Effect of Nutrition Education Program on Nutritional Status of Geriatric Patients with Chronic Kidney Diseases

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Abstract

Background: *Chronic kidney disease is a progressive condition marked by structural and functional changes in the kidneys, often resulting from various underlying health issues. Elderly with chronic kidney diseases, especially those on maintenance dialysis, are at a high risk of protein-energy wasting. Therefore, it is crucial to provide dietary education to help manage their nutritional status and overall health.* ***Aim:*** *evaluate effect of nutrition education program on nutritional status of geriatric patients with chronic kidney diseases.* ***Setting:*** *This study was carried out at outpatient nephrology clinic at New Mansoura General Hospital.* ***Subjects:*** *The study subjects were selected using the purposive sampling technique which included 60 elderly patients diagnosed with chronic kidney disease.* ***Tools:*** *Two tools were used in this study; Structured Interview Sheet, Mini Nutritional Assessment short-form.* ***Results:*** *There is a statistically significant difference P<0.001 in the nutritional status at post 1 and post 2 after program implementation. About 41.6% of the studied elderly were obese before the program while this percentage decreased to 31.6% post 2 after program implementation. The percentage of the studied elderly who have a normal body weight increased from 18.3% to 36.6% after the program.* ***Conclusion:*** a statistically significant difference P<0.001 in the nutritional status which mean improvement in the nutritional status at post 1 and post 2 after program implementation. *The dietary intervention program decreased the risk of chronic renal disease and improved nutritional status.* ***Recommendation:*** *Provide continuous support and follow-up for elderly chronic kidney disease patients post-education programs to monitor their progress and adherence to dietary recommendations.*

Key words: *Chronic Kidney Diseases, Education Program, Geriatric patients, Nutritional Status.*

I: Introduction

The term "ageing" describes a complex process of social, psychological, and physical change. Over time, some aspects of ageing increase in size while others decrease. The elderly population refers to a group of individuals 60 years of age or older. The elderly people are growingly increasing in the world **(Ahmadi et al., 2019).** The percentage of Egyptians who are "defined as 60 years of age and more" is predicted to rise from 6.8% in 2022 to 17.9% in 2052. By then, about 20 million Egyptians will fall into the senior category, corresponding to the (**Central Agency for Public Mobilization Statistics, 2023).**

Chronic kidney disease (CKD) is a worldwide public health concern that is distinguished by elevated rates of morbidity and mortality. Its incidence and prevalence are continuously increasing, making it a serious health problem. Addressing CKD and its associated risks is crucial for improving public health outcomes worldwide **(Cacciapuoti et al., 2024).** Chronic renal disease, a condition that is becoming more and more common, is characterized by a gradual and irreversible loss of kidney function. It affects between 10% to 15% of elderly persons globally **(Evans et al., 2020).** It is estimated that around 600 million individuals worldwide are affected by CKD, with its prevalence particularly increasing among elderly **(Francis et al., 2024).** Reflecting the global trend, Egypt has seen a 36% increase in the burden of CKD, ranking it as the fifth leading cause of death from 2009 to 2019 **(The Center for Economic and Social Rights, 2021).**

Malnutrition, chronic inflammation, protein-energy wasting, and metabolic and nutritional abnormalities are all associated with CKD and aging. These illnesses are important comorbidities that raise the likelihood of multimorbidity, disability, and death by predicting poor clinical outcomes. **(Wong et al., 2021).** In both CKD patients and healthy individuals, there is a strong connection between nutrition and physical activity. Specifically, inadequate nutrient intake can impair physical performance, leading to a sedentary lifestyle. As a result, CKD patients' quality of life and chances for rehabilitation are hampered by the loss of muscle mass and strength. **(Battaglia et al., 2024).** Proper nutrition is crucial in maintaining overall health and preventing the onset of chronic diseases among elderly **(Cristina & Lucia, 2021).**

The main defense against progressive wasting appears to be having a previous nutritional care plan. Protein-energy wasting may be lessened, and the course of chronic renal disease may be slowed

with dietary supplements that include enough protein and energy. While there is ongoing discussion over nutritional treatment for progressive renal failure, prior research has shown that it can help manage uremia, electrolyte and acid-base imbalances, water and salt retention, and mineral and bone abnormalities. **(Kim & Jung, 2020).**

In individuals with non-dialysis chronic kidney disease, dietary changes might assist reduce waste product buildup, alleviate uremic symptoms, and perhaps postpone the need for maintenance dialysis. Therefore, at every stage of CKD, dietary treatment should be prioritized. Nurses who provide care for patients with chronic kidney disease (CKD) need to understand their nutritional and dietary requirements. To guarantee motivation and adherence to the recommended diet, it is essential to provide nutritional assistance and patient education. (**Den Hamer-Jordaan et al., 2024).** Thus, the aim of the study is to evaluate effect of nutrition education program on nutritional status of geriatric patients with chronic kidney diseases.

Aim of the study was to:

Evaluate the effect of nutrition education program on nutritional status of geriatric patients with chronic kidney diseases.

Research hypothesis:

- Nutritional status of geriatric patients with chronic kidney disease may be improved after implementation of nutritional education program.

II. Method

Study Design

A quasi-experimental research design (pre & post) was used in this study.

Setting

This study was carried out at outpatient nephrology clinic at New Mansoura General Hospital, in Mansoura city affiliated to the Ministry of Health. Their ages ranged from 18 years old and above. Most of patients were above 50 years old.

Subjects

The study subjects were selected using the purposive sampling technique which included 60 elderly patients diagnosed with CKD from the above-mentioned setting who fulfilled the following:

- **Inclusion criteria:**

- 60 years of age or older.
- Able to communicate.
- Accepting to participate in the study**.**
- Elderly adhering to another therapeutic dietary regimen as chronic cardiac, kidney, and hepatic diseases were excluded.

Sample size calculation:
The following method was used to calculate the sample size based on data from the literature (Magalhães et al., 2018), taking into account a significance level of 5% and a research power of 80%: "(Zα/2 + Zβ)2 × {2(SD)2}" = "n"(average variation between the two groups)The standard deviation is represented by SD, the power by Zβ, which is 0.84 for 80%, and the significance threshold by Zα/2, which is 1.96 for 5%. [(1.96 + 0.84)2 × {2(9.61)2}]/ (4.9)2=60.3 is the result. The sample size, based on this formula, was sixty.

Tools of data collection
The data for this study was gathered using two instruments:

Tool I: Structured Interview Sheet: this tool was developed by a researcher based on relevant literature **(Woitok, et al., 2021: Pawlaczyk, et al., 2022).** It included four parts: -

Part I: Demographic characteristics of the elderly patients such as age, sex, place of residence, marital status, level of education, occupation before retirement, and monthly income.

Part II: Daily dietary habits (whether adequate or not according to the Egyptian food guide pyramid). Grains should be taken as the most. Eat more fruit and vegetables. Have a moderate amount of meat, fish, egg, milk and their alternatives. Decrease fat/ oil, salt and sugar and amount of liquids daily.

Part III: Risk behaviors in the lifestyle such as smoking and caffeine consumption.

Part IV: Health profile of elderly patients, it included: medications & nutrient supplements used previous hospitalization, surgery conduction and family history and laboratory investigations for electrolyte balance (sodium, potassium, chloride).

Tool II: Mini Nutritional Assessment short-form (MNA): this tool was developed by **Vellas et al., (2006)** for the elderly and translated into Arabic by **Ibrahim (2013)**; it has been designed and validated to achieve a single, rapid assessment of nutritional status in elderly patients in many settings as outpatient clinics, hospitals, and nursing homes. It consists of 6 questions. The total score was 14 points which are categorized into three levels; normal nutritional status (12 to 14 points), at risk of malnutrition (8 to 11 points), and malnourished (Less than 7 points) **(Vellas et al., 2006).** The Arabic version of this tool was used in the present study. The Mini Nutritional Assessment had good internal consistency ($\alpha = 0.80$). According to **Oumer et al., (2022),** a complete MNA has a sensitivity and specificity of 97.3%and 72.2%, respectively.

Data collection process:

I: Preparation phase:

A- Obtaining the necessary approvals:

- The Mansoura University nursing faculty formally authorized the research and the interviewing of the elderly patients in the chosen hospital.
- The Mansoura University Faculty of Nursing's Research Ethics Committee (REC) gave its approval.
- The director of New Mansoura General Hospital provided an official letter of clearance once the study's goal and data collecting timetable were explained.

B- Study tools:

- The researcher created Tool I (Structured Interview Sheet) to gather clinical and demographic information on the elderly after examining relevant literature.
- In this study, the Arabic version of Tool II (Mini Nutritional Assessment short-form, or MNA) was utilized.
- Assessment of the study subjects started by introducing the researcher herself to the older adults and giving them a brief idea about the aim of the study. Tool I (Structured interview schedule) was used to collect baseline data. A pre-intervention test by using Tool II (Mini Nutritional Assessment short form (MNA) was done to determine participants' nutritional status of life before the program.
- Study tools were tested for their content validity by a jury of five experts in related field of the study.

C- Pilot study:

- Ten percent of the participants (6) underwent it to make sure the study instruments were feasible, applicable, and clear. They were chosen from the research environment. The research subjects did not include the elderly patients who participated in the pilot trial.

D- Developing the proposed nursing nutritional education program:

- After analyzing the literature, the researcher created the suggested program in basic Arabic. It was enhanced with photographs and had information on a healthy, balanced diet and daily nutritional needs (Magalhães et al., 2018: Pereira et al., 2020: Martínez et al., 2022).

II: Implementation phases of the program:

1. The researcher reviewed the elderly's record with responsible physician to determine

eligible patients, the researcher used to meet the elderly patients in the waiting room.

2. The researcher started by salutes the patients, introducing herself to the elderly of the study sample, and explaining a brief idea about what she going to do.
3. The researcher interviewed each participant individually in the waiting room of the outpatient clinic from 9 am to 2 pm to collect the basic data using the study tools.
4. Over the course of three weeks, the researcher ran a program for small groups (three to five participants) that consisted of four sessions, each lasting 45 to 60 minutes and taking place twice a week. The topics covered in the sessions included:
    - The 1st session participants were given an explanation of the learning objectives and the topic of instruction. They also received permission to participate. The elderly patients with chronic kidney diseases were assessed using tools I, tool II, tool III (the mini nutritional assessment).
    - The 2 nd session included simple and clear knowledge about the kidney and the chronic kidney diseases as follows (functions of kidney, age related changes of kidney, definition of CK disease, causes, signs and symptoms, stages, complications and management).
    - The 3 rd session covered the nutritional guidelines for senior CKD patients, which included foods to avoid and diuretics, as well as the normal range and suggested daily requirements of phosphorus, sodium, protein, and fluid intake.
    - The 4 th session started with revision about previous sessions and examples of foods to eat, foods to avoid, and special meals for elderly persons with chronic kidney diseases were provided.
5. Data collection covered six months, from October, 2022 to April, 2023. Based on the schedule of outpatient nephrology clinic, the researcher visited the clinics 3 days per week.

III: Evaluation phase:

- ❖ The elderly patients were evaluated 3 times by using Tool II (The World Health Organization Quality of Life Questionnaire) at the end of the program by comparing the study variables before the program (pre), one months after the end of the program (post 1) and after three months (post 2) from initiation of the program.

Ethical considerations of the study:

An informed written consent was obtained from study subjects after explaining the study purpose. The privacy of the study subjects and confidentiality of the collected data were obtained. The study subjects were informed that their participation in the study is voluntary and that they can withdraw at any time after explanation the potential benefits and risks as well as study aims.

Statistical analysis

The statistical package for the social sciences (SPSS) version 21 was used to score, analyze, and tabulate the data. Frequencies and percentages were used to display the qualitative data. When comparing column proportions, the Chi-Square test and the Bonferroni technique were used to modify p-values. Quantitative data were tested for normality using the Shapiro-Wilk and Kolmogorov-Smirnov tests; if $p > 0.050$, the data was deemed normally distributed. It was represented as mean ± standard deviation (SD) if it was regularly distributed, or as median and interquartile range (IQR) if it wasn't. P-value < 0.05 was regarded as a significant threshold, and p-value ≤ 0.001 as a very significant level.

III. Results:

Table 1 displays the demographic data of the studied participants. The mean age of the elderly patients was 73.30 ±7.06. Elders aged 60 to less than 70 years constituted 40%, and who are more than 70 years were 60%. Males of the studied sample constituted 53.3% compared to 46.7% were females. More than half of the subjects 51.7% were widowed. In relation to the level of education, more than one third of the study subjects 36.7% achieved secondary education, 31.7% were illiterate, and 28.3% were primary educated. Also, 75% of them reside in rural areas.

As regards the elder's occupation before retirement; employees constituted 50% of the studied sample; 43.3% were housewives; and 6.7% were without work. About 58.3% of the subjects had enough income. Half of them had their income from pensions, and 35% had their income from sons help. About 76.7% of the studied elderly patients were living with family, and only 23.3% were living alone.

Table 2 shows that 25% of the elderly were hospitalized during the last year, while only 13.3% of them had operations. Regarding regular checkups, 66.7% of elderly persons have regular checkups,

60% of them every month, and only 22.5% of them go through checkups every two months. While 33.3 of elderly persons don't check-up regularly, the majority of them (95.5%) does not checkup regularly as they are tired, and only 4.5% due to financial problems.

In relation to risk behaviors, most of the studied sample (58.3%) is non-smokers, while 20% of them are smokers, and rest of the sample were previous smokers (11.7%). About 26.6% of the smokers' smoke cigarettes and only 5% smoke shisha. Most of the studied sample consumes a significant amount of caffeine, with 71.4% of them drinking more than three cups/day.

Figure 1 illustrates the distribution of the elderly patients with CKD according to their medical history. Only 0.5% of the studied elderly patients were free from any disease other than CKD. The commonest diseases reported are hypertension (78.3%), diabetes mellitus (65%), cardiac disease (48.3%), and respiratory disease (25%), Orthopedic disease (21.7%), GIT disease (13.3%).

Table 3 shows that most of the elderly persons (88.3%) use renal medication, while more than one third (65%) receive diabetic medication. Less than half of them (45%) received cardiac medications and only 40% used anticoagulants, while about (35%) received more than one medication.

Table 4 shows that a considerable number (63.3%) of the studied elderly patients follow a specific diet. More than half of the studied elderly patients (51.7%) follows a renal diet, and 40% of them follow a diabetic diet. About 40% of the elderly patients were forbidden from some kinds of food, while only 15% has a food allergy. Regarding meal intake during the day, 65% of the studied elderly patients takes three meals per day, while 23.3% of them take only two meals per day. About 61.7% of the studied elderly patients receives milk products; 75% of them eat around a cup of legumes per day; 36.3% of them eat animal protein per day; and 48.3% eat fruits and vegetables regularly. Most of the elderly 71.7% take around 1000 to 2000 cc of liquids per day.

Table 5 compares the effect nutrition education program on nutritional history at different time points of evaluation. There is a statistically significant difference (P1= 0.04*) in weight loss more than 3 kg between pre and post 1 after the program. While the physical mobility showed a statistically significant difference (P1 = 0.024*) between pre and post1 and (P2 = 0.004*) between pre and post2 after the program, respectively. Regarding stress during the last three months, there was a highly statistically significant difference (P1<0.001*) between pre and post 1 and also between post 1 and post 2 after the program. The result of the body mass index showed that there was a statistically significant difference between pre and post1 & post 2 after the program (P1=0.02*, P2=0.001*). While, no significant difference when evaluating post1 & post 2 at different time points of evaluation (P > 0.05).

Figure 2 shows that 41.6% of the studied elderly were obese before the program while this percentage decreased to 31.6% post 2 at 3 months after program implementation. The percentage of the studied elderly who have a normal body weight increased from 18.3% to 36.6% after the program.

Table 6 shows that a statistically significant difference found (P<0.001*) in the nutritional status which mean improvement in the nutritional status at post 1 and post 2 after program implementation.

Table 1: Distribution of the elderly patients with chronic kidney disease according to demographic characteristics

	N=60	%
Age		
60-70	24	40.0
>70	36	60.0
Mean ±SD	**73.30±7.06**	
Sex		
Male	32	53.3
Female	28	46.7
Marital status		
Single	3	5.0
Married	23	38.3
Widow	31	51.7
Divorced	3	5.0
level of Education		
Illiterate	19	31.7
Basic education	17	28.3

Secondary education	22	36.7
University	2	3.3
Residence		
Rural	45	75.0
Urban	15	25.0
Occupation before retirement		
Yes	30	50.0
No	4	6.7
Housewife	26	43.3
Monthly Income		
Enough	35	58.3
Not enough	25	41.7
Source of Income		
Pension	30	50.0
Sons help	21	35.0
Social affairs	9	15.0
Housing condition		
Alone	14	23.3
With family	46	76.7

Table 2: Distribution of elderly patients with CKD according to their past history

Items	**N=60**	**%**
Hospitalization last year	15	25.0
Operation during last year	8	13.3
Regular checkup	40	66.7
Frequency of regular checkup	**N=40**	
Two weeks	1	2.5
One month	24	60.0
Two months	9	22.5
Six months	4	10.0
One year	2	5.0
No regular checkup causes	N=20	
When tired	19	95.5
Financial problems	1	4.5
Smoking		
Yes	12	20.0
No	41	58.3
Previous smoker	7	11.7
Kind of smoking		
Cigarette smoking	16	26.6
Shisha	3	5.0
Caffeine intake	42	70.0
≥3 cups	30	71.4
<3 cups	12	28.6

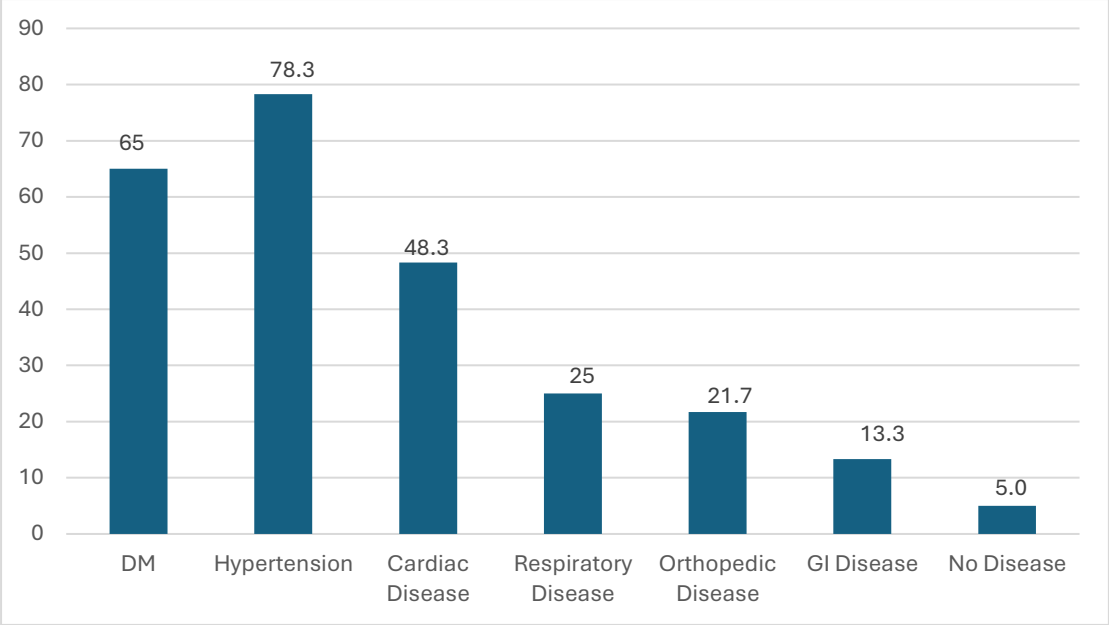

Figure (1): Distribution of the elderly patients with CKD according to their medical history.

Table (3): Distribution of elderly patients with CKD according to used medications.

Medications	N=60	%
Renal medication	53	88.3
DM medication	39	65.0
Cardiac medication	27	45.0
Anticoagulants	24	40.0
Diuretics	7	11.7
Antacids	5	8.3
Liver	5	8.3
Cortisone	4	6.7
Analgesic	3	5.0
More than one medication	21	35

Table (4): Distribution of elderly patients with CKD according to their nutritional behavior.

Items	N=60	%
Specific diet	38	63.3
Renal diet	31	51.7
DM diet	24	40.0
Cardiac diet	6	10.0
Decrease special food	24	40.0
Food allergy	9	15.0
Meals / day		
On meal	1	1.7

Two meals	14	23.3
Three meals	39	65.0
> three meals	6	10.0
Milk products	37	61.7
Cup legumes	45	75.0
Meat / chicken / fish	22	36.7
Fruits / vegetables	29	48.3
Serving of vegetables & fruits per day	**N=29**	
One	17	58.6
Two	10	34.5
Three	1	3.4
≥four	1	3.4
Amount of liquids		
<1000	12	20.0
1000-2000	43	71.7
>2000	5	8.3

Table 5: Comparison between nutritional history at different time points of evaluation

Items	Items categories	Pre	Post 1	Post 2	P value
Anorexia during the last three months	Severe loss Middle loss No loss	12(20.0) 17(28.3) 31(51.7)	10(16.7) 29(48.3) 21(35.0)	18(30.0) 12(20.0) 30(50.0)	P1=0.361 P2=0.322 P3=0.776
Weight loss during the last three months	Loss more than 3kg Don't know Loss from 1to3 kg No loss	8(13.3) 8(13.3) 10(16.7) 34(56.7)	15(25.0) 8(13.3) 18(30.0) 19(31.7)	17(28.3) 4(6.7) 11(18.30 28(46.7)	P1=0.04* P2=0.09 P3=0.371
Physical mobility	Bedridden Mobile and stay home Leave home	12(20.0) 28(46.7) 20(33.3)	9(15.0) 14(23.3) 37(61.7)	5(8.3) 20(33.3) 35(58.3)	P1=0.024* P2=0.004* P3=0.769
Stress during the last three months	No Yes	1(1.7) 59(98.3)	17(28.3) 43(71.7)	3(5.0) 57(95.0)	P1<0.001* P2=0.317 P3=0.001*
Neurological or psychological disorder	Sever senility Mild senility No psychiatric disorders	3(5.0) 20(33.3) 37(61.7)	7(11.7) 14(23.3) 39(65.0)	0 26(43.3) 34(56.7)	P1=0.724 P2=0.989 P3=0.702
BMI		**N=37**	**N=49**	**N=45**	
	Mass factor < 19 Mass factor 19 to 21 Mass factor 21 to 23 Mass factor ≥23	4(10.8) 5(13.5) 1(2.7) 27(73.0)	12(24.5) 9(18.4) 24(49.0) 4(8.2)	22(47.7) 1(2.3) 10(22.7) 12(27.3)	P1=0.02* P2=0.001* P3=0.753
leg block or muscle strain		**N=23**	**N=11**	**N=15**	
	< 31 cm ≥31 cm	11(45.8) 12(54.2)	10(91.7) 1(8.3)	9(60.0) 6(40.0)	P1=0.125 P2=0.125 P3=1.0

P value based on Chi squared test, *Statistically significant.
p1: difference between pre and post 1.
p2: difference between pre and post2.
p3: difference between post 1&2.

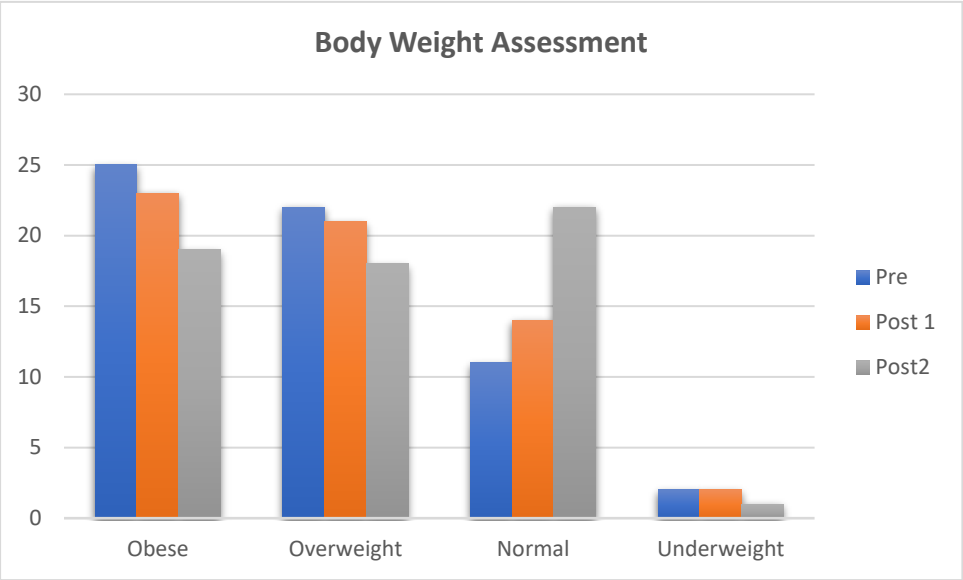

Figure (2): Distribution of body weight assessment among the studied elderly, pre, post and after the program implementation.

Table 6: Comparison between the studied samples of elderly according to their nutritional status at different time points of evaluation

MNA Level	Pre		Post 1		Post2		P value
	N	%	N	%	N	%	
Mal	42	70.0	8	13.3	1	1.7	P<0.001*
At risk	15	25.0	49	81.7	29	48.3	
Well	3	5.0	3	5.0	30	50.0	
Mean±SD	7.48±2.61		9.78±2.91		8.34±1.79		

P value based on Chi squared test, * Significant at P≤ 0.05

IV. Discussion

A patient's nutritional health can be significantly impacted by chronic renal disease, frequently leading to malnutrition. Reduced functional ability and increased rates of sickness and hospitalization are associated with this deficiency. A reduced quality of life is the result of these elements' detrimental effects on mental, physical, and emotional health **(Pawlaczyk et al., 2022).**

Patients with chronic kidney disease also need to follow a certain, nutritious diet. This guarantees that they receive the right quantities of calories, protein, water, vitamins, and minerals each day. Slowing the course of chronic renal failure and avoiding metabolic consequences including hypophosphatemia and hyperkalemia are the main objectives of nutritional therapy in chronic kidney disease (CKD). The three primary components of dietary limitations are salt, phosphorus, and potassium. **Choi and Park (2023).**

Chronic kidney disease (CKD), especially end-stage CKD, is more common as people age and frequently coexists with other chronic illnesses. Consequently, an increasing number of older adults are managing CKD along with other health issues and the typical challenges associated with aging. Therefore, improving quality of life should be a primary goal when developing management strategies and interventions for these patients **(Hammad, 2022)**. Thus, the goal of the current study was to assess how a nutrition education program affected the nutritional status and overall well-being of senior citizens with chronic renal illnesses.

Regarding, Scio demographic characteristic, the current study showed that the mean age of the elderly was 73.30 ±7.06 as a bout two thirds of elders were aged more than 70 years and more than half of them were male. This may be due to men may be at a higher risk of experiencing kidney failure earlier than women due to hormonal differences. Elevated testosterone levels in men can lead to a decline in kidney function, whereas women's kidneys benefit from the protective effects of estrogen, which remains higher until menopause **(Lima-Posada, & Bobadilla, 2021)**. Also, men tend to have unhealthier lifestyles, which increases their risk of kidney failure. Additionally, the demographic shift from high birth rates and high mortality rates to low birth rates and delayed mortality has led to an increase in the elderly population. This change further emphasizes the need to address the health challenges associated with aging, including the rising prevalence of CKD **(Cohen, et al., 2016).**

In the same line with these results, **Park, & Choi, (2023)** in Gyeonggi-do, Korea illustrated that more than half of patient were aged more than 70 years and more than half of them were male. Also, **Lee & Oh, (2020)** in Korea noted that the mean age of the participants was seventy-six years slandered deviation ranging from sixty-five to ninety-five years and more than half of the participants were male.

This finding was in contrast with **Moly, (2022)** in India who depicted that more than half of elderly were between sixty to less than seventy and more than half of the participants were female. Also, on the other hand, **Aboserea et al., (2019)** on El-keman Village Luxor Governorate, found that more than half of participant was less than seventy years old.

According to the current survey, the majority of senior citizens live with relatives. Based on the perspective of the researcher this is due to the strong relationship between Egyptian families, where most of the elderly live with their sons and daughters or as extended families, and to their religious belief, which prompts them to care for their elderly people. This study is in agreement with **Moly, (2022)** who found that most of the subjects were living with family members.

Regarding past history of the studied elderly, our findings report that about one quarter of the elderly patients remained institutionalized during the last year. This may be due to their medical history as most of them had hypertension which complicated their condition. This result is agreement with **Melo-Silva et al., (2018)** who studied the hospitalizations among older adults in Brazil and reported that more than ten percent of had been hospitalized in the previous twelve months. Additionally, this was in line with **Carvalho et al., (2018)** in Brazile and noted that the majority participant was hospitalized during the last year. Similarly, this study is in agreement with **Bordin et al. (2018)** who investigated the variables linked to elderly hospitalization in Brazile and reported that most of patients were hospitalized during the last year.

Our finding reported that most of the elderly patients were non-smokers. This result can be explained by the lack of financial ability to smoke and given their medical conditions, which forced many of them to give up smoking. This result is nearly in line with **Busa et al., (2022)** in United Kingdom who noted that more than half of elderly patient were non-smoking. In addition, **Abdelwahed et al., (2018)** found that most of elderly patient were non-smoking.

Malnutrition is a serious comorbid illness that affects about forty to fifty percent of those suffering with chronic renal disease. For hemodialysis patients on maintenance, nutritional status is an important predictor of outcome since malnourished patients with chronic kidney disease (CKD) have a poorer prognosis.The assessment of nutritional status necessitates a comprehensive nutritional examination based on anthropometric, laboratory, and clinical characteristics. Both the incidence and prevalence of chronic kidney disease (CKD) are on the rise worldwide. Studies assessing QOL of dialysis patients indicate that their QOL is often poorer than that of the general population **(Speyer et al., 2024).**

The nutritional educational sessions had significant positive effect on elderly patients' QOL, nutritional, and functional status, as specialized healthy eating program is one of the responsibilities of a gerontological nurse. When it comes to patient care, diet is crucial. Consuming the recommended daily intake of protein, calories, liquids, vitamins, and minerals is crucial. The primary goals of food prescription in chronic kidney disease (CKD) are to prevent metabolic problems including

hypophosphatemia and hyperkalemia and to reduce the course of chronic renal failure. The three primary components of dietary limitation are phosphorus, potassium, and sodium **(Mourão et al., 2022)**. **Vellas et al. (2006)** created the Mini Nutritional Assessment short form (MNA) for the elderly, and Ibrahim (2013) translated it into Arabic.

Regarding the dietary habits of the patients under investigation, the current study found that just 15% of the elderly patients under study had a food allergy, but around two thirds of them adhere to a particular diet and over half follow a renal diet. However**, Pérez-Torres et al. (2017)** found that decreased dietary energy consumption improved nutritional status in individuals with chronic kidney disease through a nutrition education program that had no effect on renal function.

Regarding meal intake during the day, the current study noted that about two thirds of the studied sample take three meals per day. This is due to Egyptian's dietary habits, such as eating three meals a day. This is in the same line with, **Aboserea et al., (2019)** who perceived that the majority of patients taken three meals per day. This was in contradiction with, **Moly, (2022)** who found that most of the subjects were eating only two meals a day.

After the training, there was a statistically significant difference in physical mobility between pre and post1 and post2. In a similar vein, **Kadhim et al. (2016)** reported that over half of participants had poor physical quality of life before a health education program, compared to almost two thirds of participants after one. In contrast, **Aboserea et al. (2019)** found no statistically significant differences between the participants in the study in certain areas, like mobility during the previous three months, with respect to the MNA (Mini Nutritional Assessment) screening conducted prior to and following the intervention.

Following the program, there was a highly statistically significant change in stress levels throughout the previous three months between pre and post 1 as well as between post 1 and post 2. In contrast, **Aboserea et al. (2019)** demonstrated that regarding MNA screening before and after intervention in specific categories, such as psychological stress during the previous three months, there were no statistically significant changes between the participants in the study. Additionally, this study contradicts **Moly's (2022)** findings, which showed that almost two-thirds of individuals had not experienced psychological stress in the previous three months.

Following the program, there was a statistically significant change between pre and post 1 and post 2, according to the body mass index results. This might be as a result of the dietary program's success in helping older patients consume less liquids. This is consistent with the findings of **Hammad (2022),** who found that the implementation of the nutritional education program resulted in a notable reduction in BMI.

Furthermore, this aligned with the outcomes of **Limwannata et al. (2021),** which demonstrated a correlation between BMI and body weight. This was also in line with the results of Magalhães et al. (2018), who discovered that both boys and females' BMI decreased statistically significantly as a result of the dietary intervention. In opposition to the study, **Cho and Kang's (2021**) results showed that BMI stayed rather constant.

According to the current study's findings, around half of the older participants were obese prior to the program, but two months following the program, this number dropped to roughly one-third. This could be the direct result of educational programs that encourage older patients to eat small, frequent meals throughout the day, drink more water, eat more potassium-rich fruits and vegetables, and consume reasonable amounts of fat, protein, and salt.

This is consistent with **Hammad's (2022)** findings that most research participants had a decrease in weight following the adoption of a nutritional education program. Additionally, this supported the findings of **Messenger et al. (2020),** who demonstrated a decrease in weight following the introduction of the nutritional education program.

Furthermore, Chanwikrai and Wungrath (2018) examined how a nutrition education program

affected the nutritional status and food consumption of patients with end-stage renal illness and found that participants' body weight decreased during the course of the trial. This was also consistent with the findings of **Magalhães et al. (2018),** who investigated the effects of a nutrition intervention program for older adults with chronic renal disease and found that both sexes saw a statistically significant decrease in body weight following the nutrition intervention.

Contrary to our findings, **De Abreu et al. (2020**) demonstrated unequivocally that following nutritional education, weight and BMI increased marginally but did not alter significantly. Additionally, in contrast to prior research by **Negm et al. (2016**), weight and BMI were marginally higher than before the nutrition education program was implemented, but they did not exhibit any discernible improvements.

According to the current study's findings, the overall nutritional status (MNA) varies statistically significantly depending on the time of examination. According to the researcher, this notable difference highlights the value of an educational program that addressed important nutrition-related subjects, such as the significance of eating small meals throughout the day, the need for adequate hydration, knowledge of the potassium content of different fruits and vegetables and educating patients on how to consume moderate amounts of fat, sodium, and protein.

This is consistent with research by **Pawlaczyk et al. (2022**), which showed that groups' MNA and overall assessment scores differed statistically significantly. This is also consistent with research conducted in Qena City, Egypt by **Abdelnasser et al. (2020**), which found a significant difference in the nutritional status assessment (MNA) before and after the implementation of the educational program. Additionally, this study supports the findings of **Chanwikrai and Wungrath (2018),** who suggested that the nutrition education program improved participants' nutritional status as seen by a substantial drop in mean body weight. Additionally, **Kim et al. (2012**) observed that the nutritional status before and after the intervention differed statistically significantly.

V. Conclusion

The study's primary finding was that there was a statistically significant change ($P<0.001$) in nutritional status between post-1 and post-2 following program implementation, indicating improvement in nutritional status.

VI. Recommendations

The following suggestions are made in light of the study's results and conclusions:

1. It is essential to establish public policies that promote food & nutrition education in primary health care through cost-effective actions that focus on CKD prevention among high-risk groups
2. Provide continuous support and follow-up for elderly CKD patients post-education programs to monitor their progress and adherence to dietary recommendations.

References:

Abdelnasser, N., Ibrahim, H. D. F., Chih, H., Hassan, A. K., & Youssef, M. K. A. (2020). Impact of Educational Program About Nutrition That Enhances the Immunity Among Older Adults At Qena City, Egypt. *NILES journal for Geriatric and Gerontology*, *3*(Geriatric nursing), 29-41.

Abdelwahed, A. Y., Algameel, M. M. M., & Tayel, D. I. (2018). Effect of a nutritional education program on nutritional status of elderly in rural areas of Damanhur city, Egypt. *International Journal of Nursing Science*, 8(5), 83-92.

Aboserea, M. M., El-Maghawry, H. A., & Mohamed, M. S. A. (2019). Effect of specific nutritional program on patients with chronic renal failure on hemodialysis on El-keman Village Luxor Governorate. *The Egyptian Journal of Hospital Medicine*, *77*(2), 5060-5067.

Ahmadi, S., Hannani, S., &Sadati, L. (2019). Evaluate the level of observing the pre-operative standard care principles in the elderly people admitted to the surgical rooms in educational hospitals of Iran University of Medical Sciences in 2017-2018. *Journal of Advanced Pharmacy Education & Research| Apr-Jun, 9(S2), 175.*

Battaglia, Y., Baciga, F., Bulighin, F., Amicone, M., Mosconi, G., Storari, A., ... et al. (2024). Physical activity and exercise in chronic kidney disease: consensus statements from the Physical Exercise Working Group of the Italian Society of Nephrology. *Journal of Nephrology*, 1-31.

Bordin, D., Cabral, L. P. A., Fadel, C. B., Santos, C. B. D., & Grden, C. R. B. (2018). Factors associated with the hospitalization of the elderly: a national study. *Revista Brasileira de Geriatria e Gerontologia*, *21*, 439-446.

Busa, I., Ordóñez-Mena, J. M., Yang, Y., Wolstenholme, J., Petrou, S., Taylor, C. J., ... & Hobbs, F. R. (2022). Quality of life in older adults with chronic kidney disease and transient changes in renal function: Findings from the Oxford Renal cohort. *Plos one*, *17*(10), e0275572.

Cacciapuoti, N., Lonardo, M. S., Di Lauro, M., Di Lorenzo, M., Aurino, L., Pacella, D., & Guida, B. (2024). Effects of Dietary Intervention on Nutritional Status in Elderly Individuals with Chronic Kidney Disease. *Nutrients*, *16*(5), 632.

Carvalho, T. C., Valle, A. P. D., Jacinto, A. F., Mayoral, V. F. D. S., & Boas, P. J. F. V. (2018). Impact of hospitalization on the functional capacity of the elderly: a cohort study. *Revista Brasileira de Geriatria e Gerontologia*, *21*, 134-142.

Central Agency For Public Mobilization & Statistics, (2023). https://www.masrawy.com/news/news_economy/details/2021/9/30/2098142/%D8%A7%D9%84% D8%A5%D8%AD%D8%.

Chanwikrai, Y., & Wungrath, J. (2018). The effect of a nutrition education program on nutritional status and dietary intake among the end-stage renal disease patients on hemodialysis at Phayao Hospital, Thailand. *Journal of Public Health and Development*, *16*(3), 29-40.

Cho, M. K., & Kang, Y. (2021). Effect of self-care intervention for controlling interdialytic weight gain among patients on haemodialysis: A systematic review and meta-analysis. *Journal of clinical nursing*, *30*(15-16), 2348-2365.

Cohen, E., Kramer, M., Shochat, T., Goldberg, E., Garty, M., & Krause, I. (2016). Relationship between body mass index and intraocular pressure in men and women: a population-based study. *Journal of glaucoma*, *25*(5), e509-e513.

Cristina, N. M., & Lucia, D. A. (2021). Nutrition and healthy aging: Prevention and treatment of gastrointestinal diseases. *Nutrients*, *13*(12), 4337.

De Abreu, A. M., Wilvert, L. C., & Wazlawik, E. (2020). Comparison of Body Mass Index, Skinfold Thickness, and Bioelectrical Impedance Analysis With Dual-Energy X-Ray Absorptiometry in Hemodialysis Patients. Nutrition in clinical practice 35(6), 1021-1028. https://doi.org/10.1002/ncp.10481.

Den Hamer-Jordaan, G., Groenendijk-Van Woudenbergh, G. J., Haveman-Nies, A., van Hell-Cromwijk, M. C., Van Der Veen, Y. J., Algra, H. F., & Kroeze, W. (2024). Factors associated with dietary behaviour change support in patients: A qualitative study among community nurses. *Journal of advanced nursing*, *80*(2), 500-509.

Evans M., Bower H., Cockburn E., Jacobson S.H., Barany P., and Carrero J.J., (2020): Contemporary management of anaemia, erythropoietin resistance and cardiovascular risk in patients with advanced chronic kidney disease: A nationwide analysis. Clin. Kidney, J. 2020;13:821–827. doi: 10.1093/ckj/sfaa054.

Francis, A., Harhay, M. N., Ong, A., Tummalapalli, S. L., Ortiz, A., Fogo, A. B., ... & Jha, V. (2024). Chronic kidney disease and the global public health agenda: an international consensus. *Nature Reviews Nephrology*, 1-13.

Hammad, B. A. (2022). Effect of the implementation of nutritional educational module on biochemical and physiological parameters for patients on maintenance hemodialysis. *Helwan International Journal for Nursing Research and Practice*, *1*(2), 44-59.

Ibrahim, N. K. (2013). Translation and validation of the Arabic version of the Mini Nutritional Assessment (MNA) tool in elderly individuals. *Journal Of Nutrition And Health*, 1(2), 100-105.

Kadhim, M. H., Sarkees, A. N., & Georgies, K. E. (2016). Effect of Nutritional Health Program in

Improving the Quality of Life-of Patients with Chronic Renal Failure in Hemodialysis Center of Duhok City. *Mosul Journal of Nursing*, *4*(1), 35-40.

Kim, B. H., Kim, M. J., & Lee, Y. (2012). The effect of a nutritional education program on the nutritional status of elderly patients in a long-term care hospital in Jeollanamdo province: health behavior, dietary behavior, nutrition risk level and nutrient intake. *Nutrition research and practice*, *6*(1), 35-44.

Kim, S. M., & Jung, J. Y. (2020). Nutritional management in patients with chronic kidney disease. *The Korean journal of internal medicine*, *35*(6), 1279–1290. https://doi.org/10.3904/kjim.2020.408.

Lee, M. K., & Oh, J. (2020). Health-related quality of life in older adults: Its association with health literacy, self-efficacy, social support, and health-promoting behavior. In *Healthcare* (Vol. 8, No. 4, p. 407). MDPI.

Limwannata, P., Satirapoj, B., Chotsriluecha, S., Thimachai, P., & Supasyndh, O. (2021). Effectiveness of renal-specific oral nutritional supplements compared with diet counseling in malnourished hemodialysis patients. *International Urology and Nephrology*, *53*, 1675-1687.

Magalhães, F. G., Goulart, R. M. M., & Prearo, L. C. (2018). The impact of a nutrition intervention program targeting elderly people with chronic kidney disease. *Ciencia & saude coletiva*, *23*, 2555-2564.

Martínez-Villaescusa, M., Aguado-García, Á., López-Montes, A., Martínez-Díaz, M., Gonzalvo-Díaz, C., Pérez-Rodriguez, A., ... & León-Sanz, M. (2022). New approaches in the nutritional treatment of advanced chronic kidney disease. *Nefrología (English Edition)*, *42*(4), 448-459.

Melo-Silva, A. M. D., Mambrini, J. V. D. M., Souza Junior, P. R. B. D., Andrade, F. B. D., & Lima-Costa, M. F. (2018). Hospitalizations among older adults: results from ELSI-Brazil. *Revista de Saúde Pública*, *52*, 3s.

Messenger, S., Bainbridge, L., & DaSilva, L. (2020). Renal Dietitians' Perceptions of the Value of Subjective Global Assessment: A Mixed Methods Study. Journal of renal nutrition, 30(2), e5-e13. https://doi.org/ 10.1053/j.jrn.2019.04.004.

Moly, K. T. (2022). Prevalence Of Malnutrition And Its Contributing Factors Among Geriatric Patients. *Journal of Positive School Psychology*, *6*(9), 4529-4536.

Mourão NJ, et al., (2022); Intradialytic parenteral nutrition does not improve survival in malnourished hemodialysis patients: a 2-year multicenter, prospective, randomized study. J Am Soc Nephrol.;18:2583–91.

Negm, D., Al-Qurashi, E. A., Alghamdi, M. A., & Alhelaly, S. (2016). Effect of nutrition education program on health status of hemodialysis patients in Makkah area. In *International Conference held at Philadelphia*.

Oumer A., Abebe T., HassanK., and HamzaA., (2022). Validity and Predictive Performance of Mini Nutritional Assessment Tool for Institutionalized Elders in Ethiopia, Hindawi BioMed Research International Volume2022, Article ID 6764657, 8pageshttps://doi.org/10.1155/2022/6764657.

Park, G., & Choi, S. (2023). The Effects of a Tailored Dietary Education Program for Older Adult Patients on Hemodialysis: A Preliminary Study. In *Healthcare*, 11(17), 2371. MDPI.

Pawlaczyk, W., Rogowski, L., Kowalska, J., Stefańska, M., Gołębiowski, T., Mazanowska, O., & Dziubek, W. (2022). Assessment of the nutritional status and quality of life in chronic kidney disease and kidney transplant patients: a comparative analysis. *Nutrients*, *14*(22), 4814.

Pereira, R. A., Ramos, C. I., Teixeira, R. R., Muniz, G. A. S., Claudino, G., & Cuppari, L. (2020). Diet in Chronic Kidney Disease: an integrated approach to nutritional therapy. *Revista da Associação Médica Brasileira*, *66*, s59-s67.

Pérez-Torres, A., Garcia, E. G., Garcia-Llana, H., Del Peso, G., López-Sobaler, A. M., & Selgas, R. (2017). Improvement in nutritional status in patients with chronic kidney disease-4 by a nutrition education program with no impact on renal function and determined by male sex. *Journal of Renal Nutrition*, *27*(5), 303-310.

Speyer, E., Tu, C., Zee, J., Sesso, R., Lopes, A. A., Moutard, E., ... & Young, E. (2024). Symptom burden and its impact on quality of life in patients with moderate to severe CKD: The International Chronic Kidney Disease Outcomes and Practice Patterns Study (CKDopps). *American Journal of Kidney Diseases*, *84*(6), 696-707.

The Center for Economic and Social Rights: Egypt social progress indicators: Health. Available at: https://www.cesr.org/egypt-social-progress-indicators-health. Accessed November 11, 2021

Vellas, B., Villars, H., Abellan, G., Soto, M. E., Rolland, Y., Guigoz, Y., ... & Garry, P. (2006). Overview of the MNA®-Its history and challenges. *Journal of Nutrition Health and Aging*, *10*(6), 456.

Woitok, B. K., Ravioli, S., Funk, G. C., & Lindner, G. (2021). Characteristics of very elderly patients in the emergency department–a retrospective analysis. *The American Journal of Emergency Medicine*, *46*, 200-203.

Wong, L., Duque, G., & McMahon, L. P. (2021). Sarcopenia and frailty: challenges in mainstream nephrology practice. *Kidney International Reports*, *6*(10), 2554-2564.

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