional care A critical review endorsed by ERN-ERA and ESPEN. *Clinical Nutritio*

## APPENDICES

### Appendix 1: Ethical Permission

4/03/2024

The Head  
Department of Nutrition and Food Engineering  
Daffodil International University  
Daffodil Smart City, Birulia, Savar, Dhaka 1216, Bangladesh

Subject: Ethical Approval of Research Study

Dear Sir,

With due regards, I am Mst. Sirajam Munira, a student of the 201 batch, wishes to submit the project titled "Food Selection and Aversion Patterns in Chronic Kidney Disease Patients" for ethical clearance.

I request you to kindly consider the project for review by the Ethical Committee. I shall be highly obliged for the same.

Kindly find attached the required documents regarding the project.

Sincerely,

*Sirajam Munira*

Mst. Sirajam Munira  
ID:201-34-050

Nutrition and Food Engineering  
Faculty of Allied Health Sciences  
Daffodil International University

*Approved*  
*Niz*  
*4/3/2024*

**Dr. Nizam Uddin**  
Associate Professor and Head  
Department of Nutrition and Food Engineering  
Faculty of Allied Health Sciences (FAHS)  
Daffodil International University

## Appendix 2: Questionary for CKD Patients

### Food Selection and Aversion Patterns in Chronic Kidney Disease Patients

1. Name:

2. Sex:

3. Age:

4. Height:

5. Weight:

6. Serum creatinine level (from biochemical test report):

7. Education level:

8.. Do you think your taste of food has changed after being affected with CKD?

9.. How is your appetite? poor/normal/good

10. Rate the present preference of following food group

| Food group          | 1<br>Dislike<br>Extremely | 2<br>Dislike<br>Very<br>much | 3<br>Dislike<br>Moderately | 4<br>Dislike<br>Slightly | 5<br>Neither<br>like nor<br>dislike | 6<br>Like<br>slightly | 7<br>Like<br>Moderately | 8<br>Like<br>Very<br>Much | 9<br>Like<br>Extremely |
|---------------------|---------------------------|------------------------------|----------------------------|--------------------------|-------------------------------------|-----------------------|-------------------------|---------------------------|------------------------|
| Rice/ruti           |                           |                              |                            |                          |                                     |                       |                         |                           |                        |
| Red meat            |                           |                              |                            |                          |                                     |                       |                         |                           |                        |
| Poultry             |                           |                              |                            |                          |                                     |                       |                         |                           |                        |
| Fish                |                           |                              |                            |                          |                                     |                       |                         |                           |                        |
| Leafy<br>Vegetables |                           |                              |                            |                          |                                     |                       |                         |                           |                        |
| Vegetables          |                           |                              |                            |                          |                                     |                       |                         |                           |                        |
| Pulses              |                           |                              |                            |                          |                                     |                       |                         |                           |                        |
| Egg                 |                           |                              |                            |                          |                                     |                       |                         |                           |                        |
| Milk                |                           |                              |                            |                          |                                     |                       |                         |                           |                        |
| Milk<br>product     |                           |                              |                            |                          |                                     |                       |                         |                           |                        |
| Sweet food          |                           |                              |                            |                          |                                     |                       |                         |                           |                        |

|            |  |  |  |  |  |  |  |  |  |
|------------|--|--|--|--|--|--|--|--|--|
| Sour food  |  |  |  |  |  |  |  |  |  |
| Fried food |  |  |  |  |  |  |  |  |  |
| Fruits     |  |  |  |  |  |  |  |  |  |
| Drinks     |  |  |  |  |  |  |  |  |  |

11. Do you feel aversion to any food after being diagnosed with CKD? Yes/ No

12. If Yes (11), for which of the following food group you feel aversion?

- a. Rice/Ruti
- b. Meat
- c. Poultry
- d. Fish
- e. Vegetables
- f. Pulse
- g. Milk
- h. Milk Product
- i. Drink
- j. egg
- k. sweet food

13. Do you restrict any food item after being diagnosed with CKD?

14. If yes (12), which of the following food group you restrict?

- a. Rice/Ruti
- b. Meat
- c. Poultry
- d. Fish
- e. Vegetables
- f. Pulse
- g. Milk
- h. Milk Product
- i. Drink
- j. Egg
- k. sweet food

### Appendix 3: Questionary for Healthy Individual

#### Food Selection and Aversion Patterns in Chronic Kidney Disease Patients (for Control Group)

1. Name:

2. Sex:

3. Age:

4. Height:

5. Weight:

6. Education level:

7. Do you have any following diseases: Diabetes/ Hypertension

8.. How is your appetite? poor/normal/good

9. Rate the preset preference of following food group

| Food group              | 1<br>Dislike<br>Extremely | 2<br>Dislike<br>Very<br>much | 3<br>Dislike<br>Moderat<br>ely | 4<br>Dislike<br>Slightl<br>y | 5<br>Neither<br>like nor<br>dislike | 6<br>Like<br>slightl<br>y | 7<br>Like<br>Moderatel<br>y | 8<br>Like<br>Very<br>Much | 9<br>Like<br>Extreme<br>ly |
|-------------------------|---------------------------|------------------------------|--------------------------------|------------------------------|-------------------------------------|---------------------------|-----------------------------|---------------------------|----------------------------|
| Rice/ruti               |                           |                              |                                |                              |                                     |                           |                             |                           |                            |
| Red meat                |                           |                              |                                |                              |                                     |                           |                             |                           |                            |
| Poultry                 |                           |                              |                                |                              |                                     |                           |                             |                           |                            |
| Fish                    |                           |                              |                                |                              |                                     |                           |                             |                           |                            |
| Leafy<br>Vegetable<br>s |                           |                              |                                |                              |                                     |                           |                             |                           |                            |
| Vegetable<br>s          |                           |                              |                                |                              |                                     |                           |                             |                           |                            |
| Pulses                  |                           |                              |                                |                              |                                     |                           |                             |                           |                            |
| Egg                     |                           |                              |                                |                              |                                     |                           |                             |                           |                            |
| Milk                    |                           |                              |                                |                              |                                     |                           |                             |                           |                            |

|              |  |  |  |  |  |  |  |  |  |
|--------------|--|--|--|--|--|--|--|--|--|
| Milk product |  |  |  |  |  |  |  |  |  |
| Sweet food   |  |  |  |  |  |  |  |  |  |
| Sour food    |  |  |  |  |  |  |  |  |  |
| Fried food   |  |  |  |  |  |  |  |  |  |
| Fruits       |  |  |  |  |  |  |  |  |  |
| Drinks       |  |  |  |  |  |  |  |  |  |

10. Do you feel aversion to any food Yes/ No

11. If Yes (11), for which of the following food group do you feel aversion?

- a. Rice/Ruti
- b. Meat
- c. Poultry
- d. Fish
- e. Vegetables
- f. Pulse
- g. Milk
- h. Milk Product
- i. Drink
- j. egg
- k. sweet food

12. Do you restrict any food items? Yes / NO

13. If yes (12), which of the following food groups do you restrict?

- a. Rice/Ruti
- b. Meat
- c. Poultry
- d. Fish
- e. Vegetables
- f. Pulse
- g. Milk
- h. Milk Product
- i. Drink
- j. Egg

- k. sweet food

## **Appendix 4: Synopsis**

### **1 Title**

Food Selection and Aversion Patterns in Chronic Kidney Disease Patients

### **2 Introduction**

Patients with Chronic Kidney Disease (CKD) often experience decreased appetite, changes in dietary preferences, and even an intolerance to specific foods (Armstrong et al, 2010). Several factors, such as taste alterations, extremely restrictive diets, nausea, and vomiting associated with uremia, contribute to patients with chronic renal disease not consuming an appropriate amount of food (Dobell et al, 1993). This study included 50 CKD (chronic kidney disease) patients who will be chosen from the National Kidney Foundation and Research Institute. The 15 foods will be grouped to compare personal preferences, food aversions, and eating restriction details will also be compared. Making better and more pleasurable food plans for CKD patients will be made easier, with knowledge about their preferences for this reason I take this topic. On this subject, relatively few research has been published, and the results of the few that have been published have been conflicting. To determine whether substantial changes in the chemosensory modalities of taste and smell are indicative of chronic kidney disease (CKD) and whether these changes might be measured and linked to renal function, we set out to investigate this (Armstrong et al, 2010). The aim is to investigate and contrast the dietary aversion and food choices of CKD (chronic kidney disease) patients.

### **3 Objective**

1. To investigate the dietary aversion patterns of CKD (chronic kidney disease) patients.
2. To find out the preferences of different food groups.
3. Compare the aversion and food preference of CKD patients with healthy controls.

### **4 Methodology**

#### **4.1 Sample Selection**

A total of 100 patients will be examined: 50 individuals with chronic kidney disease (CKD) receiving regular treatment and 50 healthy individuals. Based on their willingness to participate in interviews throughout the study. Patients with CKD will be at least 18 years old. Pregnant ladies and patients in critical condition will not be allowed during this survey.

#### **4.2 Implementing the Questionnaires**

During the hospital visit, I will conduct interviews with all the CKD patients, having them fill out my questionnaires. All participants will give verbal instructions before filling out the questionnaires. They will state that their responses should be taken as a broad assessment of every item of food and that the survey's objective wasn't to evaluate their adherence to a diet.

### **4.3 Statistical Analysis**

SPSS version 22 software will be used for all analyses. The Mann-Whitney U-Test will be used to compare the two distinct samples based on variables that are dependent. For normally distributed data, continuous variables will be reported as mean  $\pm$  standard deviation.

### **5 Expected Outcomes**

The 15 foods will be grouped to contrast personal preferences, details on eating restrictions, and food aversions. Using analysis of variance, the preference ratings of the CKD and control groups will be compared. As we can see from the previous report, Patients with chronic kidney disease (CKD) reported reduced enjoyment from vegetables ( $P = .003$ ), red meats ( $P = .010$ ), sweet foods ( $P = .002$ ), and poultry and fish ( $P = .015$ ) compared to the healthy individuals. Most of the CKD (chronic kidney disease) patients will report experiencing their taste aversions (Dobell et al, 1993).

### **6 Period of the Study:**

I started my project work on 2 November 2023.

### **References**

- Armstrong, J. E., Laing, D. G., Wilkes, F. J., & Kainer, G. (2010). Smell and taste function in children with chronic kidney disease. *Pediatric Nephrology*, 25, 1497-1504.
- Dobell, E., Chan, M., Williams, P., & Allman, M. (1993). Food preferences and food habits of patients with chronic renal failure undergoing dialysis. *Journal of the American Dietetic Association*, 93(10), 1129-1135.

