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Taste Dysfunction of Chronic Kidney Disease Patients on Renal Diet and its Relationship with Patient Satisfaction in the Medical Ward at AL-Khor Hospital – State of Qatar

Wala mohammed Asmaa AL-Muhannadi Dr. Ghazi Daradkeh*
Dietetics & clinical Nutrition Dep, AL - Khor Hospital, Hamad Medical Corporation, state of Qatar
*Corresponding author: Dr. Ghazi Daradkeh, Department of Dietetics and Clinical Nutrition, Al-Khor Hospital, Hamad Medical Corporation,
State of Qatar, Mob: +97466256246/ E-mail: gdaradkeh@ Hamad. qa

Abstract
Background: Patients with chronic kidney disease (CKD) often complain of taste dysfunction. The prevalent taste dysfunction among patients with CKD predisposes them to malnutrition, poor quality of life, and worsening disease prognoses. To appropriately treat the taste dysfunction in this group of patients, it's imperative that factors that predict taste dysfunction and its severity are identified for prompt treatment. **Aim:** To assess patient satisfaction with their renal diet and to identify factors associated with taste dysfunction and its impact on food intake among patients with CKD receiving renal diet.**Materials and Methods:** This was a hospital-based quality improvement study of adult inpatients with CKD on a renal diet at AL-Khor Hospital – Hamad medical corporation, Qatar. **Results:** There were 21 patients with CKD, with age ranges between 18 and 65 years (mean ± standard deviation [SD] 39.3 ± 13.9 years). Hypogeusia was found in most patients with CKD >80%. Renal diet modification improved patient satisfaction significantly P <0.05. **Conclusion:** Chronic kidney disease CKD patients were dissatisfied with their renal diet; special attention should be considered to modifying and improving the renal diet menus and improve patient satisfaction.
Keywords: chronic kidney disease, quality of life, satisfaction, renal diet, taste
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Introduction

Nephron destruction is irreversible and leads to chronic kidney disease (CKD). In such a case, the body's ability to maintain metabolism and balance water and electrolytes is lost, resulting in increased blood urea. Poor nutritional intake is common in those with chronic kidney disease because of Dysgeusia (abnormal taste). Taste is the chemical stimulation of taste receptor cells in the oral cavity perceived as the primary tastes of sweet, sour, salty, bitter, and umami [1]. Appreciation of taste is one of the factors that give satisfaction derived from eating and when it is defective may lead to an aversion to food. Taste influences food palatability and appetite; Unfortunately, the link between taste sensitivity and food consumption is largely unstudied in renal patients.

There are many factors that affect an individual's ability to perceive the five qualities of taste, including genetic, physiological, nutritional, environmental, and societal influences [2]. Those who suffer from renal disease tend to have lower taste sensitivity [3]. Moreover, Manley et al. (2012) [3], stated that four of the major tastes excluding umami taste can't be recognized as well by CKD patients, according to an earlier study. Impairment of taste can be devastating to a patient since it not only affects the ability to enjoy food products but also alter food choices and patterns of consumption, thereby resulting in weight loss or weight gain, and other forms of malnutrition [5,6]. Poor nutritional status results because of inadequate dietary intake, patients with chronic kidney disease (CKD) complained of malnutrition because of defective taste function [7]. Previous studies [8-10] reported that patients with CKD have a high prevalence of taste dysfunction through several mechanisms postulated that include dry mouth, tongue coating, mucosal inflammation, or oral ulceration. These features are common findings in patients with CKD [11] and might have contributed to taste disorders in them. Uremia was also suggested to cause taste dysfunction due to its effect on the taste bud, preventing their regeneration and its effect on the nerves of taste. Other mechanisms underlying taste dysfunction that have been reported include medication usage, changes in salivary composition, differences in dietary intake, and nutritional status, including zinc deficiency [5,8-10,12].

The impact of taste dysfunction is enormous on the patient's outcomes, survival, and overall reduced quality of life. However, little attention is often paid to taste dysfunction and its risk factors during routine patient evaluations. The benefits of taste assessment, prompt identification of taste dysfunction, and treatment of the risk factors during routine clinical encounters cannot be overemphasized. These benefits include adequate nutrition, retarding the progression of kidney disease, improved survival, and quality of life. The factors that have been putatively considered to be associated with the development of taste disorders among patients with CKD include age, gender, oral cavity/oropharyngeal lesion, stages of CKD, nutritional status (body mass index BMI), hemoglobin concentration (packed cell volume [PCV]), treatment modalities, and duration of illness. Prompt

identification and treatment of risk factors predicting taste dysfunction and its severity among patients with CKD will provide more insight into the pathophysiology of taste disorders in them, in addition to providing preventable and treatable options for taste dysfunction in CKD. This study, therefore, aims to assess renal diet patient satisfaction and to determine the predictors of taste dissatisfaction and their severity among patients with CKD.

Inadequate dietary intake is one factor contributing to poor nutritional status [13]. Taste influences food palatability and appetite; however, this link between taste sensitivity and food consumption is largely unstudied in renal patients. One study in HD patients demonstrated that improvement in taste acuity (by zinc supplementation) was accompanied by an increase in energy intake [14]. Taste disorders can occur in association with systemic diseases such as renal failure, hepatic failure, and gastrointestinal diseases (including postoperative conditions of the stomach and the intestine). Proteinuria due to impairment of renal function results in increased urinary excretion of zinc. In addition, the restriction of protein intake in alimentary therapy, which is performed in patients with kidney impairments, is a factor that decreases the zinc content in the body. Mahajan et al., 1980 [15], reported that the oral administration of zinc agents was significantly effective in treating taste disorders that accompanied a decrease in the serum zinc levels in patients with uremia. The palatability of food may negatively affect adherence to renal diets because of abnormalities in taste sensation. zinc deficiency, Fluid imbalances, metabolic derangements, and uremic toxin accumulation, has a role in the onset of dysgeusia [16-19]. Health-related quality of life (QOL) is related to a patient's functioning, well-being, and general health perception in physical, psychological, and social domains [20]. In chronic disease, specifically chronic kidney disease (CKD), a close relationship exists between QOL, morbidity, and mortality [21-22]. It has been established that CKD patients experience a significantly lower QOL compared with healthy controls, which is more pronounced in the pre-dialysis phase (Stages 4 and 5), especially in the elderly [23-25]**.** A decline in glomerular filtration rate GFR and an increase in uremic symptoms (including fatigue, weakness, anorexia, and muscular cramps) are associated with a reduced functional status and quality of life. [26]**.** Nutritional status has been shown to impact QOL in CKD patients by various nutrition assessment parameters [27,28]. Although improved nutritional management has been proposed as beneficial to the QOL of CKD patients.

Methods

This quality improvement cross-sectional study was conducted in the medical ward over three months from October- Dec 2022, at AL-Khor Hospital – Hamad Medical Corporation (HMC) – the state of Qatar to evaluate inpatients' satisfaction with renal diet. Eligible subjects for this cross-sectional survey were all renal impairment patients admitted to the medical ward, (≥18 years) with clinical and laboratory diagnosis of CKD defined as estimated glomerular filtration rate (eGFR) < 60 mL/min/1.73 m^2 with or without albuminuria, on the therapeutic diet (renal diet), exclusively eating from the hospital, Ethical approval was obtained from the hospital quality committee.

Study Procedure

The patient's response to the satisfaction questionnaire was assessed through face-to-face interviews after each main meal by a clinical dietitian. Demographic and social variables like age, sex, socioeconomic status, ethics, and beliefs, were out of the scope of this study. To be a specified evaluation regarding food taste only. The current study had a sample size of twenty-one inpatients from the medical ward on a renal diet. Convenience sampling was used, because the number of patients who met the study's inclusion criteria, was limited. The satisfaction level was categorized into four categories: excellent, very good, fair, and need improvement. Excellent and very good patient responses are considered as satisfied, while fair and need improvement responses were considered as dissatisfied. Patient satisfaction was evaluated as overall satisfaction, satisfaction per meal, and satisfaction per each satisfaction dimension.

Diet modification

Main meals breakfast, lunch, and dinner were reviewed by clinical dietetics staff to evaluate the taste of each food item on the daily menu and to do suitable modifications to improve food taste, food intake, and patient satisfaction. These modifications include the addition of different herbs (dill, parsley, coriander, cumin, spices, and lemon juice) and /or modifying the preparation and cooking methods (roasting, blending, and grilling) of specific food items. Few studies have attempted to assess the taste satisfaction in patients receiving a renal diet, in other words, there has been little research on 'whether the nutritional status, food intake, and quality of life are impacted by difficulties in adhering to a renal diet. Such studies are needed if we wish to widely recommend these dietary approaches [29]. The specific aim of this study was to assess the satisfaction with care experienced by patients with renal impairment receiving renal diet at AL-Khor Hospital (AKH) in the state of Qatar.

Statistical Analysis

Data was gathered, managed, tabulated, and statistically analyzed to deduce results using SPSS (Statistical Package

for Social Sciences, version 24, Chicago, IL, USA. Descriptive analysis (means and percentages) was used to describe general information.

Results

In all, data was collected from 19 of the 21 patients included in this project with a response rate of (90.5%). The age of the respondents ranged from 18 to 65 years with a mean of 39 years. Three fourth of the participants were non-national 16 (76.2%), while national patients were only 5(23.8%). The overall patient satisfaction indicated that most patients were dissatisfied with the hospital's therapeutic renal diet. (76.2%, 71.4%, and 66.7%) of patients were dissatisfied with breakfast, lunch, and dinner respectively, figure (1a, b, c). The findings revealed that meals were served based on the standard nutritional requirements of patients, which are then translated into predetermined portion sizes on the main menu.

Figure 1a Patients Satisfaction of Renal Diet (Breakfast Meal)

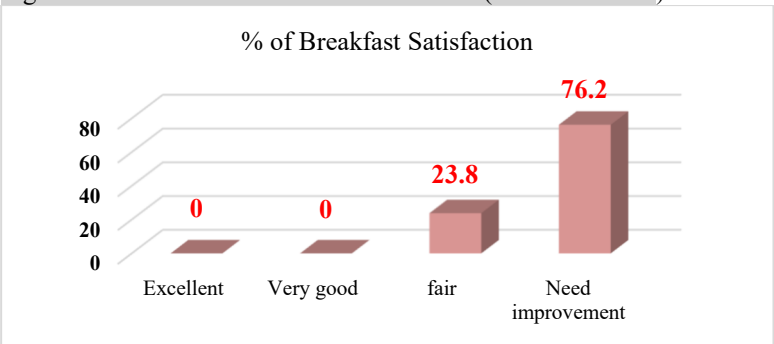


Figure 1b Patients Satisfaction of Renal Diet (Lunch Meal)

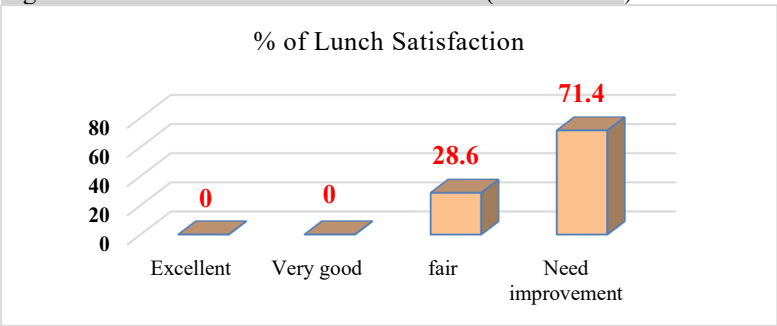
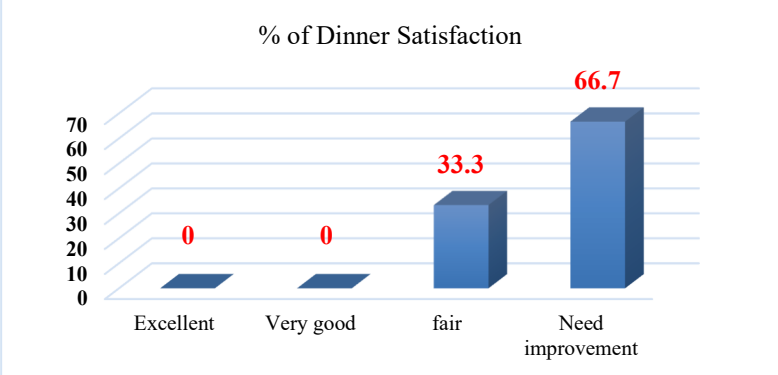


Figure 1c Patients Satisfaction of Renal Diet (Dinner Meal)



After the menu modification and implementation, patient satisfaction with the renal diet increased by 65%, 60.8%, and 54.4 % for breakfast, lunch, and dinner respectively. Patient satisfaction with the main meals of the renal diet was improved to (78.6%,85.7% & 78.6%) for breakfast, lunch, and dinner respectively Figure (2a, b, c).

Figure 2a Renal Diet Satisfaction of Breakfast Meal after Modifications

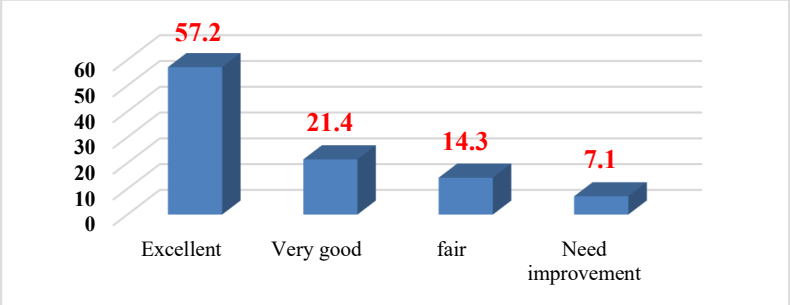


Figure 2b Renal Diet Satisfaction of Lunch Meal after Modifications

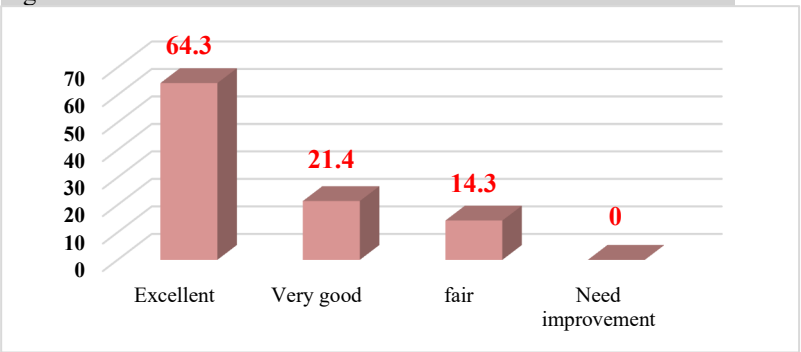
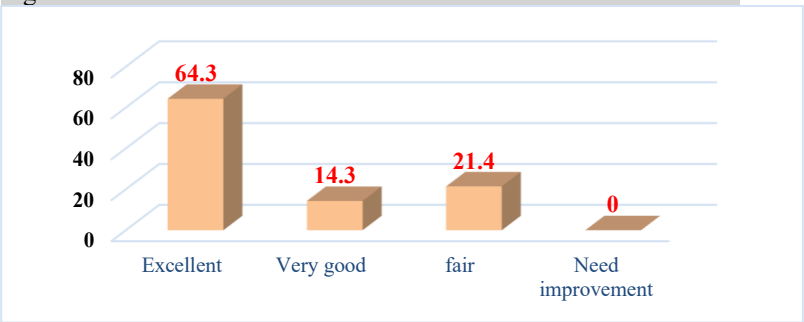


Figure 2c Renal Diet Satisfaction of Dinner Meal after Modifications



Discussion

The patient's quality of life may be reduced due to taste disfunction. Usually, during routine patient evaluations, little attention is often paid to taste dysfunction and its risk factors. Age, gender, stages of CKD, nutritional status, hemoglobin concentration, treatment modalities, and duration of illness, oral cavity/oropharyngeal lesion are factors considered to be associated with the development of taste disorders among patients with CKD. The pathophysiology of taste disorders may be clearer with early identification and treatment of risk factors predicting taste dysfunction and its severity among patients with CKD. Preventable and treatable options for taste dysfunction in CKD may be improved as well. The current study reveals that out of 21 patient's majority of the participants belong to the age group of 41 to 50 years (48%), and 74% were males. Regarding the level of taste satisfaction with the renal diet, the majority > 80% of them were completely dissatisfied, and 20% were fairly satisfied with all main meals of the renal diet, as found by previous studies metabolic disturbances, and deficiencies of multiple micronutrients due to decreased food intake (zinc deficiency) may be a cause of impaired taste among renal patients [30-33]. Drugs may also either decrease or increase the sensitivity to a certain taste; thus, medication remains a confounding variable in most studies of taste in renal patients [34,35]. The oral cavity is the first part of the alimentary tract and houses the teeth, tongue, and openings of major and minor salivary glands that help in the mastication, taste, swallowing, and digestion of some classes of food. Taste is the chemical stimulation of taste receptor cells in the oral cavity perceived as the primary tastes of sweet, sour, salty, bitter, and umami [36]. The satisfaction derived from eating is directly affected by taste, and when it is defective may lead to an aversion to food. Thereby resulting in weight loss or weight gain, and other forms of malnutrition [37]. Defective taste function among patients with chronic kidney disease (CKD) was implicated as the cause of malnutrition among them [38]. Dry mouth, tongue coating, mucosal inflammation, and oral ulceration were reported as possible mechanisms that cause a high

prevalence of taste dysfunction among patients with CKD [39-41]. The features are common findings in patients with CKD [42] and might have contributed to taste disorders in them. Taste dysfunction may be resulted because of uremia due to its effect on the taste bud which leads to preventing bud regeneration and affecting the taste nerves. Taste dysfunction may be caused by different factors such as medication usage, differences in dietary intake, and nutritional status, including zinc deficiency as well as changes in salivary composition. [37,39-41,43]

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Conclusion

This study of patient satisfaction with different aspects of CKD (renal diet) suggests that patients' nutritional requirements are not being fully met. The findings suggest that meeting CKD patient nutritional requirements for renal diet may be critical for Patient-centered care which involves listening to the needs and values of the patient, and it is evident that the dietitian is helping achieve this. This emphasizes the importance of regular interaction between patients and the dietitian for optimizing patient satisfaction.

References

1. Manley KJ. Taste genetics and gastrointestinal symptoms experienced in chronic kidney disease. *Eur J Clin Nutr*. 2015;69(7):1–5. Crossref. PubMed.
2. Matsuo, R. (2000) Role of saliva in the maintenance of taste sensitivity. Critical Reviews in Oral Biology and Medicine 11(2), pp. 216-229. Doi: 0.1177/10454411000110020501.
3. Middleton, R.A. and Allman-Farinelli, M.A. (1999). Taste Sensitivity Is Altered in Patients with Chronic Renal Failure Receiving Continuous Ambulatory Peritoneal Dialysis. The Journal of Nutrition 129(1), pp.122–125. doi: https://doi.org/10.1093/jn/129.1.122.
4. Manley, K.J., Haryono, R.Y., & Keast, R.S.J. (2012). Taste changes and saliva composition in chronic kidney disease. Renal Society of Australasia Journal, 8{2) 56-60. Available from: Taste changes and saliva composition in chronic kidney disease.: EBSCOhost (oclc.org)
5. Bromley SM, Doty RL. Clinical disorders affecting taste: An update. In: Doty RL, ed. *Handbook of Olfaction and Gustation*. 3rd ed. John Wiley & Sons; 2015:887–910. Crossref.
6. Allman, M. A., Stewart, P. M., Tiller, D. J., Horvath, J.S., Duggin, G. G. & Truswell, A. S. (1990) Energy supplementation and the nutritional status of hemodialysis patients. Am. J. Clin. Nutr. 51: 558–562
7. Raff AC, Lieu S, Melamed ML, et al. Relationship of impaired olfactory function in ESRD to malnutrition and retained uremic molecules. *Am J Kidney Dis*. 2008;52(1):102– 110. Crossref. PubMed.
8. Mcmahon EJ, Campbell KL, Bauer JD. Taste perception in kidney disease and relationship to dietary sodium intake. *Appetite*. 2014;83:236–241. Crossref. PubMed.
9. Manley KJ, Haryono RY, Keast RSJ. Taste changes and saliva composition in chronic kidney disease. *Ren Soc Australas J*. 2012;8(2):56–60.
10. Middleton RA, Allman-Farinelli MA. Taste sensitivity is altered in patients with chronic renal failure receiving continuous ambulatory peritoneal dialysis. *J Nutr*. 1999;129(1):122–125. Crossref. PubMed.
11. Oyetola EO, Owotade FJ, Agbelusi GA, Fatusi OA, Sanusi AA. Oral findings in chronic kidney disease: implications for management in developing countries. *BMC Oral Health*. 2015;24:1–8.
12. Kusaba T, Mori Y, Masami O, et al. Sodium restriction improves the gustatory threshold for salty taste in patients with chronic kidney disease. *Kidney Int*. 2009;76(6):638–643. Crossref. PubMed.
13. M. A. , Stewart P. M., Tiller D. J., Horvath J.S. ,Duggin G. G. , Truswell A. S. Energy supplementation and the nutritional status of hemodialysis patients. *Am. J. Clin. Nutr.* 51 1990 558 - 562
14. Atkin-Thor E. , Goddard B. W. , O'Nion J. , Stephen R. L , Kolff W. J. Hypogeusia and zinc depletion in chronic dialysis patients. *Am. J. Clin. Nutr.* 31 197819481951
15. Mahajan SK, Prasad AS, Lambujon J, Abbashi AA, Briggs WA, McDonald FD : Improvement of uremic hypogeusia by zinc: A double-blind study.Am J Clin Nutr 33, 1517- 1521, 1980.
16. Boltong A., Campbell K. 2013. 'Taste' changes: a problem for patients and their dietitians. *Nutr Diet*. 70(4):262–269. [Google Scholar]
17. McMahon EJ, Campbell KL, Bauer JD. 2014. Taste perception in kidney disease and relationship to dietary sodium intake. *Appetite*. 83:236–241. [PubMed] [Google Scholar]
18. Carrero JJ. 2011. Mechanisms of altered regulation of food intake in chronic kidney disease. *J Ren Nutr*. 21:7–11. [PubMed] [Google Scholar]
19. Neto LC, Bacci MR., Sverzutt LC, Costa MG, Alves BCA, Fonseca FL. 2016. The role of zinc in chronic kidney disease patients on hemodialysis: a systematicreview. *Health* 8:344–352. [Google Scholar]
20. Valderrabano F, Jofre R, Lopez-Gomez JM. Quality of life in end-stage renal disease patients. Am J Kidney

Dis 2001; 38(3):443e64.
21. Pais-Ribeiro JL. Quality of life is a primary end-point in clinical settings. Clin Nutr 2004;23(1):121e30.
22. Kalantar-Zadeh K, Kopple JD, Block G, Humphreys MH. Associations among SF36 quality of life measures and nutrition, hospitalization, and mortality in hemodialysis. J Am Soc Nephrol 2001;12(12):2797e806.
23. Neto JFR, Ferraz MB, Cendorogolo M, et al. Quality of life at the initiation of maintenance dialysis treatmentda comparison between the SF-36 and the KDQ questionnaires. Qual Life Res 2000;9(1):101e7.
24. Loos C, Briancon S, Frimat L, Hanesse B, Kessler M. Effect of end-stage renal disease on the quality of life of older patients. J Am Geriatr Soc 2003;51(2):229e33.
25. Gorodetskaya I, Zenios S, McCulloch CE, et al. Health-related quality of life and estimates of utility in chronic kidney disease. Kidney Int 2005;68(6):2801e8.
26. Caravaca F, Arrobas M, Pizarro JL, Sanchez-Casado E. Uraemic symptoms, nutritional status and renal function in pre-dialysis end-stage renal failure patients. Nephrol Dial Transplant 2001; 16(4):776e82.
27. Kimmel P, Peterson R, Weihs K, et al. Aspects of quality of life in hemodialysis patients. J Am Soc Nephrol 1995;6(5): 1418e26.
28. Hickson M, Frost G. An investigation into the relationships between quality of life, nutritional status and physical function. Clin Nutr 2004;23(2):213e21.
29. Hahn D, Hodson EM, Fouque D. Low protein diets for non-diabetic adults with chronic kidney disease. Cochrane Database Syst Rev 2018; 10: CD001892
30. Atkin-Thor, E., Goddard, B. W., O'Nion, J., Stephen, R. L & Kolff, W. J. (1978) Hypogeusia and zinc depletion in chronic dialysis patients. Am. J. Clin. Nutr. 31: 1948–1951.
31. Burge, J. C., Park, H. S., Whitlock, C. P. & Schemmel, R. A. (1979) Taste acuity in patients undergoing long-term haemodialysis. Kidney Int. 15: 49–53.
32. Shepherd, R., Farleigh, C. & Pryor, J. S. (1986) Changes in salt taste in dialysis and their relationship to blood constituents. Percept. Mot. Skills 62: 343–347.
33. Vreman, H. J., Venter, C., Leegwater, J., Oliver, C. & Weiner, M. W. (1980) Taste, smell and zinc metabolism in patients with chronic renal failure. Nephron 26: 163–170.
34. Van Der Eijk, I. & Allman-Farinelli, M. A. (1997) Taste testing in renal patients. J. Renal Nutr. 7: 3–8
35. Allman, M. A., Stewart, P. M., Tiller, D. J., Horvath, J.S., Duggin, G. G. & Truswell, A. S. (1990) Energy supplementation and the nutritional status of hemodialysis patients. Am. J. Clin. Nutr. 51: 558–562.
36. Manley KJ. Taste genetics and gastrointestinal symptoms experienced in chronic kidney disease. *Eur J Clin Nutr*. 2015;69(7):1–5.
37. Bromley SM, Doty RL. Clinical disorders affecting taste: An update. In: Doty RL, ed. *Handbook of Olfaction and Gustation*. 3rd ed. John Wiley & Sons; 2015:887–910.
38. Raff AC, Lieu S, Melamed ML, et al. Relationship of impaired olfactory function in ESRD to malnutrition and retained uremic molecules. *Am J Kidney Dis*. 2008;52(1):102–110.
39. Mcmahon EJ, Campbell KL, Bauer JD. Taste perception in kidney disease and relationship to dietary sodium intake. *Appetite*. 2014;83:236–241.
40. Manley KJ, Haryono RY, Keast RSJ. Taste changes and saliva composition in chronic kidney disease. *Ren Soc Australas J*. 2012;8(2):56–60.
41. Middleton RA, Allman-Farinelli MA. Taste sensitivity is altered in patients with chronic renal failure receiving continuous ambulatory peritoneal dialysis. *J Nutr*. 1999;129(1):122–125.
42. Oyetola EO, Owotade FJ, Agbelusi GA, Fatusi OA, Sanusi AA. Oral findings in chronic kidney disease: implications for management in developing countries. *BMC Oral Health*. 2015;24:1–8.
43. Kusaba T, Mori Y, Masami O, et al. Sodium restriction improves the gustatory threshold for salty taste in patients with chronic kidney disease. *Kidney Int*. 2009;76(6):638–643.