Development and testing of recipes suitable for patients with chronic renal failure

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Abstract

Objectives: The main objectives of the study were to develop and test recipes that meet the nutritional requirements of and are acceptable to patients with chronic renal failure. The secondary objectives were to determine gender and racial differences in the participants' responses during consumer sensory testing.

Design: This was a descriptive study with an analytical component.

Materials and methods: Patients on haemodialysis (n = 42) and continuous ambulatory peritoneal dialysis (n = 3) from Tygerberg Academic Hospital were included. Data were collected in three phases with census sampling: 1) the development and adaptation of recipes; 2) sensory testing with the nine-point hedonic scale; and 3) the rating of recipes, final nutritional analysis and the allocation of renal exchanges.

Results: Recipes were developed and adapted to suit the needs of the target population. Forty-five patients took part in the sensory evaluation (acceptance, appearance, smell, texture and taste) of 30 recipes. Twenty-three recipes were deemed acceptable (> 80% of the participants scored ≥ 6 out of 9). Significant differences were found between the male and female subgroups for *Fish and Vegetable Pie* (p = 0.031), *Chicken Pilaf* (p = 0.008) and *Date Fingers* (p = 0.002) and between the black and Westernised subgroups for *Rice Salad* (p = 0.006), *Wheat and Mushroom Casserole* (p = 0.022), *Curried Wheat Salad* (p = 0.043) and *Coconut Ice* (p = 0.005). The 23 recipes were nutritionally analysed and renal exchanges were allocated.

Conclusion: The 23 recipes that were acceptable to the study participants are recommended for inclusion in the RenalSmart software program. The recipes are suitable for patients following a Westernised diet.

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Introduction

Patients with chronic renal failure (CRF) must deal not only with the disease itself but also with conflicting feelings about the treatment process, the changes in the quality of their lives and the necessity of adapting to a chronic progressive illness. Renal patients usually need to take several medications and to follow a strict dietary regimen,[1] but recipes for South African renal patients that are based on the South African food composition data are non-existent.

The dietary requirements of patients with CRF are not only complex but also unique to each patient and may vary with changes in the patient's condition and medical treatment. It is a challenging process for dietitians to prescribe a diet suitable for every patient's individual needs and it is often difficult for the patient to grasp the concept of the diet and the renal exchange lists. Several international nutritional guidelines exist for patients with CRF.[2–6] In South Africa, guidelines for patients with CRF were developed with the use of various scientific sources.[7–12] The South African renal exchange lists were developed to assist dietitians in the planning of complex renal diets.[13]

The successful implementation of renal diets may be hampered by several factors contributing to poor food intake by patients with CRF,[14–18] including changes in the taste of food, the symptoms of uraemia including nausea, vomiting and a metallic taste in the mouth,[19] dietary restrictions,[1] limited food choices and depression.[20] Some explanations for renal patients experiencing changes in taste include metabolic disturbances, the deficiency of multiple micronutrients due to decreased food intake and alterations in peripheral nerve function.[19,21] Drugs may also either decrease or increase sensitivity to a certain taste.[22] Patients participating in renal replacement programmes, such as haemodialysis (HD) and continuous ambulatory peritoneal dialysis (CAPD), and with chronic uraemia have been shown to be affected the most.[20]

When taking into account the possible taste alterations that may occur, developing recipes suitable for patients with CRF can become a challenge. An integral part in recipe development therefore consists of the sensory evaluation of recipes to determine whether they are suitable for and acceptable to the intended target group.[23] Sensory evaluation can be categorised into two main areas: analytical sensory evaluation; and consumer sensory testing. Both types use the same evaluation technique but differ with regard to the purpose of the evaluation, the problems that they address and the composition and training of the personnel and of the public testing the products.[24] Consumer-aimed sensory testing targets the public or a specific group of individuals to determine the degree of acceptability,

preferences or the purchasing potential of food products by means of preference or hedonic testing. For consumer sensory testing to be effective, the panel should be representative of the target population and should preferably have no or little sensory training. The nine-point hedonic scale to determine product preference is the rating scale most commonly used in consumer preference testing.[25] This was developed by the Quartermaster Food and Container Institute in the late 1940s.[26] In determining the acceptance of a product to the general public, an untrained panel of up to 35 has been successfully used in previous investigations where the population was small.[27]

In conclusion, there is currently a great demand in South Africa from dietitians and patients for new and updated recipes tested specifically on the South African renal patient and based on the new South African renal exchange lists of 2005.[13]

A web-based program (RenalSmart) has therefore been developed for the fast, accurate, online planning of renal diets. This program offers a pool of recipes suitable for and tested on renal patients from different cultural and ethnic groups, allowing for the influence of culture on eating habits. The present observational, descriptive study, which has an analytical component, was conducted as the first phase in the development and testing of appropriate recipes for the recipe pool of RenalSmart. The first phase of the project focused on the development of recipes commonly followed by those on a Westernised diet, determining the perceptions of renal patients from a low- to middle-income group in the Western Cape.

Methods

Objectives

The main objectives of the study were to identify and adapt recipes to meet the nutritional requirements of renal patients, to test the recipes through consumer sensory testing on dialysis patients from Tygerberg Academic Hospital (TAH), Tygerberg, South Africa, to analyse for nutritional value the recipes that meet the specified criteria and to rewrite the recipes into a user-friendly format.

The secondary objectives were to identify any significant differences between the male and female participants' responses and any significant differences in the responses of the different races during consumer sensory testing.

The null hypothesis of the study was that there was no significant difference between the male and female participants' responses to the consumer sensory testing and that there was no significant difference among the different races in their responses to the consumer sensory testing.

Study population and sample size

The study population consisted of patients with CRF on HD and CAPD from TAH. A census of all patients with CRF on dialysis at TAH was done. Only TAH was included due to requirements in terms of food safety, transportation, facility availability for food preparation and financial reasons. Data were collected during August and September 2008. All the HD and CAPD patients present in TAH at the time of data collection who met the inclusion criteria were included. All literate Afrikaans and English adult ($\geq$ 18 and < 65 years of age) HD and CAPD patients who were willing to give written, informed consent to take part in the study were included in the study but patients with diagnosed diabetes mellitus were excluded.

Methods of data collection

Data were collected in three phases: the development of recipes; the testing of the recipes; and the rating of the recipes and allocation of renal exchanges, as shown in Figure 1.

Development of recipes (Phase 1)

Steps 1 to 6: Thirty suitable recipes commonly consumed by people following a Westernised diet were identified. Existing renal recipes that had previously been analysed with outdated renal exchanges and ordinary recipes from recipe books[28–30] were also included and adapted. The recipes were categorised into three subgroups: main meals; side dishes; and desserts and sweets. The recipes were prepared, evaluated and analysed according to steps 1 to 6 in Figure 1.

PHASE 1: DEVELOPMENT OF RECIPES
STEP 1: Identify 30 suitable recipes
STEP 2: Prepare the recipes according to the original quantities
STEP 3: Evaluate the end-product with regard to overall acceptance, appearance, smell, texture and taste
STEP 4: Analyse the recipes nutritionally using the Foodfinder 3 computer software program
STEP 5: Adapt the recipes for a renal diet (protein, phosphate, sodium, potassium content)
STEP 6: Analyse the adapted recipes nutritionally
PHASE 2: TESTING RECIPES, COLLECTING SOCIO-DEMOGRAPHIC DATA
STEP 7: Prepare recipes, do sensory evaluation, collect socio-demographic data of participants
PHASE 3: SCORING AND ALLOCATION OF EXCHANGES
STEP 8: Score the recipes according to the results obtained from the sensory evaluation
STEP 9: Allocate renal exchanges per portion
STEP 10: Do practical and final formatting

Figure 1: Process of data collection

Testing of recipes (Phase 2)

Obtaining written consent from the participants

All potential participants were asked for written consent to take part in the study. The consent form was discussed in detail with each patient, including the purpose of the study and what would be expected of the patients. The researcher also discussed the sensory evaluation form and explained the scoring on the evaluation form to familiarise the patients with the format.

To ensure anonymity, each participant received a unique code number that was used during the capturing of data.

Preparation and sensory evaluation of the recipes

Step 7: The chosen recipes were adapted and then tested. The adapted recipes were prepared by a research assistant on two weekday afternoons in a household kitchen using household equipment and utensils. Three dishes comprising a main meal, a side dish and a dessert or sweets were prepared at any one time. After preparation, the dishes were refrigerated overnight in sealed plastic containers. The following morning, the dishes were transferred to a cooler box to maintain the cold chain and transported to TAH.

At TAH, the dishes that are normally served hot were reheated in the TAH food preparation area in ovenproof containers for 15 seconds to ensure microbial safety until they reached an internal temperature of 74ºC.[31] The cold foods were served at a temperature below 10°C.

Permission was obtained from the chief director of TAH and the food service manager of the main kitchen to use one oven and a working surface in the main kitchen to prepare the samples. A 60 g sample of each recipe (a main meal, a side dish and a dessert or sweets) was portioned and placed in a white Foamalite container, transported to the dialysis unit in an insulated trolley to maintain the internal temperature as far as possible and immediately served to the patients.

Description of the consumer sensory testing form

On the form used for the sensory testing, the patients were given basic instructions on how to perform the sensory evaluation test, such as rinsing their mouths with water before tasting. They were asked to rate several aspects, including overall acceptance, appearance, smell, texture (mouth feel) and taste. They were given a separate form for each recipe.

The researcher undertook the pilot study to determine the face validity of the consumer sensory testing form in June 2008. The researcher did this by preparing one recipe and testing and evaluating a 60 g sample of the dish with the consumer sensory testing form. Using convenience sampling, the researcher selected five patients without diagnosed CRF from a general ward in TAH to take part in the pilot study. The five patients consisted of three females and two males; four of the participants were coloured, while one participant was white. The patients came from the same socio-economic and cultural background as the patients in the dialysis unit. Patients on dialysis in TAH were not used for the pilot study due to the already small number of potential study participants. After giving written consent, the patients were asked to test and evaluate the dish and then to give feedback regarding the problems that they experienced while completing the sensory evaluation form using the nine-point hedonic scale. Adaptations were made according to the comments received.

The test-retest reliability of the scale had previously been determined to be adequate, with no statistically significant differences between the answers of the initial test and those of the follow-up retest after two weeks.[26,27,32]

Sensory evaluation of the recipes

Each patient who had given consent and did not feel ill or nauseous on the day of the sensory evaluation received all the food samples to be tested on the day simultaneously. A serviette, a glass of water, a pen and two/three/four pre-coded sensory evaluation forms were also provided, one for each recipe. While on dialysis, the patients proceeded with the sensory evaluation of the recipes, always starting with the main meal or meals, followed by the side dish or dishes, and the dessert or desserts or sweets. The patients completed the sensory evaluation forms themselves and returned them to the researcher, who was always available for any questions or queries. This procedure was followed every morning and afternoon on Wednesdays and Fridays for the full duration of the data-collection period.

Collection of the socio-demographic data

The researcher collected the age, gender and race of all the participants from the patient files on the last day of the sensory evaluation.

Rating of recipes and allocation of renal exchanges (Phase 3)

Step 8: After the completion of the sensory evaluation of the 30 recipes, the researcher identified those recipes deemed acceptable by the study participants. This was done by assigning ordinal values to the response choices of the participants for each recipe, based on previous studies.[32–34] A score of 1 was given if a participant ticked the box "Dislike extremely", while a score of 9 was given if a participant ticked the box "Like extremely". A score of 1 to 9 was therefore given for each recipe tested by every participant. Only those recipes that received an overall average score of 6 ("Like slightly") or higher for all characteristics by more than 80% of the study population were included. These values were selected arbitrarily due to a lack of clear guidelines in literature. According to research by Herselman, who also developed recipes suitable for patients with CRF in 1985, the cut-off point for acceptability was four on a seven-point scale, where 80% of the participants had to give a score of four or more.[35]

Step 9: The researcher determined the number of exchanges per portion for each acceptable recipe using the new South African renal exchange lists[13] to assist renal patients when they want to include a portion of a recipe as part of their diet. The procedure of allocating renal exchanges to a recipe is indicated in Figure 2.

Step 10: After allocating renal exchanges to a portion of each recipe, the researcher completed the final formatting for each recipe. The main aim was to present the recipes in a user-friendly format that was easy to follow and understand, in accordance with the RenalSmart format.

STEP 1: After nutritional analysis, decide in which exchange group the recipe should fit based on the nutrient composition of the recipe compared to the specific renal exchange group
STEP 2: Identify the protein, carbohydrate and fat value of the chosen exchange group*
STEP 3: Compare the protein value of the recipe with the protein value of the exchange group and adjust the portion size of the recipe if indicated
STEP 4: Compare the values of the other macronutrients with those of the exchange group
STEP 5: Check the values of the relevant micronutrients to classify the exchange as low/medium or high potassium/phosphate or sodium
STEP 6: If the fat and/or sugar contents are high, allocate extra fat and sugar exchanges

* Use only full exchanges as far as possible.

Figure 2: Procedure followed in the allocation of renal exchanges to a recipe

Data analysis

The STATISTICA 8.0 software program was used for the statistical analysis.[36] Mainly descriptive statistics, such as frequency tables, means, standard deviations, medians and the quartiles of ordinal data, were used. Comparative measures, such as the Mann-Whitney test, were used, since the measurements for each group were not normally distributed.

Ethics and legal aspects

A protocol for the proposed study was submitted to and approved by the Committee for Human Research, Faculty of Health Sciences, Stellenbosch University, in 2007. Informed consent was obtained from all the participants and all information was handled in a confidential manner.

Results

Participant demographics

In total, 45 patients who complied with the inclusion criteria gave written informed consent to take part in the study. Of the 45 participants, 80% (n = 36) were coloured, 15.56% (n = 7) were black, while only 4.44% (n = 2) were from the white population. There was an almost equal gender distribution of females and males, 51% (n = 23) and 49% (n = 22) respectively. The mean age of the participants was 39.11 (SD ± 8.32) years, with 44.44% (n = 20) falling within the 40 to 50-year category; the ages ranged from 19 to 53, with only 11.11% (n = 5) of the participants being older than 50.

On different days of the recipe testing, the patients who had already given consent at an earlier date to take part in the study were sometimes absent or refused to take part in the sensory evaluation on any given day for various reasons, including feeling too ill and being very nauseous on that day. The total number of participants present for every sensory evaluation varied between 32 and 37. On several occasions, no white participants took part in the sensory evaluation and, on one occasion, a patient did not take part in the sensory evaluation of a recipe (Indian Pork Dish) for religious reasons.

Due to the very small number of white participants taking part in the study, the white and coloured participant subgroups were combined for the purpose of data analysis to form one subgroup named the "Westernised" group.

Overall acceptability scores

The patients were asked to rate the overall acceptability and appearance of each recipe using the nine-point hedonic scale. A summary of the overall scores is shown in Figures 3, 4 and 5 for the main meals, side dishes and desserts or sweets, respectively.

There was no significant difference between the overall acceptability scores of males and females, with the exception of the following: *Fish and Vegetable Pie* (p = 0.031); *Chicken Pilaf* (p = 0.008); and *Date Fingers* (p = 0.002), with the females preferring the two main dishes while the males showed greater preference for the sweets. There was no significant difference between the overall acceptability scores of the black and Westernised subgroups, with the exception of the following: *Wheat and Mushroom Casserole* (p = 0.022); *Curried Wheat Salad* (p = 0.043); and *Coconut Ice* (p = 0.005), with the Westernised subgroup showing greater preference for these recipes.

All the main meals received an overall acceptability score above 6.00, the side dishes above 6.24, with the exception of the *Green-bean, Pea and Mushroom Salad,* the *Wheat and Mushroom Casserole* and the *Brussels Sprouts with Tomato and Onion Sauce,* which scored below 6.00, and the desserts above 6.00 for all the subgroups combined.
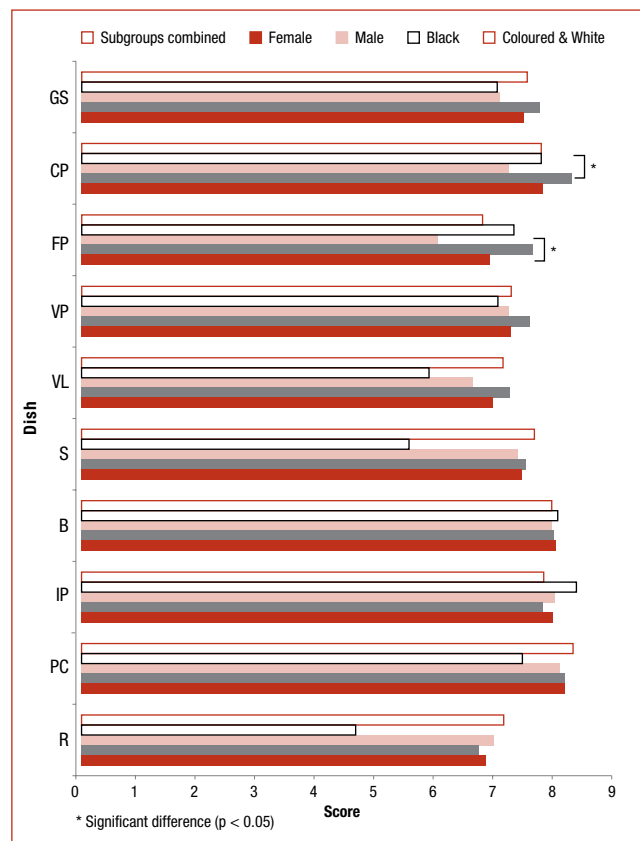

Figure 3: Overall scores – Main meals

Abbreviations: GS: Green-bean Stew; CP: Chicken Pilaf; FP: Fish and Vegetable Pie; VP: Vegetable Paella; VL: Vegetarian Lasagne; S: Beef Kebabs; B: Bobotie; IP: Indian Pork Dish; PC: Pineapple Chicken; R: Risotto

Appearance, smell, texture and taste scores

All the recipes with statistically significant scores for appearance and/or smell and/or texture and/or taste are shown in Table I. It is interesting to note that statistically significant differences were found for only seven dishes, while, for six of these dishes, statistically significant differences were found for the appearance, smell, texture and taste scores.

Recipes to be included in the RenalSmart web-based program

The recipes that received a score of 6 ("Like slightly") or more for all the characteristics (the overall score) by 80% of the study participants were deemed acceptable and are proposed for inclusion in the RenalSmart web-based program. A summary of all the dishes is shown in Table II.

In total, 23 recipes were included in the RenalSmart web-based program. The *Green-bean, Pea and Mushroom Salad, Wheat and Mushroom Casserole, Cabbage Pot, Peas in Lemon and Mint Sauce, Potato Fritters, Brussels Sprouts with Tomato and Onion Sauce and Poached Pears* were deemed unacceptable by the Westernised subgroup. It is therefore proposed that these dishes be excluded.

Discussion and recommendations

Choosing recipes specifically suited for patients with CRF is a challenge not only because of the dietary restrictions that these patients face but also because of the possible taste deviations that
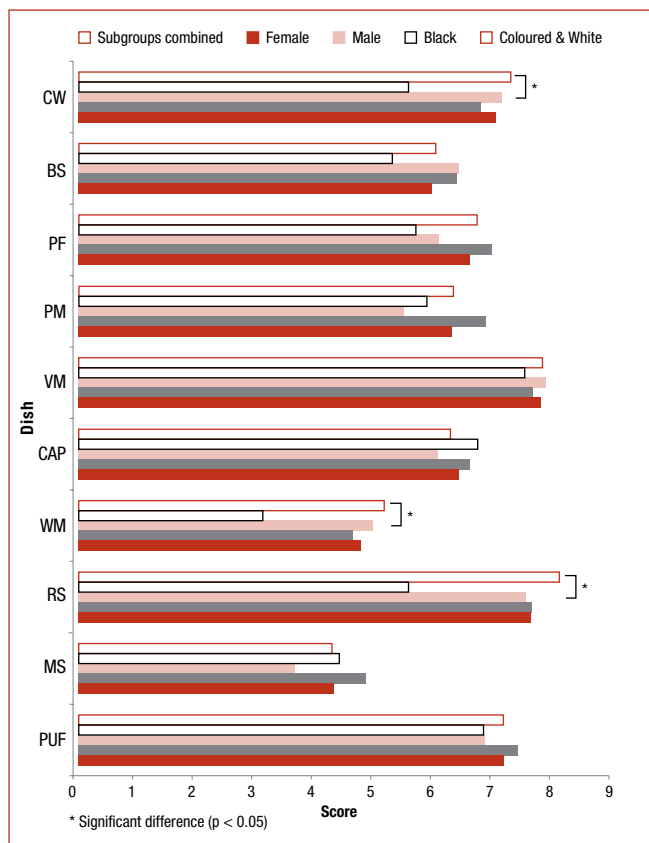
Figure 4: Overall scores – Side dishes

Abbreviations: CW: Curried Wheat Salad; BS: Brussels Sprouts in Tomato and Onion Sauce; PF: Potato Fritters; PM: Peas in Lemon and Mint Sauce; VM: Vegetarian Mushroom Dish; CAP: Cabbage Pot; WM: Wheat and Mushroom Casserole; RS: Rice Salad, MS: Green-bean, Pea and Mushroom Salad; PUF: Pumpkin Fritters
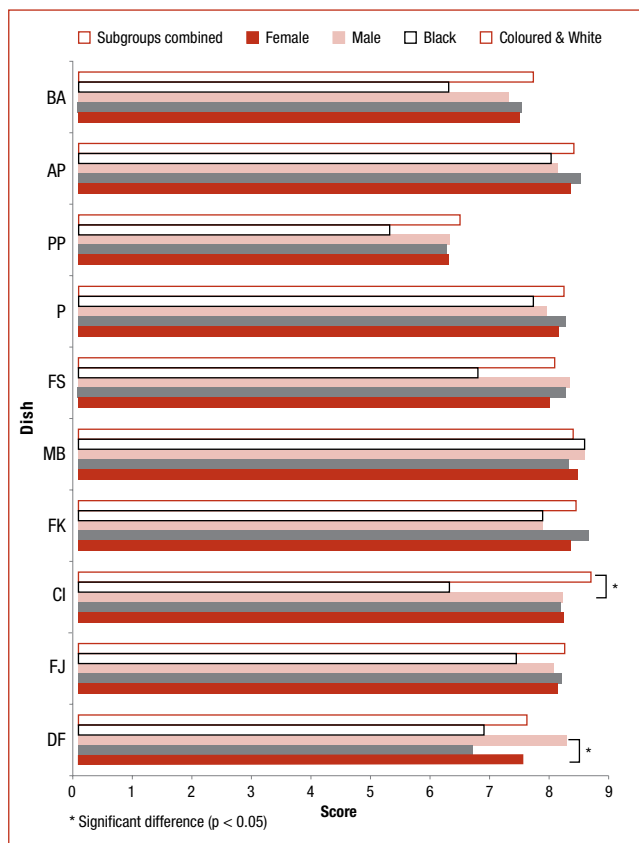

Figure 5: Overall scores – Desserts and sweets

Abbreviations: BA: Baked Apples in Custard Sauce; AP: Baked Apple Pudding; PP: Poached Pears; P: Pancakes; FS: Fruit Salad; MB: Marie Biscuit Fudge; FK: Fruit Kebabs; CI: Coconut Ice; FJ: Fruit Jelly; DF: Date Fingers

they may have.[19,21,37–41] As a result of the generally low nutrient intake of patients with CRF due to various factors,[20,42,43] it was important to try and include exciting, tasty recipes that the patients would find attractive and easy to incorporate into their daily lifestyle.

Although food choice is a complex process, some demographic variables, such as gender, age, race and education, may have an influence on food choice and preference behaviour.[44] The sample from the study population consisted of an almost equal number of males (n = 22) and females (n = 23), with almost three-quarters (n = 33) being between the ages of 30 and 50. This may be due to the strict selection criteria followed by TAH and the limited number of elderly patients selected for dialysis.

The majority (n = 36) of the participants were coloured and only seven black and two white patients participated in the study. This may be due to the drainage area of TAH, situated in close proximity to the Cape Flats, which is inhabited mostly by coloured people.

Mean overall scores

For all the subgroups combined, it was interesting to note that the chicken and pork dishes scored the highest overall in the main-meals category. This may be attributed to the fact that chicken is a popular dish for all races within the Western Cape and that almost everyone is familiar with this meat.

The side dishes received lower scores for all the subgroups combined, with recipes such as the *Green-bean, Pea and Mushroom Salad, the Wheat and Mushroom Casserole and the Brussels Sprouts with Tomato and Onion Sauce* scoring below 6. The recipes that scored the highest were those with added cheese and fat, as in the case of the *Pumpkin Fritters.* Subsequently, in most cases, the recipes with a higher fat and kilojoule content scored higher (the *Pumpkin Fritters* and the *Vegetarian Mushroom Dish*) than the healthier options with a lower fat and kilojoule content.

A study by Nu et al investigated the effects of age and gender on the food habits and preferences of adolescents in France. The researchers found that all the adolescents, both male and female, of all ages, disliked vegetables and preferred food with a higher fat and sugar content. Even though the study was performed on adolescents, it has been shown that food preferences are already formed during childhood and stay more or less the same during adulthood. Although girls and women are more aware of body image and health issues than boys and men, they still prefer food with a higher sugar and fat content. They do, however, still sometimes restrict these and increase their intake of food that is perceived to be healthy.[45,46] This may also explain the relatively high overall scores for desserts and sweets.

Table I: Summary of all the statistically significant differences for the appearance, smell, texture and taste scores

Appearance scores						
	Female subgroup	Male Subgroup	p Value	Black subgroup	Westernised subgroup	p Value
	Mean (Standard deviation)			Mean (Standard deviation)		
Fish and Vegetable Pie	7.50 (1.50)	6.07 (2.15)	0.021	–	–	–
Chicken Pilaf	8.21 (0.79)	7.19 (1.42)	0.008	–	–	–
Rice Salad	–	–		5.57 (2.51)	8.14 (0.95)	0.004
Wheat and Mushroom Casserole	–	–	–	3.14 (1.35)	5.27 (2.05)	0.017
Date Fingers	7.06 (2.04)	8.29 (1.21)	0.008	–	–	–
Fruit Kebabs	8.67 (0.49)	7.87 (1.46)	0.039	–	–	–
Coconut Ice				6.29 (2.81)	8.59 (0.68)	0.011
Smell scores						
	Female subgroup	Male subgroup	p Value	Black subgroup	Westernised subgroup	p Value
	Mean (Standard deviation)			Mean (Standard deviation)		
Fish and Vegetable Pie	7.45 (1.47)	6.10 (2.17)	0.047	–	–	–
Chicken Pilaf	8.16 (0.76)	7.31 (1.49)	0.030	–	–	–
Rice Salad	–	–	–	5.57 (2.51)	8.03 (0.91)	0.007
Wheat and Mushroom Casserole	–	–	–	3.14 (1.35)	5.23 (1.90)	0.013
Date Fingers	6.67 (2.22)	8.35 (1.27)	0.001	–	–	–
Coconut Ice	–	–	–	6.29 (2.81)	8.48 (0.95)	0.015
Texture scores						
	Female subgroup	Male subgroup	p Value	Black subgroup	Westernised subgroup	p Value
	Mean (Standard deviation)			Mean (Standard deviation)		
Fish and Vegetable Pie	7.45 (1.47)	6.00 (2.30)	0.037	–	–	–
Chicken Pilaf	8.16 (0.76)	7.19 (1.42)	0.012	–	–	–
Rice Salad	–	–	–	5.57 (2.51)	8.10 (0.94)	0.005
Wheat and Mushroom Casserole	–	–	–	3.14 (1.35)	5.12 (2.05)	0.025
Date Fingers	6.56 (2.09)	8.24 (1.35)	0.001	–	–	–
Coconut Ice	–	–	–	6.29 (2.81)	8.66 (0.67)	0.005
Taste scores						
	Female subgroup	Male subgroup	p Value	Black subgroup	Westernised subgroup	p Value
	Mean (Standard deviation)			Mean (Standard deviation)		
Fish and Vegetable Pie	7.45 (1.47)	6.00 (2.30)	0.037	–	–	–
Chicken Pilaf	8.21 (0.79)	7.19 (1.42)	0.008	–	–	–
Rice Salad	–	–	–	5.57 (2.51)	7.97 (1.18)	0.008
Wheat and Mushroom Casserole	–	–	–	3.14 (1.35)	5.12 (2.08)	0.025
Date Fingers	6.44 (2.04)	8.29 (1.21)	0.005	–	–	–
Coconut Ice	–	–	–	6.29 (2.81)	8.62 (0.78)	0.006

Scores for males and females

Significant differences were found between the males and females for the *Fish and Vegetable Pie and the Chicken Pilaf,* with the females showing greater preference for these dishes than the males. Furthermore, it is interesting to note that the females gave higher scores, although not significantly different, for the *Vegetable Lasagne, the Vegetable Paella and the Green-bean Stew* than the males. This may be attributed to the fact that men tend to prefer meals containing a substantial amount of protein in the form of meat and may dislike main meals that contain only vegetables or a large amount of vegetables.

When comparing the mean overall score and the appearance, smell, texture and taste scores for the side dishes, the males showed greater preference, although not significantly different, for the *Wheat and Mushroom Casserole, the Vegetarian Mushroom Dish and the Curried Wheat Salad* than the females. The females, however, showed greater preference, although not significant, for the *Green-bean, Pea and Mushroom Salad, Cabbage Pot, Peas in Lemon and Mint Sauce, Potato Fritters and Brussels Sprouts with Tomato and Onion Sauce* than the males. It can therefore be assumed that the males preferred the starch-based side dishes while the females, with the exception of the *Potato Fritters,* preferred the vegetable-based side dishes. The latter may be due to the fact that girls and women may be more interested in weight control and more concerned with slimness and nutrition than men.[45] Recipes containing more vegetables may be perceived as healthier and more nutritious.

Reicks et al investigated the factors affecting the consumption of fruits and vegetables by low-income families and the participants of the study and their families showed that they were more likely to eat vegetables when sauces, dips and seasonings were added to the food to mask the taste of the vegetables.[47]

The females had greater preference, although not always significantly different, for the fruit-based desserts, while the males preferred the sweets containing more fat and sugar. This, again, may be due to the fact that the females perceived the fruit-based desserts to be healthier than the other desserts and sweets tested.

To summarise, the null hypothesis stating that there is no significant difference between the

Table II: Acceptability of dishes – Westernised participants

Dish	Total number of participants who evaluated the dish	Number and percentage of participants with a score of 6 and above		Number and percentage of participants with a score of 5 and below		Dish acceptable or unacceptable
MAIN MEALS						
Green-bean Stew	28	26	92.86	2	7.14	√
Risotto	30	25	83.33	5	16.67	√
Pineapple Chicken	29	29	100.00	0	0	√
Indian Pork Dish	26	26	100.00	0	0	√
Bobotie	28	27	96.48	1	3.52	√
Beef Kebabs	30	27	90.00	3	10.00	√
Vegetable Lasagne	30	26	86.67	4	13.33	√
Vegetable Paella	28	23	82.14	5	17.86	√
Fish and						
Vegetable Pie	28	23	82.14	5	17.86	√
Chicken Pilaf	28	26	92.86	2	7.14	√
SIDE DISHES						
Pumpkin Fritters	29	25	86.21	4	13.79	√
Green-bean, Pea and Mushroom Salad	30	10	33.33	20	66.67	x
Rice Salad	29	29	100.00	0	0	√
Wheat and Mushroom Casserole	26	10	38.46	16	61.54	x
Cabbage Pot	28	21	75.00	7	25.00	x
Vegetarian						
Mushroom Dish	30	28	93.33	2	6.67	√
Peas in Lemon						
and Mint Sauce	30	21	70.00	9	30.00	x
Potato Fritters	28	22	78.57	6	21.43	x
Brussels Sprouts with Tomato and Onion Sauce	28	18	64.29	10	35.71	x
Curried Wheat Salad	28	24	92.86	4	7.14	√
DESSERTS AND SWEETS						
Date Fingers	29	27	93.10	2	6.9	√
Fruit Jelly	30	29	96.67	1	3.33	√
Coconut Ice	29	29	100.00	0	0	√
Fruit Kebabs	26	25	96.15	1	3.85	√
Marie Biscuit Fudge	28	27	96.43	1	3.57	√
Fruit Salad	30	29	96.67	1	3.33	√
Cinnamon Sugar Pancakes	28	28	100.00	0	0	√
Poached Pears	28	21	75.00	7	25.00	x
Baked Apple Pudding	28	27	96.43	1	3.57	√
Baked Apples in Custard Sauce	28	26	92.86	2	7.14	√

male and female participants' responses in the consumer sensory testing was rejected for all the scores for the Fish and Vegetable Pie, the Chicken Pilaf and the Date Fingers and for the appearance score for the Marie Biscuit Fudge.

Scores for race

Culture, vegetarianism, beliefs, religion and ethnicity play a large role in the eating patterns and diets of all people,[48] as they have their own set of dietary practices and these rules can have an important effect on access to food, food choices, preparation and storage methods.[49]

The majority of the participants in this study were coloured, while a small number of participants were black or white. Although religion and heritage were not determined in this study, it is likely that culture and religion may have played a role in the preferences of the participants. It was therefore important to distinguish recipes chosen for the Westernised population – including the coloured, white and, particularly, black participants who followed a Westernised diet, recipes for the black population following a traditional diet and recipes for the Indian population.

In this study, the main focus was to identify and test recipes for those living in the Western Cape and following a Westernised diet. Although black participants were also included in the study, it is important to note that the recipes chosen did not take the preferences and culture of the black population following a traditional diet into consideration. Traditional meals for the black African, such as the one main dish that comprises a bulky carbohydrate (usually mealie meal), supplemented by a side dish, such as a meat stew, a vegetable and sour milk),[48] are planned for the next phase of the project.

When comparing the mean overall scores for the main meals and their appearance, smell, texture and taste, the coloured and white subgroup showed greater preference, although not significantly so, for almost all the recipes, except for the *Bobotie and Fish and Vegetable Pie.* This may be due to the fact that recipes popular within the Westernised culture were initially chosen to be tested. It is interesting, however, that the black subgroup had a slightly higher mean overall score for the *Bobotie* than the Westernised subgroup, even though bobotie is considered a very popular South African dish within the Westernised population.

The mean overall scores for the side dishes and their appearance, smell, texture and taste again showed that the Westernised subgroup gave a higher mean score for the majority of the recipes, except for the *Green-bean, Pea and Mushroom Salad and the Cabbage Pot,* where the scores were very similar. The Westernised subgroup showed significantly greater preference for the *Rice Salad, Wheat and Mushroom Casserole and the Curried Wheat Salad.* This may be attributed to the black population's traditional preference for mealie meal and samp as a starch, rather than rice and wheat.

Except for the *Marie Biscuit Fudge,* the black subgroup gave lower (although not significantly lower scores for all the desserts and sweets) mean overall, appearance, smell, texture and taste scores than the Westernised subgroup for all the desserts and sweets.

When comparing the mean scores of the black participants with the scores of the Westernised participants for all the recipes, taking into consideration the small sample size of the black participants, it is clear that one cannot assume that the black population living in the urban areas of the Western Cape follow a Westernised diet, due to the overall lower scores given by the black subgroup for most of the recipes. There is therefore a need to develop recipes specifically for the black population following a traditional diet.

To summarise, the null hypothesis, stating that there is no significant difference among the different races of the participants and their responses in the consumer sensory testing, was rejected for all the scores for the *Rice Salad, the Wheat and Mushroom Casserole and the Coconut Ice* and for the overall and taste scores for the Curried Wheat Salad.

Implications for renal dietitians

From the findings of this study, it is clear that menu planning and recipe ideas for renal dietitians who are prescribing diets for patients with CRF may be a challenging and daunting task. Not only should the diet prescriptions be suitable for the renal patients and take their dietary restrictions and risk for low nutritional intake and malnutrition into consideration, but individual preferences, gender, ethnicity, religion and cultural beliefs should also be considered. Before commencing with dietary counselling, it is important for dietitians to ensure that the renal patients are ready for change, thereby improving the chances of sustained behavioural change.

For the development and testing process of future recipes, it is recommended that more dialysis facilities from both the public and the private sectors be targeted with a better racial and ethnic distribution in order to obtain a more representative sample of all dialysis patients. Due to the tendency of patients to score all sensory attributes the same (including appearance, smell, texture and taste), the researcher recommends that only one overall attribute be evaluated, namely the overall acceptability of the dish.

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