

Effect of Sesame and Garlic Spicy Mix on Hypertensive Subjects

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ABSTRACT: Hypertension is the main reason of deaths and ranks next to diabetes amongst the chronic diseases. High blood pressure or hypertension is the generally occurring public health problem and often referred to as a silent killer. Hypertension and atherosclerosis are primarily responsible for cardiovascular diseases globally. Drug remediation solely might not be passable enough for treatment of either the hypertension or atherosclerosis without the involvement of any dietary management. Nevertheless sesame and garlic mix become a vital part in course of the cardiovascular disease therapy. Since sesame seeds have shown to have good nutritious source of manganese, calcium, iron and certain vitamins as well as dietary fiber which helps to delay the coronary heart disease by limiting the oxidation of LDL cholesterol and thereby reduce blood pressure. Similarly garlic has also shown beneficial effects on hypertension. Therefore the present study was undertaken to see the effect of sesame and garlic spicy mix powder in lowering the blood pressure.

KEYWORDS: Sesame seeds, Drug remediation, cardiovascular diseases, Hypertension.

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I. INTRODUCTION

Hypertension is named as “The Silent Killer”. It is for the reason that many might not have awareness of the existence of hypertension. Hypertension or high blood pressure occurs due to the force of blood passing through blood vessels are above normal (C. J. O'Donnell et al., 2008). High blood pressure is a significant cardiovascular threat factor. High blood pressure (BP) is ranked as the third most important risk factor for attributable burden of disease in south Asia (2010) (Lim SS et al., 2012).

Hypertension (HTN) wields an imperative public health problem on cardiovascular health status as well as healthcare systems in India (Leeder S et al., 2004 and Srinath Reddy et al., 2004). HTN is unswervingly accountable for 57% of all stroke deaths and 24% of all coronary heart disease (CHD) deaths in India (Gupta R 2004). In accordance to WHO HTN rates were commonly the most significant reasons for premature death worldwide (Mackay 2004). In accordance to the Global and Regional Burden of Disease and threat Factors study (2001) which distinctively revealed in a systematic analysis of population on health data characteristically for death and recognizable disease problems and hence has ranked second place for HTN in south Asia (Lopez 2006).

On examination of worldwide data for the global burden of HTN, 20.6% of Indian men and 20.9% of Indian women were enduring from HTN in 2005 (Kearney PM et al., 2005). The rates for HTN in percentage are proposed to rise to 22.9 and 23.6 for Indian men and women, correspondingly by 2025 (Bansal SK et al., 2012). Present studies from India have displayed the predominance of HTN to be 25% in urban and 10% in rural people in India (Thankappan KR et al., 2006; Das et al., 2005 Gupta et al., 1997). In Accordance to the WHO 2008 guesstimate, the predominance of aroused BP in Indians was 32.5% (33.2% in men and 31.7% in women) (Devi et al., 2013). Nevertheless, only about 25.6% of treated patients had their BP under control, in a multicenter study from India on awareness, medication, and adequacy of control of HTN (Gupta et al., 2012).

High blood pressure or hypertension is the most commonly widespread public health problem and often categorized to as a silent killer. The term hypertension itself causes a disorder involving tension or stress. Victor et al., (2001) illustrated hypertension as systolic pressure augmented than 120mmHg and diastolic pressure enhanced than 80mmHg. Several studies had been conducted to reduce hypertension amongst the diet has

proven to be a powerful strategy to combat hypertension. According to Retta et al., (1994) blood pressure decline was shown by dietary factors. Hence in our present study the prevalence of hypertension was reduced by using sesame seeds and garlic spicy mix powder.

II. MATERIALS AND METHODS:

1.1. Selection of Area:

The area selected for the current study was kajuluru area of East Godavari District, AP, whereby people belonging to various food habit cultures are residing. There are many polyclinics providing good medical facilities.

1.2. Selection of sample size:

A survey was conducted out in various health care polyclinics and a total number of patients in the hospital were 200 and among them 80 members were selected randomly and further from the 80 members randomly selected 40 members and sub sampled to produce 20 members and divided into 10 experimental groups and 10 control groups.

1.3. Biochemical analysis:

Collected blood samples from the subjects in order to estimate the fasting serum cholesterol, serum triglycerides and HDL cholesterol. The blood was withdrawn by Harold Varley method (1969).

Analysis of Lipid profile in blood serum:

Estimation of lipid profile was done for both the control and experimental group by following kit based method.

1.4. Estimation Of Hdl-Cholesterol

METHOD: PEG- CHOD- PAP, end point assay with lipid clearing factor (LCF).

Low density lipoprotein (LDL) Cholesterol, very low density lipoprotein (VLDL) Cholesterol and chylomicron fractions are precipitated by addition of polyethylene glycol 6000(PEG). After centrifugation, the high Density lipoprotein (HDL) fraction remains in the supernatant is determined with CHOD-PAP method.

1.5. Formulation of Sesame and garlic spicy mix powder

The ingredients for preparations of 100gm of spicy mix powder are given in table no.1

Table No. 1: Ingredients for spicy mix

Ingredients	Amount
Sesame	70gm
Garlic	20gm
Cumin seeds	5gm
Chillies	5gm
Total	100gm



Fig-1: Sesame and Garlic Spicy Mix Powder

1.6. Preparation of Sesame and garlic spicy mix powder:

- Roast the sesame seeds and grind into powder
- Add the chillies, curry leaves and garlic to the sesame powder and mix thoroughly all the ingredients.

1.7. Standardization of the spicy mix powder:

The product was standardized by repeated trails in the laboratory and by checking the organoleptic characters through trained panel members, suggestions made by the trained panel were incorporated to prepare the final product and finally product was kept for the overall organoleptic evaluation and were interpreted and discussed.

Table-2: Nutritive values of Sesame and Garlic spice mix

Ingredients	Amount (gm)	Protein (gm)	Fat (gm)	CHO (gm)	Fiber (gm)	Ca (gm)	Mg (gm)	Na (gm)	K (gm)
Sesame	70	5.81	30.31	17.5	11.96	101.5	-	-	-
Garlic	15	0.945	0.015	2.98	0.765	4.5	10.65	-	-
Cumin seeds	5	0.935	0.75	1.85	1.5	54	23.75	6.3	49
Chillies	5	0.795	0.325	1.58	-	8	-	2.7	26.5
Salt									
Total		8.485	31.4	23.91	14.025	108.5	34.4	9	75.5

Source: Nutritive values of Indian foods (Gopalan et al., 1995)

1.8. Effect of storage on organoleptic characteristics

When the quality of food product is assessed by means of human sensory organs the evaluation is said to be sensory or subjective or organoleptic evaluation appearance, flavour and mouth feel decide the acceptance of sesame and garlic spicy mix powder (Srilakshmi 2002).

1.9. Organoleptic evaluation of sesame seeds and garlic spicy mix

The prepared sesame seeds and garlic spicy mix was subjected to sensory analysis where rating scale was used to find out the overall acceptability of each sample. In this test scores were assigned for quality like appearance, colour, flavour, texture and taste. The panel members were asked to assign scores depending upon the quality of the product.

III. NUTRIENT ANALYSIS OF PREPARED SESAME SEEDS AND GARLIC SPICY MIX POWDER

3.1 Protein: Is analyzed by microkjeldhal method procedure, Fat is analyzed by Soxhlet method and Calcium by Modified clark and collip method.

3.2. Nutrient Supplementation

The supplementation was done by incorporation of sesame seeds and garlic spicy mix powder which can be used with rice, chapatti and dosa. Thirty gm of spicy mix was given to hypertensive patients per day.

The supplementation was given for 45 days. The blood pressure levels and lipid profile was assessed before and after supplementation.

3.3. Statistical analysis

The statistics were generated using Graph Pad Prism 3 software. All data were expressed as means ± SD. Changes in BP, Lipids i.e LDL, HDL, Total cholesterol and Triglycerides levels between groups were compared by analysis of covariance (ANCOVA), with adjustment for baseline values. The subjectable variables under study categorized as before and after the administration within groups, which were compared by Student’s paired t-test.

3.4 Results

3.4.1. Age and sex of the sample

Age and sex is the most important factor for assessing nutritional status.

Table-3: Percentage distribution of the sample according to age and sex

S.No.	Sex	Sample Size	Age	
			40-50	50-60
1.	Male	11(55)	6(54.55)	5(45.45)
2.	Female	9(45)	6(66.67)	3(33.33)

The data in table-3 shows that distribution of sample according to age and sex. It reveals that the majority of the hypertensive were in the age group of 40-50 years age (66.67%) and males are (54.55%). This data indicates that prevalence rate is more during 40-50 years age.

3.4.2. Dietary Assessment

Table-4 Percentage distribution of sample according to frequency of food intake

S.No.	Aspects	N=20	40-50 yrs	50-60yrs
1.	Vegetarian	1(5)	1(100)	-
2.	Non-Vegetarian	19(95)	11(57.89)	8(42.11)
S.No.	Frequency of intake (Non-Veg)	Total N=20	Age 40-50	50-60
1.	Not taking	1(5)	1(100)	-
2.	Weekly Once	13(65)	7(53.85)	6(46.15)
3.	Weekly Twice	6(30)	4(66.67)	2(33.33)

The present study results in similar to the Statement of Black HR et al., (2003), who stated vegetarian have long been known to have lower blood pressure than meat eaters.

3.4.3. Heredity

Individuals with high blood pressure were found to have the highest exchange rate than those with normal blood pressure who had significantly lower exchange rates and few with normal blood pressure who had a family history of hypertension, had high exchange rates suggesting that those individuals were genetically susceptible to the development of hypertension.

Table-5: percent distribution of sample according to age and heredity

S.No.	Heredity	Total N=20	Age	
			40-50	50-60
1.	Yes	11(55)	5(45.45)	6(54.55)
2.	No	9(45)	7(77.78)	2(22.22)

Vijaya et al., (1983) reported that the role of heredity is prime importance in understanding of the nature of chronic diseases and found a significant difference in serum cholesterol levels between relatives of 1 HD patients.

The data in the table-5 indicates the percent distribution of sample according to the age and heredity factor. Majority (55%) of subjects has family history of hypertension, followed by no family history (45%).

3.4.4. Product development

Formulation of spicy mix with sesame and garlic

Garlic has potential in the prevention and control of cardiovascular disorder and is beneficial when taken as a dietary supplement. Garlic has much beneficial effects against atherosclerosis, hyperlipidemia and hypertension. Therefore during the formulation other ingredients such as Jerra, curry leaves were added to improve flavour, taste and appetite etc.

Table-6: Organoleptic evaluation of formulated Spicy mix powder

S.No.	Attributes	Sesame seeds garlic spicy mix Mean±SD
1.	Appearance	5.00±0.63
2.	Color	5.60±0.49
3.	Flavour	4.80±0.75
4.	Astringency	4.60±0.80
5.	Spicy	7.40±0.80
6.	Mouth feel	6.40±0.49
7.	After taste	4.60±0.49
8.	Overall acceptance	6.20±0.75

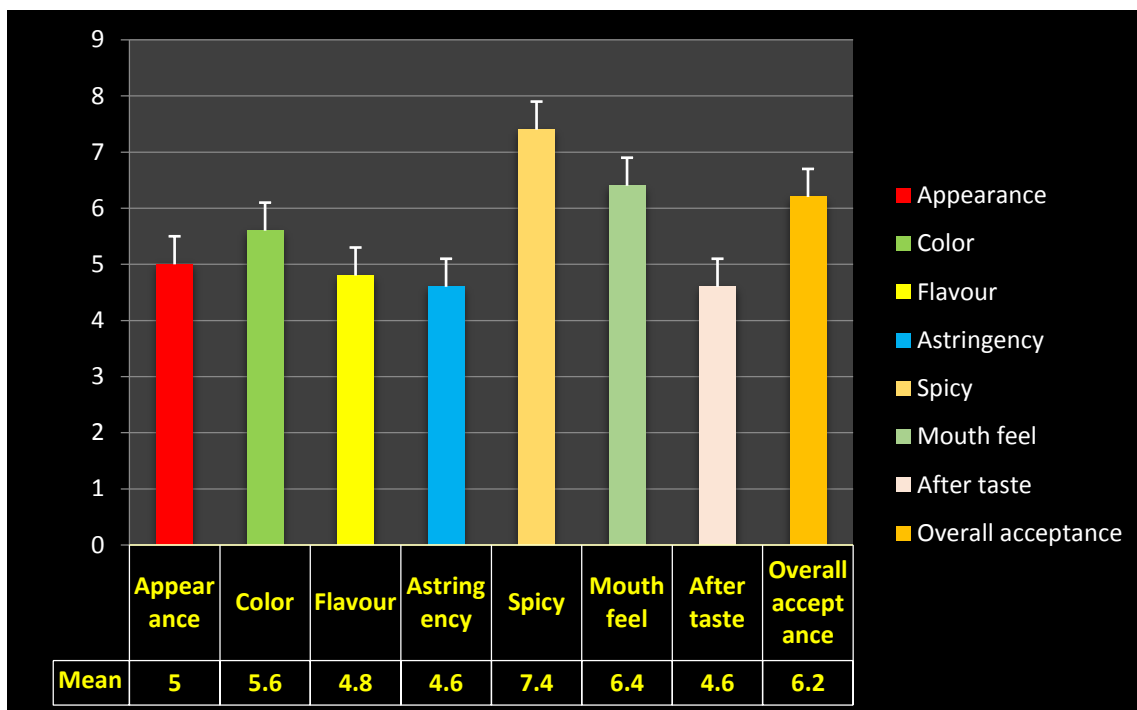


Fig-2: Organoleptic evaluation and Mean scores for formulated spicy mix powder

Table-6 and Fig-2 depicts organoleptic evaluation and mean scores for the developed spicy mix powder. There are several steps involved in a few product development among which taste panel stage is the most important (Baker et al., 1994). In the taste panel stage various attributes of the product like appearance, colour, texture, mouth feel are judged by trained members.

3.4.5. Nutrient analysis from prepared products

Data in table-7 depicts the nutrients analysis of sesame and garlic spicy mix powder developed.

Table-7: Analyzed nutrient in sesame seeds and garlic spicy mix powder

Nutrients	Sesame and garlic spicy mix 100g
Protein (g)	8.248
Fat (g)	30.45
Calcium (g)	1075.4

3.4.6. Effect of storage on the organoleptic characteristics of the developed spicy mix

The storage or the shelf life of any product places a very important role in increasing its acceptability on storage. Foods undergo a number of changes both chemically and enzymatically which might bring about deteriorative changes in flavour, colour, taste and appearance of the product leading to decrease in acceptability of the product. Generally chemical additives are used to increase the shelf life of the various commercial products.

The effect of storage on organoleptic characteristics of spicy mixes was assessed by a panel of 5 members using rating scale. The panellists were selected according to the guidelines given by the Indian standards (1972). The fresh products were prepared and storage in air-tight containers to see the effects of storage on the organoleptic characteristics and microbial count are tabulated.

Table-8: Mean and standard values of effect of organoleptic characteristics of spicy mix

Organoleptics characteristics	Fresh	4days	I week	II week
Appearance	5.00±0.63	5.00±0.63	4.20±0.40	3.80±0.75
Colour	5.60±0.49	5.60±0.49	5.00±0.63	4.60±0.49
Mouth feel	6.40±0.49	6.40±0.49	6.00±0.63	4.80±0.98
Flavour	4.80±0.75	4.80±0.75	4.80±0.75	3.60±0.49
Spiciness	7.40±0.80	7.40±0.80	7.40±0.80	6.20±0.75
Astringency	4.60±0.80	4.60±0.80	4.40±1.02	3.00±0.63
After taste	4.60±0.49	4.60±0.49	4.40±0.49	3.20±0.40
Overall acceptance	6.20±0.75	6.20±0.75	5.40±0.80	4.60±1.02
	44.60	44.60	41.60	33.80

The results in table-8 shows that on storage of product some deteriorating changes were found in terms of appearance, colour, taste, texture, flavour and over all taste. The deterioration starts in spicy mixes in first week to second week. In second week texture has changed and giving off taste and increased astringency. Thus indicating that the product can be stored only for a week.

Microbial count was done for the fresh product, after I week and II week by using platelet count and the results were tabulated in table-9.

Table-9: Mean Microbial count for developed Spicy mix powder

Recipe	Fresh	I week	II Week
Sesame and garlic mix	1.11 X 10 ¹¹	1.2 X 10 ¹¹	1.4 X10 ¹¹

The data in table-9 shows microbial count of products. There is a significant deterioration from fresh to second week. Thus it can be concluded that the spicy mix can be stored up to 1 week without undergoing any deteriorating changes.

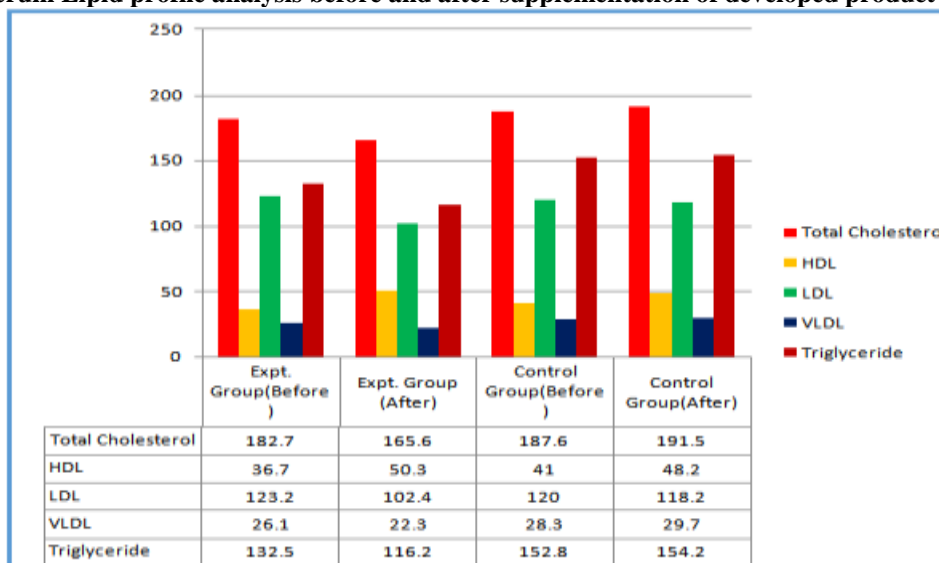
Hence in conclusion it can be said the developed spicy mix had a satisfactory nutrients composition moderate, shelf life and high acceptability.

3.4.7. Effect of supplementation of spicy mix powder on Blood pressure compared with control and experimental group

Group		Blood pressure	T value
		Mean ±SD	
Experimental group (N=80)	B	154.700±5.984	0.811
	A	152.500±6.152	
Control group (n=20)	B	156.000±11.790	0.945
	A	160.700±10.402	

Blood pressure apparatus (sphygmomanometer) used to read the blood pressure of patients. In the blood pressure reading, the first figure is the systolic blood pressure and the second, the diastolic blood pressure. The normal blood pressure 120/80mm/Hg. The mean difference in blood pressure of experimental group before and after supplementation with 30 gm of sesame and garlic spicy mix. It was observed that after supplementation with sesame and garlic mix there was a decrease in the blood pressure from 154.700 mg/dl to 152.500 mg/dl and these values are statistically not significant.

3.4.8. Serum Lipid profile analysis before and after supplementation of developed product



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The Fig-3 reveals that the comparison between mean before value of control group and before value of experimental group.

The results shows that in both the groups i.e., control and experimental groups significant difference was observed in total cholesterol, VLDL and triglyceride and no significant difference observed in HDL and LDL.

3.5. Discussion

Hypertension is the most common problem faced by many worldwide. Hypertension is characterized as systolic blood pressure of at least 90 mmHg (Stamler J et al., 1989). William et al., (1983) accounted that as many as 65% of the aged population who had their first stroke had a prior history of hypertension. Several reports carried out by numerous earlier studies, in which supplementation of either vitamin E or sesamin and sesamol as well as garlic mix demonstrated that these antioxidants inhibit lipid peroxidation [Cooney RV et al., 2001; Ikeda S et al., 2003; Kang MH et al., 1998; Nakai M et al., 2003 and Yamashita K et al., 1995]. The antioxidant effect is expected to contribute to dwindle the endothelial dysfunction from free radicals [Ito H et al., 1995], resulting in an augmentation in the vasorelaxing factor, nitric oxide (NO) (Ward et al., 2004).

To the paramount of our knowledge, this study is one of the first investigations that were conducted to assess the effect of sesame seed and garlic spicy mix to analyse on lipid profile. Even though no earlier studies have directly investigated the effect of sesame and Garlic spicy mix powder on BP, Lipid content. Although several studies have reported the potential antihypertensive effect of sesame's contents (Sankar D et al., 2006). Our study revealed a significant decrease in serum cholesterol from 182.700 mg/dl to 165.600mg/dl with difference of 19.1 mg/dl.

Similarly there was decrease in serum HDL levels from 132.500mg/dl to 116.200mg/dl with a difference of 16.3mg/dl. The fig-3 emphasizes that after supplementation with sesame and garlic spicy mix, the results have shown that in both groups i.e control and experimental groups there was significant difference in total cholesterol, VLDL and triglyceride but not in HDL and LDL. This might be due to the insufficient time period of supplementation.

Nevertheless several reports support our results and emphasize the antioxidant effects of sesame and garlic spicy mix (Sankar D et al., 2011; Abou-Gharbia HA et al., 2000, Biswas et al., 2010). Significantly, in our current study there have no apparent side effects from the consumption of sesame and garlic spicy mix powder. Hence throughout this study entails that it might be safe as a nutritional supplement for health promotion.

IV. CONCLUSION

In total it can be concluded that sesame and garlic spicy mix effectively reduces blood pressure levels and blood cholesterol levels. From the results it was evident that there was a decrease in blood pressure and lipid profiles after supplementation. On the whole it can be concluded that the sesame and garlic spicy mix have much medicinal importance and can be used effectively in the reduction of blood pressure and hypertension as well as subsequently blood cholesterol levels and thereby prevent cardiovascular diseases.

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Competing interests

The authors declare that they have no competing interests.

Consent for publication

Not applicable.

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