

Nurses- Led Interventions: Effect of Alkaline-Based Diet on Blood Pressure, Lipid Profile and Weight among Patients with Hypertension

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Abstract

Nurses are qualified to provide effective nursing interventions in management of hypertensive patients and lower risk of cardiovascular disease; nurses-led interventions for hypertensive patients are measuring and monitoring blood pressure (BP); educate patients about importance of performing physical exercises, and select healthy diet as alkaline based diet. Eating more alkaline diet has many advantages as lowering blood pressure, lipid profile as cholesterol so improving cardiovascular health, moreover reducing body weight. **The aim of the study:** to examine the effect nurses- led interventions as intake alkaline-based diet on blood pressure, lipid profile and weight among patients with hypertension. **Design:** Quasi Experimental design. **Setting:** Medical outpatient clinic of Menoufia University Hospital, Egypt. **Subject:** Purposive samples of 100 hypertensive patients, they fulfill the inclusion criteria, 50 patients in each group (study and control). **Tools:** Three tools used to collect the current data; as follows: **The tool (I):** Interview questionnaire; **Tool (II):** Questionnaire for Alkaline – Based Diet. **Tool (III):** Physiological measurement. **Results:** the present results documented that; a highly significant difference was found between the two groups post intervention in relation to knowledge levels; blood pressure of the study group was lower than those of the control group after following the alkaline diet and water; also highly statistically significant differences were found between study and control groups at all measurements during post intervention in weight and all lipid profile variables except at the 3rd measurement. **Conclusion:** consumption of alkaline diet and water had a good effect in reducing arterial blood pressure, body weight and blood lipids. **Recommendation:** replicate the study on large sample and establishing periodical alkaline diet programs with planned meals for hypertension, overweight and high blood lipids patients with continuous follow up.

Keywords: Nursing Interventions, Alkaline Diet, Hypertension, Lipid profile, Weight.

Introduction

Nurses are essential participants of team-based hypertension management; nursing interventions in controlling hypertension has expanded over the years, completing and accompanying of the physician. Nurses are qualified to provide effective nursing interventions as non-pharmacological methods for management of all hypertensive patients beginning with measuring and monitoring blood pressure (BP); additionally patients' education regards importance of weight reduction, performing physical exercises, eating healthy diet as alkaline based diet; smoking stopping; restrict saturated fat and sodium in diet intake, to lower their risk of cardiovascular disease (Cheryl, et al 2016).

A healthy diet is useful for promoting health and preventing disease. Eating a diet that

is more acidic food is conducive to promote a disease state while eating a more alkaline diet promote the health, and more likely to prevent disease (Lynnette, et al., 2021& Jessie Suneetha, et al., 2019). Alkaline based diets characterized by a high percentage of water, rich of alkaline minerals as potassium, magnesium, low in all types of sugar and carbohydrates, as fruits, all vegetables especially green foods containing chlorophyll and phytochemicals are required for remaining well energetic (Jelang Jelku, et al., 2019).

Alkaline-based diet has many advantages as improving cardiovascular health, lowering blood pressure, body weight, blood lipid as cholesterol and protecting the body from diseases. Several studies documented within two weeks high blood pressure reduced by practice of Dietary Approaches to Stop Hypertension (DASH) by effect of limit

the intake of sodium (Gay, H.C.; et al., 2016 and Danika Krupp 2018).

Eating alkaline based diet focus on 80% alkaline foods and 1 sodium to 3 potassium ratio maintaining blood pressure within normal range. High blood pressure has many harmful effects on health and can cause a major stress on body by enhancing the releasing of more cortisol. Potassium plays an important role in releasing the tension from veins and arteries as a vasodilator for them. Also decreases load on cardiovascular system lead to improve the blood flow. Some of alkaline foods as watermelon, fruits and vegetables like corn, pumpkins, tomatoes and carrots have Carotenoids, which reduce the blood pressure by avoid hardening the walls of the arteries and veins (Feresin, R.G.; et al., 2017).

High intake of fruits and vegetables as plant source of alkaline food is better than high protein intake including phosphorus has a potential increasing renal acid load which induces elevation of blood pressure which increased by aging process. Additional the alkaline diet characterized with low dietary sodium intake as a risk factor for hypertension (Danika Krupp 2018).

High blood lipid include cholesterol may arise from ingesting more acidic foods, which has saturated fats, which increasing the probabilities of causing heart disease. An alkaline ash diet characterized by lack of animal protein, saturated fatty foods predisposing to various health problems of hyperlipidemia, so adopting of consumption from alkaline diets is needed for reducing blood cholesterol level (Jelang Jelku D Sangma 2019).

Overweight is a risk factor for many harmful diseases. Alkalinity of foods is a good guider in reduction of weight, blood cholesterol level and many effective methods for weight loss as the combination of alkaline diet interventions and physical exercises, overweight cause the incidence of many diseases. Many studies approved eating more alkaline foods principal to body weight loss, which characterized by restriction of eating food had a calorie daily (Kuno Hottenrott; 2020 and Jelang Jelku D Sangma; 2019).

Significance of the Study:

High blood pressure is a public health problem around the world, without controlling it the incidence of its complications increased. Soliman, et al (2020) reported that; about 26% from adult Egyptian population had hypertension. The last annual statistical report of Menoufia University Hospital for rate of follow hypertensive cases was 520 cases. One of method of hypertension management is dietary modification as reduction of sodium intake, which it is an important in control of hypertension and inhibition of complications. Moreover there is no research has been done about the effect on alkaline-based diet on blood pressure, lipid profile and weight among patients with hypertension in Menoufia University.

The aim of the study:

To examine the effect of nurses- led interventions as intake alkaline-based diet on blood pressure, lipid profile and weight among patients with hypertension.

Research hypothesis:

- 1- Patient's knowledge score will increase in study group after intervention as compared with control group.
- 2- There will be reduction in blood pressure, and lipid profile among study group after application of nurses led interventions as alkaline dietary management if compared with control group.
- 3- There will be reduction in weight among study group after application of nurses led interventions as alkaline dietary management and performing physical exercises if compared with control group.
- 4- There will be an improvement in Biochemical Analysis among study group after application of nurses led interventions as alkaline dietary management as compared with control group.

Subjects and Methods

Design: Quasi Experimental design was utilized for this study.

Setting: The current study was conducted at medical outpatient clinic of Menoufia University Hospital, Egypt. Menoufia University Hospital is the unique university hospital in Menoufia city; it provides all types of health services for all Menoufia population, it located at Shebin El Kom, average 90km northwest Cairo in delta.

Duration of study: Data were collected within 3 months from the beginning of April 2021 to the end of June 2021.

Subject: A Purposive sample of 100 patients who were recruited after their acceptance to participate in the study. They were randomly assigned into two groups (50 for each). The first 50 subjects became the intervention group: patients who received conventional antihypertensive medications and nurses led interventions as intake alkaline-based diet provided by researchers and the next 50 subjects were the control group: patients who received only prescribed conventional antihypertensive medications. This was done to avoid sample contamination and bias. The patients were enrolled based on the inclusion and exclusion criteria.

Inclusion criteria: Patients who were willing to participate at the time of the study. Adult, Both sexes. Uncontrolled hypertension. High blood lipid.

Exclusion criteria: Patients were excluded from the study if they: Not willing to participate in the study. Patients had chronic diseases as diabetes mellitus, cardiac, renal and hepatic; because each type of this disease need to a therapeutic special diet.

Calculation of the sample size:

In order to calculate the required sample size, the researchers used the online sample size calculator website. It has been searched, reviewed and checked for the calculated results based on known formulas for common research objectives. The flow rate of the target population with this specific inclusion and exclusion criteria were 520 patients per year. With a study power of 91% the required sample size was equal 98 patients. The

researchers added 2 patients and the sample became equal 100 patients.

<http://www.raosoft.com/samplesize.html>.

Tools of the study: Three tools were being developed to collect the current data; as follows:

The tool I: Interview questionnaire; it developed by researchers; divided into three parts: Part one: Sociodemographic and medical data as age; gender, patient's education, marital status, monthly income, smoking, duration of hypertension and type of convestional medication; Part two: Patient's Knowledge about alkaline diet (pre-post), included; what is an alkaline diet, source, benefits, harms, daily requirements, and its effect on weight, blood pressure and lipid profile. Part three: Questionnaire for daily physical exercises, it included questions and techniques of patient's daily activities, abilities in performing different physical exercises, compliance of study group with exercises.

Tool (II): Questionnaire for Alkaline – Based Diet; it included planned alkaline diets and water, compliance of study group with learned planned diet management and alkaline water.

Tool (III): Physiological parameters; it consisted of: Part one: Blood Pressure measurements; Part two: Anthropometric measurements as weight and height and Part three: Biochemical Analysis as triglycerides, total cholesterol, low density lipoproteins, high density lipoproteins, potassium, sodium, calcium and PH for urine.

Scoring system:

Patients' compliance for interventions of alkaline diet:

Each question was given a score of two if comply with measures, a score of one if comply to sometimes and a score of zero with no compliance.

Patients' Knowledge questionnaire about alkaline diet:

Total score ranged from (1-18) grade. It's defined as follows; from 1-8 grade or <50%

that indicated poor knowledge, from 9-13 grade or 50 - < 75% that indicated fair knowledge, and from 14-18 grade or $\geq 75\%$ that indicated good level of knowledge.

Validity of the tools:

All tools were tested for its content validity by three experts in the field of Medical Surgical Nursing, Faculty of Nursing, Menoufia University, and two experts in the field of therapist nutrition, Faculty of Home Economics and specialized physician, Faculty of Medicine, Menoufia University. Modifications were done by the researchers.

Reliability of tools:

Reliability was estimated among 10 participants by using test retest method with two weeks apart between them. Then Cronbach alpha reliability test was done through SPSS computer package.

Regarding Tool I: Part two: Patient's

Knowledge about alkaline diet; Cronbach alpha reliability value was 0.89.

Regarding Tool II: Questionnaire for Alkaline – Based Diet; Cronbach alpha reliability value was 0.87.

Regarding Tool III: Physiological parameters; Cronbach alpha reliability value was 0.82 for three parts.

Pilot study: was done by 10 % of patients before starting the actual data collection; to evaluate the effectiveness of the study tools, clarity, techniques and the availability of the study sample; and subjects who participated in the pilot study were not included in the study sample.

Ethical considerations:

An official permission for conducting the study was obtained from the Research Ethics Committee at the Faculty of Nursing after complete explanation of study purpose and data collection procedure. The researchers obtained an official permission from hospital manager, executive of the Menoufia University Hospital and from head nurse of medical outpatient clinic. Oral consent was obtained from the patients who met the study inclusion criteria to participate in the study; the contributors were informed that the participation in this study is

voluntary and they can withdraw at any time without giving reasons. The purpose of the study was explained to them and they were reassured that any information obtained would be confidential and would be used only for the study purpose.

Field work: Field work consists of four phases as follows:

Phase (1) Preparatory phase:

An illustrative structured colored small booklet was prepared to be introduced to study group (group I) as a guide for the practices of nursing led intervention. Moreover it was written in simple Arabic language; it was tested by the experts in the Medical Surgical Nursing; specialized physician in Medicine and Therapist nutrition to check the content relevance, clarity and feasibility. The researcher went through extensive literature to design the plan for the interventions. The booklet included information about characteristics of alkaline diet, benefits, 7 day alkaline meal plan, Menu options included different examples for breakfast, lunch, dinner and snacks, also in booklet the researchers explored way of own alkaline water.

Food analysis of dietary intake:

Initially before the beginning of dietary management and modulation of daily routine, the food intake of each patient was recalled for 3 days per week by 24 hour recall form (Laurence et al., 2017). Nutritive values of the consumed foods were estimated using computer software (Food Analysis Computer Program, 1995). The adequacy of sodium and potassium was estimated according to food and nutrition board, institute of medicine, national academies (IoM, 2005). The recommended dietary allowances (RDA) and adequate intakes (AI) are 1500 and 4700mg per day for sodium and potassium according to (Institute of Medicine of the National Academies, Food and Nutrition Board, 2005).

Nutritional requirements:

Based on the collected data of patients (age, weight, height, and the level of physical activity), the total energy requirement was estimated using the Institute of Medicine's Estimated Energy Requirement (EER) equations (IoM, 2005), the equations as follow:

Men (19 years and older)

$$EER = [662 - (9.53 \times \text{age (yr.)})] + PA \times X [(15.91 \times \text{wt. (kg)}) + (539.6 \times \text{ht (m)})]$$

Women (19 years and older)

$$EER = [(354 - (6.91 \times \text{age (yr.)})] + PA \times X [(9.36 \times \text{wt. (kg)}) + (726 \times \text{ht (m)})]$$

EER, Estimated energy requirement; wt. = body weight; ht = height; PA = Physical activity coefficient.

Meal planning:

Meals were designed using the method of the six-food exchange menu (Marcus, 2013; Mahan and Raymond, 2017) with a content of 2000 calories per day for 7 days (include breakfast, lunch, dinner and snacks). The 2000-calorie menu is ideal for adult people with an ideal body weight for maintaining it, as well as those who are overweight and obese, to reach a healthy weight.

Planning nutritious alkaline meals and snacks reinforces to eat more vegetables, sprouted seeds and grains, fruits and drinking lots of water and cutting back on dairy products, sugar, artificial sweeteners, and sugary treats, including soda and soft drinks, excessive caffeine and fatty meats and other animal protein, processed products, such as hot dogs, cold cuts, and frozen dinners and refined grains and simple carbohydrates such as white rice and bread.

An alkaline diet planned essentially to contain three to five alternatives of vegetables per day with variety (dark leafy vegetables, red and orange vegetables, legumes and seeds, starchy vegetables, and others); The meals recommend to administer high-acid fruits like lemons, and tomatoes, they actually help to make the body more alkaline. So a cup of warm water with a squeeze of lemon first thing in the morning is usually an easy and effective way to manage pH levels.

The number of fruit alternatives in the meal is not less 4 alternatives, the preferable fruits to have ones with their peel or alkaline fruit juices to affect the body (the best of which are citrus fruits, apples, berries), the number of alternatives from the group of cereals and starches 6 alternatives per day (with a focus on sources of complex carbohydrates high in their fiber content, such as whole grains and bread of whole grains, and brown rice), the number of alternatives from the meat group and its alternatives is 5.5), in case of preferring animal protein sources over plant-based ones such as beans and tofu, the meals planned to choose lean cuts of meat and create plenty of variety so that the times of eating red meat does not exceed once a week, in the amount of 60 grams at a time, eggs not more than 3 times a week, chicken or turkey breast no more than 3 times a week (preferably breast meat not more than the hips, no more than 60 grams at a time), eating fish high in omega-3 content twice a week (Dietary Guidelines for Americans, 2020-2025).

Phase (2) Interviewing and assessment phase:

The researcher interviewed the patients and explained aim of the study and procedures. After that their participating agreement in this study was obtained, each participant has a right to withdrawal from the study when he/she want. Each patient of both groups was interviewed to collect personal and medical base line data using structured interviewing questionnaire. The needed time for completing questionnaire was about 20-30 minutes.

Phase (3) Implementation phase:

The researchers attended the medical outpatient clinic one day per week, the researchers distributed an illustrated by colored booklet to each patient. The (100) patients were grouped into 50 study group and 50 control group over a period of three months, the first month 33 patients, the second month 33 patients and the last third month 34 patients. During the first week of each month, the researchers met the patients, fill out the questionnaire. All interventions were explained to study group as follows:

Nursing – Led Interventions included the following: the researchers took the medical history, assessed and laboratory investigations

results, measuring blood pressure and weight, then the researchers separate the study group from control, the researchers educated and practiced the study group physical exercises, where the researchers explaining the theoretical content of the booklet and giving them a listed meals and their alternatives, and these meals are divided into three daily meals within 7 days, and they are stressed on the need to adhere to the meals during three consecutive weeks to achieve the aim of the study and have the beginning of the week, as well as the alternatives and give them instructions and recommendations to be implemented before leaving the outpatient clinic, the two groups are given a request for the laboratory investigations to be brought in the next week.

In the second week, the patients brought the results of the laboratory investigations with them. The researchers performed the same previous measures of weight, blood pressure, record the results of the laboratory investigations and compare them with the previous one. The study group is alerted to the need to adhere to the same duties or alternatives during the next two weeks, and before leaving the outpatient clinic, the two groups are given a request for the tests to be brought in the next week. And repeat all of the above in the third and fourth week.

Phase (4) Evaluation and follow up phase:

The interventions of a designed meals continued 3 weeks, the researchers taken 4 measurements to evaluate the effectiveness of nurses led interventions. The first measurement before the interventions (pre-intervention); second measurements or follow –up after one week of first measurement (post 1-intervention) and third measurement after one week of post 1 measurement or follow up (post 2-intervention); fourth measurement after one week of post 2 measurement (post 3-intervention). Comparison of both groups was done. The phase took approximately 20 minutes.

Statistical analysis:

Data were coded and transformed into a specially designed format suitable for computer feeding. All entered data were verified for any errors. Data were analyzed using statistical package for social sciences (SPSS) version 20

windows and were presented in tables and graphs. Chi-square analysis was performed independent sample t test, repeated measures ANOVA, and mean and standard deviations were computed. P-value at 0.05 was used to determine significance regarding:

- P-value > 0.05 to be statistically insignificant.
- P-value ≤ 0.05 to be statistically significant.
- P-value ≤ 0.001 to be highly statistically significant.

Results

Table (1): this table shows that; two third of patients were female in study group but 60% in control group, the mean age of participant in study and control group (48.28 ± 7.52 , 49.93 ± 7.50) respectively, regarding marital status the majority of studied sample were married. About 34% was university education in study group while 16% only in control group.

Table (2): It is obvious from table 2; no statistically significant difference was found between both groups pre- intervention. However, a highly significant difference was found between the two groups post intervention in relation to knowledge levels. **So, the first hypothesis was supported.**

Table (3): This table clears that; at first measurement post intervention, about (50 %) of study group and only (12%) of control groups respectively used alkaline diet and water to some extent, however, at 3rd measurement post intervention, (74 %) and only (2%) of study and control groups respectively used alkaline diet and water all day. A highly significant difference was found between the two groups throughout study phase.

Table (4): This table reveals that; there is a highly statistically significant difference between studied groups throughout post intervention phases regarding Systolic and Diastolic blood pressure ($p=0.007$, 0.000 , 0.000 ; 0.002 , 0.000 , 0.000) respectively. It is apparent that; scores of arterial blood pressure of the study group were lower than those of the control group after following the alkaline diet and water. **So, the second hypothesis was supported.**

Table (5): This table shows presence of the differences of lipid profile among study and control group throughout study phases. It is clear that, highly statistically significant differences were found between study and control groups at all measurements post intervention for all lipid profile variables. Likely, for the study group, the table also shows that the means of all lipid profile variables were improved all through study phases. This improvement was significantly associated with adherence to the nursing led interventions as suggested alkaline diet and water, whereas, concerning the control group ones who only received a routine care, there were no statistically significant differences found for all lipid profile variables at all measurements. **So, the third hypothesis was supported.**

Table (6): It is obvious from this table, there was a statistically significant differences were found between study and control groups at all measurements pre and post intervention for body weight except at the 3rd., post intervention ($P=0.000, 0.000&0.027$) respectively. **So, the fourth hypothesis was supported.**

Table (7): This table illustrates that; highly statistically significant differences were found between study and control group at different intervals of study phases for all Biochemical Analysis variables. In addition, for the study group, it is indicated that the mean and standard deviation of all Biochemical analysis variables were improved throughout the study phases. This improvement was significantly associated with adherence to the suggested alkaline diet and water.

Table (8): this table indicates that; pre intervention, only (2 %) and (4%) of study and control groups respectively were following physical exercises, However, at the 3rd measurement post intervention, (80%) and only (4%) of study and control groups respectively performed physical exercises. Additionally regarding compliance without complain, this table reveals that there is a highly statistical significant difference between both groups throughout post intervention phases ($p=0.000^{***}$). It shows that majority of study group and only (12%) and control group complied with physical exercises to some extent. A highly significant difference was found between the two groups throughout study phases.

Table (1): Distribution of Socio-demographic characteristics between study and control groups in percentage:

Variable	Study group (N=50)		Control group (N=50)		X ² p values
	No	%	No	%	
Sex					
Male	17	34.00	23	40.00	X ² 1.40 P=1.54 N.s
Female	33	66.00	27	60.00	
Age:					
30-39	13	26.00	15	30.00	1.43 P=.78 N.s
40-49	12	24.00	14	28.00	
50 and more	25	50.00	21	42.00	
Mean ±SD	48.28±7.52		49.93±7.50		
Education:					
Illiterate	4	8.00	6	12.00	2.56 P=.07 N.s
Primary	14	28.00	18	36.00	
Secondary	15	30.00	18	36.00	
University	17	34.00	8	16.00	
Marital status:					
Married	42	84.00	41	82.00	1.08 P=.58 N.s
Divorced	1	2.00	4	8.00	
Widow	7	14.00	5	10.00	

Table (2): Knowledge levels among study and control group regarding alkaline diet throughout study phases:

knowledge levels	Pre intervention		post intervention		X ² p value Pre and post intervention for study group	X ² p value Pre and post intervention for control group
	Study (N=50) N(%)	Control (N=50) N(%)	Study (N=50) N(%)	Control (N=50) N(%)		
Poor knowledge	42(84%)	42(84%)	0(0%)	40(80%)	X ² = 58.24 P= .000	X ² = 1.08 P= 0.180
Fair knowledge	6(12%)	5(10%)	6(12%)	7(14%)		
Good knowledge	2 (4%)	3(6%)	44(88%)	3 (6%)		
X ² -p/value	X ² = 0.292 p= 0.863 NS		X ² = 77.85 p= 0.000			

Table (3): Patient's compliance on alkaline diet and water among study and control group throughout study phases:

Patient's compliance on alkaline diet and water		Study group (N=50)		Control group (N=50)		Chi-Square Test- p value
		N	(%)	N	(%)	
Post intervention	No	24	48%	43%	86%	17.976 .000
	To some extent	25	50%	6	12%	
	Yes	1	2%	1	2%	
At 2nd., post intervention	No	5	10%	45%	90%	65.519 .000
	To some extent	37	74%	5%	10%	
	Yes	8	16%	0	0%	
At 3rd., post intervention	No	0	0%	43	86%	79.684 .000
	To some extent	13	26%	6	12%	
	Yes	37	74%	1	2%	
Chi-Square Tests- p value		37.97 .000		.059 .973		

Table (4): Effect of Patients' Compliance of Alkaline Diet and water on Blood pressure between studied samples throughout study phases:

Item	First time post intervention		At 2nd., post intervention		At 3rd., post intervention	
	Mean ±SD		Mean ±SD		Mean±SD	
Systolic blood pressure						
Study (N=50)						
• No	148.1±8.90		147.7±7.69		147.9±7.64	
• To some extent	144.8±4.73		138.5±4.65		135.5±4.60	
• Yes	143.2±4.63		137.2±4.50		133.1±4.20	
Chi-Square Test- p value	1.13 0.106		11.03 0.001**		18.01 P=0.000***	
Control (N=50)						
• No	147.3±8.00		146.7±7.61		146.6±7.62	
• To some extent	146.4±7.90		145.5±7.50		145.7±7.64	
• Yes	145.2±7.10		143.9±6.91		144.4±7.42	
Chi-Square Test- p value	1.013 0.096		.993 .130		.167 0.567	
T-p values	T=2.71 P=0.007***		T=4.11 P=.000***		T=8.11 P=.000***	
Diastolic blood pressure						
Study (N=50)						
• No	96.6±4.45		93.8±2.95		95.8±2.97	
• To some extent	94.4±4.25		93.0±2.90		91.0±2.90	
• Yes	93.5±5.27		86.5±5.73		83.5±5.70	
Chi-Square Test- p value	T=1.54 P= 0.103		T=14.01 P=.000***		T=24.31 P=.000***	
Control (N=50)						
• No	96.6	±4.45	95.6	±2.95	95.1	±2.94
• To some extent	95.5	±4.44	93.6	±2.92	94.7	±2.96
• Yes	94.6	±4.35	93.2	±2.91	95.3	±2.95
Chi-Square Test- p value	1.57 0.117		1.69 0.115		1.17 0.212	
T p values	T= 3.17 P=0.002		T= 7.99 P=0.000***		T= 9.91 P=0.000***	

N.s = not significant

Table (5): Differences of lipid profile among study and control group throughout study phases:

Item	Pre intervention	post intervention	At 2nd., post intervention	At 3rd., post intervention	F P values
	Mean±SD	Mean±SD	Mean±SD	Mean±SD	
Triglycerides					
Study (N=50)	190.08± 13.95	180.38± 11.17	165.2± 10.39	145.26.69	F= 23.800 P=0.000***
Control (N=50)	189.28± 13.56	188.2± 12.96	185.1± 10.61	183.410.37	F= 1.51 P= 0.108
T- p values	T=.29 P=.772	T= -3.23 P= .002***	T= -9.46 P=. 000***	T= -21.877 P=.000***	
Total cholestérol					
Study (N=50)	228.28±10.63	216.9±8.19	199.80±9.31	185.30±6.42	F= 21.91 P=0.000***
Control (N=50)	224.7±11.57	221.3±11.32	221.80±10.53	219.60±10.14	F= 1.44 P= 0.108
T p values	T= 1.610 P= .111	T= 3.794 P= .000	T=11.065 P=0.000***	T=20.202 P=.000	
High density lipoprotien					
Study (N=50)	39.98±3.074	43.38±5.477	52.00±4.135	65.06±3.026	F= 19.99*** P=0.000
Control (N=50)	41.22±4.171	41.26±4.337	42.02±4.354	42.32±4.587	F= 1.24 P= 0.403
T p values	T=1.692 P=.094	T=2.146 P=.034	T=11.752 P=.000	T=29.261 P=.000	
Low Density Lipoprotein					
Study (N=50)	137.22±6.062	128.18±6.832	117.90±8.984	99.76±5.723	F= 25.91 P=0.000***
Control (N=50)	137.02±5.791	137.12±6.056	134.24±4.433	133.42±5.522	F= 1.94 P= 0.101
T- p values	T=.169 P=.866	T=6.924 P=.000	T=11.533 P=.000	T=29.927 P=.000	

N.s = not significant

Table (6): Mean and standard deviation of body weight between studied samples at different intervals:

Measurements of weight	Mean± Std. Deviation		T	p values
	Study	Control		
• Pre intervention	78.80±6.599	72.886.954	4.367	0.000
• At first time post intervention	77.86±6.490	72.90±6.840	3.720	0.000
• At 2nd., post intervention	76.14±6.350	73.10±7.129	2.252	0.027
• At 3rd., post intervention	74.46±5.980	73.10±7.237	1.024	0.308
• F	11.81	1.65		
• P value	0.000***	0.123		

Table (7): Differences of Biochemical Analysis between study and control group throughout study phases:

Item	Pre intervention	post intervention	At 2nd., post intervention	At 3rd., post intervention	F p values
	Mean±SD	Mean±SD	Mean±SD	Mean±SD	
Potassium					
Study (N=50)	4.22±.760	4.28±.798	4.30±.798	4.33±.786	F= 1.54 P= 0.203
Control (N=50)	3.46±.258	3.58±.232	3.67±.178	3.76±.159	F= 2.64 P= 0.103
T p values	T=6.676 P=0.000***	T= 5.955 P= 0.000***	T= 5.462 P=0.000***	T= 5.079 P=.000***	
Sodium					
Study (N=50)	134.64±1.838	135.70±1.282	136.74±1.496	137.26±1.575	F= 21.91*** P=0.000
Control (N=50)	138.20±5.214	138.32±5.061	138.88±4.960	139.44±4.854	F= 1.44 P= 0.301
T-p values	T= 4.554 P= .001	T= 3.549 P= .001	T= 2.921 P=0.004***	T=3.021 P=.003	
Calcium					
Study (N=50)	8.19±.308	8.48±.244	8.77±.308	9.15±.313	F= 1.90 P= 0.103 N.s
Control (N=50)	8.28±.198	8.34±.164	8.40±.150	8.46±.165	F=1.34 P= 0.203
T-p values	T=1.777 P=.079	T=3.421 P=.001	T=7.637 P=.000	T=13.624 P=.000	
PH for urine					
Study (N=50)	5.21±.603	5.28±.636	8.52±.270	8.58±.237	F= 10.04 P= 0.003
Control (N=50)	4.78±.889	4.78±.889	4.98±.952	5.10±1.027	F=1.34 P= 0.133
T-p values	T=2.792 P=.006	T=3.182 P=.002	T=25.230 P=.000	T=23.371 P=.000	

N.s = not significant

Table (8): Differences of physical exercises and Compliance without complain between study and control group throughout study phases:

Item	Study group (N=50)		Control group(N=50)		Chi-Square Tests- p value	
	N	(%)	N	(%)		
Do you perform physical exercises?						
Pre intervention	No	31	62%	42	84%	4.99
	To some extent	18	36%	6	12%	.018
	Yes	1	2%	2	4%	
Post intervention	No	11	22%	43	86%	
	To some extent	36	72%	7	14%	.000
	Yes	3	6%	0	0%	
At 2nd., post intervention	No	2	4%	42	84%	
	To some extent	31	62%	6	12%	.000
	Yes	17	34%	2	4%	
At 3rd., post intervention	No	1	2%	42	84%	
	to some extent	9	18%	6	12%	.000
	Yes	40	80%	2	4%	
Chi-Square Tests- p value		60.09		.650		
Compliance with physical exercises without complain						
Pre intervention	No	0	0%	2	4%	40.93
	To some extent	12	24%	6	12%	.000
	Yes	13	26%	0	0%	
	Not perform exercises	25	50%	42	84%	
Post intervention	No	1	2%	2	4%	
	To some extent	47	94%	6	12%	.000
	Yes	0	0%	0	0%	
	Not perform exercises	2	4%	42	84%	
At 2nd., post intervention	No	4	8%	2	4%	
	To some extent	45	90%	6	12%	.000
	Yes	0	0%	0	0%	
	Not perform exercises	1	2%	42	84%	
At 3rd., post intervention	No	4	8%	2	4%	
	To some extent	45	90%	6	12%	.000
	Yes	0	0%	0	0%	
	Not perform exercises	1	2%	42	84%	
Chi-Square Tests- p value		52.30		1.29		

Discussion

Nurses are the principal health personals and they play a key role in detect and manage hypertensive patients by collaborating patients and health care workers through establishing the patient's treatment plan. The nursing interventions in hypertension management involve in seven aspects of care, start by early recognition of disease and ended by performing all practices in its management and preventing complications. The alkaline diet is also promoted for conditions as hypertension; high blood lipid and overweight and changing food choices to more 'alkaline' selections prevents their serious complications. The study aimed to examine the effect of nurses- led interventions as intake alkaline-based diet on blood pressure,

lipid profile and weight among patients with hypertension.

Change in studied sample' knowledge and compliance about alkaline dietary management:

From the study findings, hypothesis one was supported, because it was found that no statistically significant difference was found between two groups pre- intervention regarding knowledge. However, a highly significant difference was found between the two groups post intervention which reflected the researcher role as a nursing educator and written handbook of the study, which serves as an ongoing reference and may be that changes in practice based on the guidelines for alkaline dietary management and others nursing

interventions included in the study; this result agreed with **Shaban, et al., (2017)**, they stated that; presence of improvement in the participants' total knowledge scores after implementation of the educational program.

Effect of nurses-led interventions by intake alkaline based diet on blood pressure throughout all study phases:

The present study apparent that; scores of arterial blood pressure of the study group were reduced than those of the control group after following the alkaline diet and water with highly statistically significant differences; this finding was in concurrence with **Akter, et al., (2015)**; **Esche, et al., (2016)**; **Carnauba, et al., (2017)**; **Krupp, (2018)** and **Sangma, Jessie, and Kumari, (2019)**, they reported that; eating diets rich in fruits and vegetables, like the Dietary Approaches to Stop Hypertension (DASH)-diet, are usually characterized by high potassium intake and reduced dietary acid load, and have been shown to lower blood pressure (BP).

Effect of nurses-led interventions by intake alkaline based diet on lipid profile throughout all study phases:

The current study findings clarified that; the means of all lipid profile variables were improved all through study phases. This result is similar to **Sangma, Jessie, and Kumari, (2019)** and **Hottenrott, et al., (2020)**, they reported that; the balance of pH in the body through alkaline diets helped in reduction in cholesterol levels and triglycerides by weakening the metabolism and discharge of triglycerides from adipose tissue and more consumption of alkaline mineral significantly increased fat loss. The researchers explained that improvement was significantly associated with adherence to the suggested alkaline diet and water that provided by application of nurses-led interventions, whereas, concerning the control group who only received a routine care, there were no statistically significant differences found in all their lipid profile variables among the all measurements.

Effect of nurses-led interventions by intake alkaline based diet and exercises on weight throughout all study phases:

It is obvious that; highly statistically significant improvement differences were

found between study and control groups at all measurements for weight except at the 3rd. post intervention. This improvement was significantly associated with adherence to the intake of alkaline diet and water through application of nurses led interventions, however concerning the control group ones who only received a routine care, there were no statistically significant differences found for weight among the all measurements. This finding is in line with **Krupp, (2018)**; **Esche, et al., (2018)**; **Sangma, Jessie, and Kumari, (2019)** and **Hottenrott, et al., (2020)**, they reported that; alkaline diets is an effective management method in reduction of body weight. Moreover the combination of taking alkaline based diet with practicing physical exercised had a better effect in weight reduction, this result was supported with **Kuno, (2020)** & **Hottenrott, et al., (2020)**, they approved that; eating more alkaline foods with doing exercised are the principal to body weight loss.

Regarding to Biochemical Analysis:

The recent findings documented that; highly statistically significant differences were found between study and control groups all through study phases for all biochemical analysis variables. This result was agreed with **Hottenrott, et al., (2020)** [22], who reported that, alkaline supplementation improved increased plasma HCO_3 concentration and urinary pH, furthermore avoid acidosis.

Finally the researchers explained the reduction in study group blood pressure, cholesterol and weight by effect of nurses led interventions as intake alkaline dietary management and practicing physical exercises.

Conclusion

The current study concluded that; involvement nurses in hypertension team care very important by their interventions aimed to control high blood pressure and its risk factors for incidence cardiovascular diseases. Consumption of alkaline diet and water had a good effect in reducing arterial blood pressure, body weight and blood lipids. Combination of alkaline diet with practicing physical exercises helping in reduction of weight loss.

Recommendation

The current study recommended; replicate the study on large sample and establishing periodical alkaline diet programs with planned meals for hypertension, overweight and high blood lipids patients with continuous follow up.

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References

- Akter, S.; et al. (2015). High dietary acid load is associated with increased prevalence of hypertension: The Furukawa Nutrition and Health Study. *Nutrition*, 31, 298–303.
- Carnauba R., Baptistella A., Paschoal V., and Hübscher G., (2017). Diet-Induced Low-Grade Metabolic Acidosis and Clinical Outcomes, *Nutrients*, 9, 538; 10.3390/nu9060538 www.mdpi.com/journal/nutrients.
- Cheryl R. Dennison Himmelfarb, Yvonne Commodore-Mensah, Baltimore, and Atlanta. (2016). Expanding the Role of Nurses to Improve Hypertension Care and Control Globally. *Annals of Global Health*, VOL. 82, NO. 2.
- Danika Krupp, Jonas Esche, Gert Bernardus Maria Mensink, Stefanie Klenow, Michael Thamm and Thomas Remer. (2018). Dietary Acid Load and Potassium Intake Associate with Blood Pressure and Hypertension Prevalence in a Representative Sample of the German Adult Population. *Nutrients*, 10, 103; doi: 10.3390/nu10010103.
- Dietary Guidelines for Americans, 2020-2025. 9th Edition. December 2020. In accordance with Federal civil rights law and U.S. Department of Agriculture (USDA) and U.S. Department of Health and Human Services (HHS). Available at DietaryGuidelines.gov.
- Esche, J.; Shi, L.; Sánchez-Guijo, A.; Hartmann, M.F.; Wudy, S.A.; and Remer, T. (2016). Higher diet-dependent renal acid load associates with higher glucocorticoid secretion and potentially bioactive free glucocorticoids in healthy children. *Kidney Int.*, 90, 325–333
- Feresin, R.G.; Johnson, S.A.; Pourafshar, S.; Campbell, J.C.; Jaime, S.J.; Navaei, N.; Elam, M.L.; Akhavan, N.S.; Alvarez-Alvarado, S.; Tenenbaum, G.; and et al. (2017). Impact of daily strawberry consumption on blood pressure and arterial stiffness in pre- and stage 1-hypertensive postmenopausal women: A randomized controlled trial. *Food Funct.* 8, 4139–4149.
- Food Analysis Computer Program (1995). Food Analysis Software of Egyptian Foods. Computer Program, Faculty of Home Economics. Shebin El.Kom, Egypt.
- Freedman, L.S.; Commins, J.M.; Willett, W.; Tinker, L.F.; Spiegelman, D.; Rhodes, D.; Potischman, N.; Neuhouser, M.L.; Moshfegh, A.J.; Kipnis, V.; Baer, D.J.; Arab, L.; Prentice, R.L. and Subar, A.F. (2017). Evaluation of the 24-Hour Recall as a Reference Instrument for Calibrating Other Self-Report Instruments in Nutritional Cohort Studies: Evidence From the Validation Studies Pooling Project. *American Journal of Epidemiology*, Volume 186, Issue 1, Pages 73–82, <https://doi.org/10.1093/aje/kwx039>.
- Gay, H.C.; Rao, S.G.; Vaccarino, V.; and Ali, M.K. (2016). Effects of different dietary interventions on blood pressure: Systematic review and meta-analysis of randomized controlled trials. *Hypertension*, 67, 733–739. [CrossRef] [PubMed].
- Hottenrott K., Werner T., Hottenrott L., Meyer T., and Vormann J., (2020). Exercise Training, Intermittent Fasting and Alkaline Supplementation as an Effective Strategy for Body Weight Loss: A 12-Week Placebo-Controlled Double-Blind Intervention with Overweight Subjects. *Life*, 10, 74; doi:

- 10.3390/life10050074
www.mdpi.com/journal/life.
<http://www.raosoft.com/samplesize.html>
- .Institute of Medicine of the National Academies, Food and Nutrition Board (2005). DRI Dietary Reference Intakes for Water, Potassium, Sodium, Chloride, and Sulfate. Washington, DC, 2005, the National Academies Press. www.nap.edu.
- Institute of Medicine of the National Academies, Food and Nutrition Board (2005). Dietary reference intakes for energy, carbohydrate, fiber, fat, fatty acids, cholesterol, protein, and amino acids, Washington, DC, The National Academies Press. www.nap.edu. <https://doi.org/10.17226/10490>.
- Jelang Jelku D Sangma, Jessie Suneetha W and B Anila Kumari. (2019). Concepts of acid alkaline diet. The Pharma Innovation Journal. 8(4): 932-935
- Jessie Suneetha W, Jelang Jelku, and Anila Kumari Bethapudi. (2019). Concepts of acid alkaline diet. The Pharma Innovation Journal, 8(4): 932-935. Concepts_of_acid_alkaline_diet.<https://www.researchgate.net/publication/333532069>.
- Krupp D., Esche J., et al., (2018). Dietary Acid Load and Potassium Intake Associate with Blood Pressure and Hypertension Prevalence in a Representative Sample of the German Adult Population, *Nutrients*, 10, 103.
- Kuno Hottenrott, Tanja Werner, Laura Hottenrott, Till P. Meyer and Jürgen Vormann. (2020). Exercise Training, Intermittent Fasting and Alkaline Supplementation as an Effective Strategy for Body Weight Loss: A 12-Week Placebo-Controlled Double-Blind Intervention with Overweight Subjects. *Life*, 10, 74; doi: 10.3390/life10050074
- Lynnette M Neufeld, Sheryl Hendriks, and Marta Hugas. (2021). Healthy diet: A definition for the United Nations Food Systems Summit. Scientific Group <https://sc-fss2021.org/https://www.un.org/en/food-systems-summit/leadership>.
- Mahan, K.L. and Raymond, J.L. (2017). Krause's food & the nutrition care process, Fourteenth edition. Elsevier Inc. Canada. P.1017-1028.
- Mohamed Ibrahim Shaban, Nahid Fouad Ahmed EL-Gahsh, and Abeer El-said Hassane El-sol. (2017). Ginger: It's Effect on Blood Pressure among Hypertensive Patients IOSR Journal of Nursing and Health Science (IOSR-JNHS) e-ISSN: 2320-1959,p- ISSN: 2320-1940 Volume 6, Issue 5 Ver. III., PP 79-86
- Marcus, B.J. (2013). Culinary Nutrition. The Science and Practice of Healthy Cooking. Chapter 9, Diet and Disease: Healthy Choices for Disease Prevention and Diet Management: Practical Applications for Nutrition, Food Science and Culinary Professionals. P.371-430, Academic press. <https://doi.org/10.1016/B978-0-12-391882-6.00009-1>.
- Sangma J., Jessie W., and Kumari B., (2019). Concepts of acid alkaline diet The Pharma Innovation Journal; 8(4): 932-935.
- Saeed S Soliman, Emily H Guseman, Zelalem T Haile, Gillian H Ice. (2020). Prevalence and Determinants of hypertension unawareness in Egyptian adults: a cross-sectional study of data from the 2015 Egyptian health issues study. *The Lancet Global Health*. Volume 8, Special Issue, 520.