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Ginger: It's Effect on Blood Pressure among Hypertensive Patients

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Abstract: *Hypertension is a major factor for coronary artery disease and lead to death. Ginger is an ancient herbal used for treatment of variety of diseases. It has a diuretic and blood pressure lowering effect so recommended by Food and Drug Administration (FDA) as a food additive that is "generally recognized as safe."* ***Aim of the study*****:** *To determine the effect of ginger on blood pressure among hypertensive patients' in Menoufia University Hospital.*
Subjects & method: Research design; *Quasi experimental design was used to achieve the aim of the study.*
Setting**:** *The study was conducted at medicine outpatient's clinic at Menoufia University Hospital.*
Subjects: *A convenience sample of 120 adult who visited outpatient clinic was undertaken. They were divided alternatively into three equal groups 40 patients in each group (two studies which divided into group taking ginger only, group taking ginger with the prescribed medication and control group).*
Tool: *two tools used; tool 1 divided into: -Part one: to assess socio demographic data; Part two: (A) Medical history and symptoms. (B) Current symptoms of hypertension; and Part three: patients Knowledge about their disease;* ***Tool two****: physiological Measurement of blood pressure.*
Results: *There was statistically significant difference among both studied groups and control group regarding to systolic and diastolic blood pressure during post one week and month of intervention. There was a high statistically significant difference for blood pressure clinical manifestations between both study groups and control, after taking ginger for one month; good prognosis occurred for both study groups; while control group had the signs and symptoms in pre-post.*
Conclusion: *Based on the previous researches and the current study results, the researchers supported ginger in treatment of hypertension with antihypertensive drug.*
Recommendation: *Integrate program about herbal therapy support conservative medication for chronic diseases as cardiovascular diseases. Apply research on large number of patient with more times for follow up.*
Key words*: Hypertension. Ginger.*

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I. Introduction

Hypertension (HTN) is the major health problem leads to cardiovascular disease. It means blood pressure equal or increase than 140/90 mm Hg. Hypertension can be categorized into high normal when systole of blood pressure (SBP) 130–139 mm Hg and/or diastole 80–89 mm Hg. Grade (1)140–159 mmHg systolic; 90–99 mmHg diastolic). Grade (2) hypertension is a systole of blood pressure 160-179 mm Hg or higher or a diastole of 100-109 mm Hg. Grade (3) hypertension is a systole of blood pressure 180mm Hg or more or a diastole 110mm Hg or increase and isolated systolic hypertension means systolic pressure equal or higher 140mm Hg and a diastolic pressure equal or higher 90mm Hg" **(1)**.

It is affecting approximately one billion people worldwide. In Egypt 16 million people had hypertension **(2, 3).** Elevated blood pressure often called silent killer because it may discover when the patient seeking health care services for any health problem. But some people with hypertension may report headache, blurred vision, vertigo, tinnitus or fainting episodes **(4)**.

Hypertension can be managing or controlling by pharmacological as antihypertensive medication or non-pharmacological through life style modification and alternative therapy as ginger, which is one of most substitute method that offers several health benefits. It acts as therapeutic effects which enhance immune

system, improve cardiovascular system by reducing level of low density lipoprotein and cholesterol that has harmful effect on heart. Also act as vasodilator which can reduce blood pressure, improve blood circulation [(5)].

Ginger contains many cations and anions, as calcium, magnesium and phosphorus that it has a function in bone development, muscle contraction and nerve conduction. These minerals in ginger are useful for muscle contraction, hypertension, muscle weakness, seizures. It also contains great amount of potassium which has a role in regulation of blood pressure &heartbeat [(6)]. In addition to study by **Ojulari, et al; in 2014**[(7)], who investigate the effect of ginger on the cardiovascular system (CVS), their result showed that significant reduction of systole and diastole blood pressure.

Chemical proprieties in ginger may help lower overall blood cholesterol, as well as low density lipoproteins, which are components of cholesterol that can contribute to heart disease, by atherosclerosis& plague. This creates obstacles that can contribute to high blood pressure by restricting the inner diameter of arteries and may also reduces the elasticity of arteries, further contributing to high blood pressure [(8, 9)].

In the study of **Ghayur MN, et al 2005**[(10)], ginger lowered blood pressure through the blockage of voltage-dependent calcium channels. They used a crude extract of ginger in this experiment, which caused a significant decreasing in the arterial blood pressure. Furthermore, **Satyanand, et al., 2013**[(11)] stated ginger aids in decreasing the blood pressure through block the electrical current of calcium channels, that normally stimulate the contraction of the smooth muscle tissue originated in organs and arterial walls. The reduction of the smooth muscle contraction results in more relaxation of arterial walls that allow blood to flow more easily and reduce blood pressure. Moreover, Ginger reduces hypertension by decreasing the need for salt in diet [(12)].

1.1. Significance of study

Hypertension increases morbidity and mortality rate as well as cost to community and health care services. In Egypt, high prevalence of hypertension due to lack of population awareness about its treatment. Moreover, management of hypertension in Egypt is not easy because of treatment costs- a common cause of interruption of therapy or discontinue treatment; so, it is important to maintain blood pressure within normal range or lowering the level of high blood pressure, ginger as herbal therapy can be used under supervision which is low cost and more effective to manage hypertension.

1.2. Aim of the study: - To determine the effect of ginger on blood pressure among hypertensive patients' in Menoufia University Hospital.

1.3. Research hypothesis: -

1- Elevated Blood pressure will reduce among hypertensive patient after drinking Ginger in study group rather than control group.
2- Patient's knowledge score will increase in study group after intervention as compared with control group.

II. Subjects And Methods

2.1. Research design:

Quasi experimental design was used to achieve the aim of the study.

2.2. Setting:

The study was conducted at medicine outpatient's clinic at Menoufia University Hospital.

2.3. Subject:

A convenience sample of 120 adult who visited outpatient clinic was undertaken. They were divided alternatively into three equal groups 40 patients in each group. Also fulfilled the following inclusion criteria:

2.3.1. Inclusion criteria:

Adult conscious patient, age (from18 to 60) year's old, (Both gender (male and female), have a confirmed diagnosis of hypertension recently or less than three months.

2.3.2. Exclusion criteria:

-Patients have a history of (gallstones, heartburn, stomatitis, hypoglycemia, heart diseases).
- Patients have bleeding disorder or taking blood-thinning medications, including aspirin, Warfarin.
- Female patients have pregnancy or breastfeeding.
-Before having surgery or being placed under anesthesia.

2.4. Tools: -

To achieve the aim of study one tool was utilized to collect the data:

2.4.1. Tool I: An instructional interviewing questionnaire was developed by the researcher based on pertinent. Literature and guidance of expertise including two parts - :

Part one: to assess socio demographic data as age, sex, education, occupation, smoking& contraceptive method if the patient is female.

Part two: (A) Medical history as duration of hypertension and symptoms that leads patient to seek health care service-medication.
(B) Current symptoms of hypertension as dizziness, headache, blurred vision, irregular heart beat after giving ginger.
Part three: Patients knowledge about their disease, its symptom, factor decreasing hypertension, complication of hypertension, different method of treating hypertension, and ginger as an herbal therapy can help in management of hypertension, benefits of ginger, method of preparation of ginger, contraindication & side effect of ginger.
2.4.2. Tool two: physiological Measurement: that includes different measurement of blood pressure at different interval.

2.5. Methods: -

- The study was conducted over a period of 10 months from November 2015 to August 2016.
- A written Approval was obtained from responsible authorities after explanation the purpose of the study.
- Tools were constructed by the researchers after reviewing of relevant literatures and were tested for content validity by 5 experts in Medical Surgical Nursing.
- Consent was obtained from subject to gain his / her cooperation. Each participant has a right to withdrawal from the study.
- Reliability: A test retest method was used to test reliability of tool I part 2 and Pearson correlation coefficient formula to ascertain the consistency of the tool to measure the items. Correlation coefficient alpha was 0.89.
- A pilot (purposive) study was carried out before starting the actual data collection. A pilot study was carried out on10% of studied sample (12 adult patients) to assess the clarity, applicability and time needed to fill the tool. The necessary modifications were done as revealed from the pilot study. The sample of pilot study was excluded from the total sample to assure the stability of the result.
- **Data collection:**
- **For study group:**
- **Study group (1)** 40 patients took ginger only.
- **Study group (2)** 40 patients took antihypertensive drug beside ginger.
- **Control group;** 40 patients included in this group, took prescribed antihypertensive drug only. The researchers evaluate patients at next morning from took anti-hypertensive medication, after one weak &after one month.
- First time: Each participant individually interviewed and the researchers explained the purpose of study, initiated data collection by assessing Socio-demographic data, medical history, knowledge about disease and ginger-then the researchers provide information about hypertension and ginger (using tool one & two).
- Second time the researchers brought the ginger and educated the participant how to prepare it for drinking, as followed, bring fresh ginger then peel it & cut into small slices, preferably directly used to avoid the loss of oil that resides in it which is what gives us all the health and therapeutic interest. Get a half a letter of boiling water and then put the ginger slices and cover the pot with water until it is warm water. Bring honey or sugar and then add to ginger/took one time per day; also, the researcher measure blood pressure.
- Then the researchers follow the participant by telephone to ensure that the participant drank ginger then the researchers asked him/her to measure blood pressure and recorded it. After one week from drinking ginger regularly the researchers met the participant again to refresh knowledge, answer any question and measure blood pressure (using tool two).
- Then the researchers evaluated effect of ginger after one month using tool one part two, part three and tool two.

2.6. Statistical Analysis

Data was entered and analyzed using SPSS (Statistical Package for Social Science) statistical package version 20. Data was presented using in numbers, percentages, mean and standard deviation (SD), t-test, Pearson correlation analysis were used for assessment of the inter-relationships among quantitative variables, and one-way anova. Statistical significance was considered at p-value < 0.05.

III. Results

Table (1) Distribution of study groups according to their Socio-demographic data.

Socio demographic data	Study group N (120)	
	No	%
-Age (years): -		
36-40	12	10
40-43	34	28
44+	74	62

Sex: - -Male **-Female**	 24 96	 20 80
-Levels of Education: -Illiterate -Read and write -Secondary -University	 12 24 66 18	 10 20 55 15
-Type of work: - Hard Little Nervous	 78 18 24	 65 15 20
Smoking: - Yes No	 24 96	 20 80

Table (1): This table illustrated that, more than half of study group were aged of 44 years old and more, while two third from the studied sample were female. Regarding to level of education more than half of them had secondary level of education, about 65% from the studied sample; their work needed to hard capabilities, however two third from studied sample were nonsmokers.

Table (2): Mean of different Systolic and Diastolic Blood Pressure Pre-intervention among studied and control groups.

(One Way Anova Test)

Blood Pressure	**Control Group N=40**		**Study Group (1) N=40**		**Study Group (2) N=40**		**F-test**	**P value**
	X	± SD	X	± SD	X	± SD	.568	0.452 NS
Systolic BP	141.000	±4.377	143.783	±5.498	141.125	±4.465		
Diastolic BP	98.722	±5.966	93.991	±6.169	92.225	±5.545	.590	0.444 NS

Table (2): This table showed that, there was no statistically significant difference in systolic and diastolic blood pressure during pre-interventions period among control group and both study group.

Table (3): Mean of different Systolic and Diastolic Blood Pressure Post one week of intervention among studied and control groups.

Blood Pressure	**Control Group N=40**		**Study Group (1) N=40**		**Study Group (2) N=40**		**F-test**	**P value**
	X	± SD	X	± SD	X	± SD	1.837	0.042 S
Systolic BP	141.000	±4.377	116.25	±9.963	104.000	±13.118		
Diastolic BP	98.722	±5.966	86.500	±6.565	69.333	±7.749	3.118	0.000 HS

(One Way Anova Test)

Table (3): This table illustrated that, there was statistically significant difference among both studied group and control group regarding to systolic and diastolic blood pressure during post one week of intervention (P value; 0.042 S,0.000 HS.) respectively. Hypothesis1was supported by the data.

Table (4): Mean of different Systolic and Diastolic Blood Pressure Post one month of intervention among studied and control groups.

Blood Pressure	Control Group N=40		Study Group (1) N=40		Study Group (2) N=40		F-test	P value
	X	± SD	X	± SD	X	± SD	3.837	0.022 S
Systolic BP	141.000	±4.377	113.250	±19.869	105.500	±13.337		
Diastolic BP	98.722	±5.966	68.300	±8.697	71.666	±8.026	6.228	0.000 HS

(One Way Anova Test)

Table (4): This table represented that, there was statistically significant difference among both studied group and control group regarding to systolic blood pressure and showed highly statistical significant difference regarding to diastolic blood pressure in post one month of intervention P (0.022, 0.000) respectively. Hypothesis1was supported by the data.

Table (5): Mean of different Systolic and Diastolic Blood Pressure after taking ginger only Post one week and one month of intervention among studied groups.

(One Way Anova Test)

Blood Pressure	Study Group (1) post one week N=40		Study Group (1) Post one month N=40		F-test	P value
	X	± SD	X	± SD	.559	0.891 NS
Systolic BP	116.25	±9.963	113.250	±19.869		
Diastolic BP	86.500	±6.565	68.300	±8.697	3.118	0.000 HS

Table (5): This table revealed that, there was no statistically significant difference between both studied group regarding to systolic blood pressure during post one week and one month of interventions after taking ginger only; while presence of high statistically significant difference in diastolic blood pressure within the same both interventions.

Table (6): Mean of different Systolic and Diastolic Blood Pressure after taking ginger and medication Post one week and one month of intervention among studied groups.

Blood Pressure	Study Group (2) post one week N=40		Study Group (2) Post one month N=40		F-test	P value
	X	± SD	X	± SD	.723	0.748 NS
Systolic BP	104.000	±13.118	105.500	±13.337		
Diastolic BP	69.333	±7.749	71.666	±8.026	1.530	.113 NS

(One Way Anova Test)

Table (6): This table showed that, there was no statistically significant difference between both studied group regarding to systolic and diastolic blood pressure during post one week and one month of interventions after taking ginger and antihypertensive medication.

Table (7): Distribution of study group according to their knowledge about Ginger among control group, studied group1, and 2 (pre-and post one month).

Knowledge about Ginger	Control Group N=40		Study Group (1) N=40		Study Group (2) N=40		x^2	p –value
	N0	%	N0	%	N0	%		
Pre-intervention:								
poor	30	75	25	62.5	20	50		
fair	10	25	15	37.5	18	45	3.333	.068 NS
good	0	0	0	0	2	5		
Post one month of intervention:	30	75	10	25	5	12.5		
poor	10	25	0	0	0	0	56.800	.000*** HS
fair	0	0	30	75	35	87.5		
good								

Table (7): This table illustrated that, the knowledge of both studied and control group, were poor and fair about ginger effect on hypertension in pre-intervention; with no statistically significant difference among groups, but the knowledge of both studied group only improved to good level in post one month of intervention, with high statistically significant difference (P value; 0.000 HS). Hypothesis 2 was supported by the data.

Table (8) Correlation between the educational level and their blood pressure when taking ginger only.

Educational level	Pearson correlation			
	Total score of their blood pressure when taking ginger only			
	Pre		Post one week	
	R	Significant	R	Significant
(University level)	.011	. 901	1	0

Table (8): This table presented that, presence of positive correlation between level of education for patients received ginger only and controlling of their blood pressure since the first post intervention (post-one-week intervention).

Table (9): Distribution of study group according to their clinical manifestation among control, studied group 1 and2 (pre-and post one month).

Items	Control Group N=40		Study Group (1) N=40		Study Group (2) N=40		x^2	p –value
	N0	%	N0	%	N0	%		
Signs and symptoms Pre-intervention:								
Drowsiness	2	5	8	20	10	25	2.400	.301 NS
Headache	11	27.5	5	12.5	12	30		
Blared vision	11	27.5	15	37.5	10	25		
Irregular heart rate	12	30	12	30	8	20		
All of the above	4	10	0	0	0	0		
Signs and symptoms post one-month:-								
Drowsiness	2	5	3	12.5	0	0	56.800	.000*** HS
Headache	11	27.5	2	22.5	0	0		
Blared vision	11	27.5	5	40	5	80		
Irregular heart rate	12	30	3	25	3	20		
All of the above	4	10	0	0	0	0		

Table (9): This table revealed that, there was a high statistically significant difference for clinical manifestations of blood pressure among both study group and control, after taking ginger for one month; good prognosis occurred for both study groups; while control group had the same signs and symptoms in pre-post.

IV. Discussion

Uncontrolled hypertension (HTN) is one of the mainly significant public health problems in the world today and it has a significant high risk to incidence of atherosclerosis, heart disease, stroke, kidney disease, and blindness. Conservative anti-hypertensive medications are usually linked with several side effects. About 75 to 80% of the world population use herbal medicines as ginger to help in the treatment of HTN. The present study aimed to investigate the effect of ginger on blood pressure among hypertensive patients' in Menoufia University Hospital

Regarding to Socio-demographic characteristics:

The present study revealed that, most of studied sample were female; they aged above 44 years old, which agreed with **Daugherty, et al; (2012) [13],** they stated that female in pre-menopausal period of life have lesser blood pressure than men aged in the same age because the effect of sex hormones, which possibly will influence age dependent gender differences in HTN control.

In relation to the effect of ginger on Systolic and Diastolic Blood Pressure:

The present study clarified that the mean Systolic and Diastolic Blood Pressure among the both study sample in pre-intervention were high than normal but measurements after one week from taking ginger indicated that it has a strong positive effect in lowering (HTN), this improvement in Systolic and Diastolic. Also blood pressure improved post one month by ccontinuous drinking of ginger, this results supported by **Yu Wang, et al; (2017)[(14)] Akinyemi A.J. et al;(2013)[(15)]** and **Akinyemi A.J. et al; (2014)[(16)];** they documented that, ginger has an antihypertensive effect on angiotensin-converting enzyme (ACE) and inhibitory outcome by stimulus of muscarinic receptors and obstruction of Ca^{+2} channels, so the use of ginger help in good prognosis of hypertension and palpitations. Additional the research result succeed to lower blood pressure measurement within both times of measurements after intervention, this result agreed with **Tabassum & Ahmad (2011)[(17)]**; they said that, patients had blood pressure higher than normal are high risk of diabetes and occurrence of renal disease in the forthcoming. While the current study stated that, the mean Systolic and Diastolic Blood Pressure for the control group were elevated in pre-intervention, and still high without change in post-one week and one- month interventions than pre-intervention. The researcher explained that ginger has biological medicinal possessions associated with blood pressure-lowering. These results were supported by hypothesis1.

Regarding to Diastolic Blood Pressure after taking ginger:

The current study stated that, decreasing in the mean of diastolic blood pressure for both studied group within the both interventions; after taking ginger highly, with statistical significant, this results on lined with **Brickman A.M. et al**; **(2010) [(18)]**; who mentioned that, blood pressure decreased after their intervention (took ginger).

According to the difference between pre-and post level of knowledge about ginger among studied groups:

The present study stated, that the improvement of knowledge occurred for most of both study group during post-one month intervention to good level than poor level in pre-intervention, while the knowledge of control group was poor level during pre-post of intervention; which reflected the researcher role as a nursing educator; this result agreed with **Hussain & Mohamed (2015)[(19)]** & **Ahmed Abdalla Ahmed Jarelnape, et al**; **(2016)[(20)];** who said that, if hypertensive patients not had enough knowledge about their disease, and its management; this may contributing to increased the occurrence of complications; but post- nursing intervention about hypertension; patient knowledge improved. The researcher explained that one of the nursing responsibilities toward the patients is education them about their diseases to reduce its morbidity and mortality. These results were supported by hypothesis 2.

Regarding to level of patient education and blood pressure:

The current study documented that, presence of a strong positive relation between university level of education and blood pressure measurement in post intervention, this result on the same line with El-**sol, et al; (2016) [(21)]**; who mentioned that there was significant difference related to level of education and acquired knowledge. While this result was contrast with **May, et al; (2010) [(22)]**; they documented that, there was no significant association between education level and osteoporosis information. The researcher explained that high level of education as university help patients in gain and understanding the provided information.

According to the effect of intervention on patients' clinical manifestations of hypertension (Pre-post):

In pre-intervention ;the present study documented that, most of patients complain of drowsiness, headache, blurred vision, irregular heart rate; this result supported by **Victor & Kaplan (2012)[(23)]**; who wrote that, people with uncontrolled hypertension had a history of clinical manifestations as drowsiness, headache, blurred vision; so managing or controlling hypertension led to good prognosis in signs and symptoms of hypertension among patients by the effect of taking the ginger post intervention, this result was the same line with **Satyanand, et al; (2013)[(11)]**; who stated that ginger had a strong effect on reducing the smooth muscle contraction leads to extra relaxation of arterial walls that let blood to flow more freely, lower pressure and improvement patient complains.

V. Conclusion

Based on the previous researches and the current study results, the researchers recommended dietary choice of daily ginger consumption against hypertension and CHD, as well as its ability to reduce the probability of hypertension complications.

VI. Recommendation

Integrate program about herbal therapy support conservative medication for chronic diseases as cardiovascular diseases. Apply research on large number of patient with more times for follow up.

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