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Impact of Exercise and Garlic in the Self-Management of Hypertension: The Psychological Implication

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Abstract: The study examined impact of exercise and garlic in the self-management of hypertension among three women who were purposively selected, monitored for a period of six (6) months and interviewed in-depth on their engagement in long walks and garlic consumption. A Henson (HS 126) tape recorder was used to record the responses of the three participants. Their blood pressures were measured in the morning with the sphygmomanometer by nurses who were health care providers for the women. It was demonstrated that with this technique the three clients ceased medication entirely after a period of six (6) months. The study established that women who adhered to self-regulated exercise and garlic consumption were able to control their hypertension and remained asymptomatic. The study employed a single-subject design. Psychological implications were discussed.

Key words: Exercise · Garlic · Hypertension · Adult sufferers · Sphygmomanometer

INTRODUCTION

Blood pressure elevation popularly known as hypertension, sometimes called arterial hypertension is a chronic medical condition in which the blood pressure in the arteries is elevated [1]. It occurs when arteries experience increased pressure on the artery walls. This requires the heart to work harder than normal to circulate blood through the blood vessels. [2] defines hypertension as the amount of blood that is exerted on the arteries of the body as the blood circulates round the system. The human body is so constituted that there must be a balance between the contraction of the left ventricle of the heart and the amount of blood pumped into the aorta [2]. Blood pressure is summarized by two measurements, systolic and diastolic, which depend on whether the heart muscle is contrasting (systole) or relaxed between beats (diastole). Normal blood pressure at rest is within the range of 100-140mmHg systolic (top reading) and 60-90mmHg diastolic (bottom reading). Hypertension is said to be present if it is persistently at or above 140/90mmHg [2]; [1]. The only reliable way to measure the blood pressure is by using the sphygmomanometer and the best time to measure the blood pressure is in the morning shortly after rising.

There are basically two classifications of hypertension; popularly known as primary (essential) and secondary hypertension. Primary (essential) hypertension indicates that no specific medical cause can be found to explain a patient's condition. About 90-95% of hypertension is essential hypertension [1]. The vast majority of blood pressure elevation diagnoses fall into this category. This classification means that the physician or health care team is not able to locate a single cause which explains the elevated blood pressure. A modest number of high blood pressure diagnoses are classified as "secondary hypertension." The classification differs from a diagnosis of primary hypertension because in this case, a clearly identifiable cause of the hypertension is determined. Importantly hypertension on diagnosis includes understanding whether the disorder is "primary" (essential)" or "secondary." These two classifications form the basis of determining the underlying cause of the disorder. Because the management strategies and treatment options available depend on the underlying cause of high blood pressure, it is important to understand which type of hypertension an individual suffers. It is pertinent to consult with one's physician or healthcare provider on proper guidance on diagnosis and management strategy. Usually when it is secondary

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hypertension, if the doctor is able to remove the underlying cause, the person's blood pressure normalizes. However, when the disease is tagged primary or essential hypertension, the individual tend to live with it and therefore has to manage it for life.

Because hypertension is affected by diet, lifestyle and lack of exercise, it requires self-management. In healthcare self-management means the interventions, training and skills by which patients with chronic condition, disability or disease can effectively take care of themselves and even learn to do so [3]. In the aspect of managing hypertension, the person engages in lifestyle activities that reverses, eliminates and even prevents such a disease condition. Self-management of hypertension involves knowing and keeping low the systolic and diastolic counts to at most 120/80 and at least 110/70. Hence, this work explores engagement in long walks and radical garlic consumption as lifestyle activity that reduces hypertension. Best known natural remedies or treatments for hypertension is engaging in regular exercise as well as integrating garlic into daily diet.

Numerous studies for instance [4], [3]; [5] recognize that there is a direct relation between physical inactivity and cardiovascular mortality and physical inactivity is an independent risk factor for the development of coronary artery disease. Conversely many researchers, example [6] note that regular aerobic physical activity increases exercise capacity and play a role in both primary and secondary prevention of cardiovascular disease. Exercise can help control blood lipid abnormalities, diabetes and obesity. In addition, aerobic exercise adds an independent blood pressure–lowering effect in certain hypertensive groups with a decrease of 8 to 10 mm Hg in both systolic and diastolic blood pressure measurements [7]. There is a dose-response relation between the amount of exercise performed from approximately 700 to 2000 kcal of energy expenditure per week and all-cause mortality and cardiovascular disease mortality in middle-aged and elderly populations. The greatest potential for reduced mortality is in the sedentary who become moderately active [8]. Most beneficial effects of physical activity on cardiovascular disease mortality can be attained through moderate-intensity activity (40% to 60% of maximal oxygen uptake, depending on age) [9]. The activity can be accrued through formal training programs or leisure-time physical activities.

Many activities of daily living require more arm work than leg work. Activities such as walking, hiking, stair-climbing, aerobic exercise, calisthenics, jogging, running, swimming, dancing and sports such as tennis, soccer, basketball and football are especially beneficial when performed regularly. Brisk walking is also an excellent choice. These activities involve leg as well as arm and arms respond like legs to exercise training. Persons of all ages should include physical activity in a comprehensive program of health promotion and disease prevention and should increase their habitual physical activity to a level appropriate to their capacities, needs and interest. Persons with hypertension require using their arms as well as their legs in exercise training.

Exercise though a key ingredient to increase metabolism and improve general wellbeing may sound boring (and can be). It is also associated with pain and injury. With the busy lives most people live, there are many reasons people don't exercise. Exercise can sometimes be the last thing on a person's list with a schedule filled with demanding jobs and children. Women are most in jeopardy. However, what most people do not realize is that regular exercise can make life easier. A busy schedule is the most common reason people choose not to exercise. Whether the busy schedule is due to a job or children or both, many people can't imagine fitting exercise into a packed day. However exercise can be fit in almost any schedule by spending even 15 minutes of exercise daily or 30 minutes of exercise every other day.

Some others complain of space as well as limited budget that prevent a person from affording a gym membership. It seems quite obvious that someone who complains of space shows signs of outright hatred to exercise. When a person hates exercise, it can be because she/he finds it boring or painful. Lots of people get injured and have sores as a result of probably choosing the wrong exercise. Eventually they might become discouraged. However, finding the right exercises that are enjoyable will help prevent boredom. Some people do best by taking up a physical activity hobby instead of traditional exercise. Dancing, karate and playing football are three examples of ways to spice up exercise. Similarly, there are other ways to get exercise without spending a lot of money. Some recreational centers have low cost or free exercise classes. People can also exercise at home without expensive equipment. Majority have attempted to make exercise a routine and failed if a person has experienced many failed exercise attempts where she felt like the exercise was ineffective or gave up on a workout routine, she might feel discouraged. If a person gets easily bored with exercise, changing an exercise routine frequently can help keep her focused on exercise [10].

Garlic can help lower hypertension and improve health. Garlic (Allium Sativum), as an active ingredient can be combined with African spinach or leafy green (Spinacia Oleracea), fluted pumpkin leaves (Telfairia Occidentalis), waterleaves (Talium Triangulare) and Onion (Allium Sepa). The above-named traditional soup vegetables are prepared normally in addition to fish, crayfish and a little salt as hypertensive patients are advised to eat little salt and palm oil which contains antioxidants are cooked for not more than two minutes. 8 to 12 cloves garlic is recommended to be eaten two or three times a day for about six or seven months, subsequently once a day and gradually reduced to three times a week. This is usually used when hypertensive drugs prove abortive especially where anxiety and insomnia are present. It might as well be used in combination of medication. For some reasons it is preferable to moderately cook garlic and add other vegetables. First and foremost is to reduce the odor, make it palatable and appetizing. Again, because garlic is a blood thinner, it requires that it is eaten in combination of other vegetable to avoid anemia.

[2], notes that garlic (*Allium sativum*) belongs to the allium family, which comprises some 700 species. When garlic is eaten, its odor impregnates all the body secretions: breath, sweat, urine, belches, saliva and even the milk of a breastfeeding mother. The odor is the reason why many people do not like eating garlic, however, that of the breath is reduced when garlic is cooked. [2], notes that the peculiar smell is a result of the presence of diallyl disulphide an enzyme derived from allicin, which is a by-product of allinase). Garlic contains alliin, niacin and vitamins A1, B1, B2 and C. As volatile substance, allicn and diallyl dysulphur easily permeate all body organs and tissues making it impossible to hide the smell. The body organs which benefits most from garlic are the organs of elimination such as Lungs, bronchi, Liver, Kidneys and the skin [2]. As the body increases production of an enzyme called angiotensin I-converting enzyme, or "ACE", blood pressure increases. Pharmaceutical drugs called ACE inhibitors work by blocking the formation of this enzyme, but they have multiple side effects [3]. Garlic contains gamma-glutamylcysteine, a natural ACE inhibitor. This chemical, in combination with the high allicin content, give garlic its ability to dilate arteries, thereby lowering blood pressure [11]. A fresh clove of garlic (4 grams) contains 1% allicin. You can dice up one fresh garlic clove daily and add it to your dishes, but it may leave you with rather unpleasant breath [11].

The antihypertensive abilities of garlic are largely due to its main active ingredient sulfides, specifically, an organosulfur compound called allicin. Allicin is found in aged garlic extract, but it is also formed when fresh garlic is crushed or chopped, basically that is the only way you can get it out of fresh garlic [12]. Garlic also contains an organic compound called S-Allyl cysteine (SAC), which may have cholesterol-lowering effects. Garlic-derived polysulfides are known to enhance endothelial nitric oxide (an enzyme that helps protect the cardiovascular system) and stimulate the production of hydrogen sulfide, a vascular gasotransmitter (a gaseous molecule that sends chemical signals which trigger changes in the body). Basically, this reduces blood pressure and induces vasodilation, which allows the blood vessels or the smooth muscle cells to relax. It is thought that sulfur deficiency may also play a part in the development of hypertension [12].

Garlic has a low toxicity meaning it can be consumed in high quantity without endangering health [13]. Nevertheless, it is quite important to discuss with one's doctor when on medication because garlic can alter the functioning of various medications even though some doctors might think it is a mere food supplement For instance, garlic supplementation is thought to interfere with the effectiveness of an HIV drug called saquinavir [12]. Garlic has blood thinning qualities that can pose risks in certain situations [13], especially when one plans to have surgery or is taking medicine that are co-blood thinners such as vitamin E and Omega -3 fatty acids or other drugs that can be affected by blood thinners. Garlic can also cause upset stomach, heartburn, allergic reactions, halitosis and body odor. However, [12] notes that aged garlic extract is not known to interact with blood pressure-lowering or blood-thinning drugs.

Statement of the Problem: As a result of increasing sedentary life-style, consumption of over- processed diet as well as familial factors, there is rapid increase in the development of non-communicable diseases especially cardiovascular diseases prevalently hypertension. [11] note that as the body increases its production of an enzyme called angiotensin I-converting enzyme, or "ACE", blood pressure increases. Pharmaceutical drugs called ACE inhibitors work by blocking the formation of this enzyme, but they have multiple side effects [13]. Besides, some of the anti-hypertensives drugs are not effective. Physical activity has been shown to be beneficial to a wide range of health conditions like hypertension. Garlic contains gamma-glutamylcysteine, a natural ACE inhibitor which, in combination with the high allicin content, give garlic its ability to dilate arteries,

thereby lowering blood pressure [12]. Hence the study poses the following question:

- Will 20-60 minutes long walks done at least three times a week result in observable reduction of hypertension using the sphygmomanometer for measurement?
- Will regular consumption of 7-12 cloves of chopped and slightly heated garlic eaten 2-3 times daily for a period of six months result in observable reduction of hypertension using the sphygmomanometer for measurement?

Purpose of the Study: The study examines impact of exercise and garlic in the self-management of hypertension: the psychological implications. The researcher aims at understanding whether combination of:

- Regular 20-60 minutes long walks done at least three times a week will result in observable reduction of hypertension using the sphygmomanometer for measurement.
- And regular consumption of 7-12 cloves of chopped and slightly heated garlic eaten 2-3 times daily for a period of six months will result in observable reduction of hypertension using the sphygmomanometer for measurement.

Theoretical Review

Theory of Planned Behavior (Ajzen,I 1985): [6] proposed the theory of planned behavior through his article "From intentions to actions". The theory was developed as an extension of the theory of reasoned action [9]. The theory of reasoned action was in turn grounded in various theories of attitude such as learning theory, expectancy value theory, consistency theories (such as Heider's Balance Theory, Osgood and Tannenbaum's Congruity Theory and Festinger's Dissonance Theory) and attribution theory. According to the theory of reasoned action, if people evaluate the suggested behavior as positive (attitude) and if they think their significant others want them to perform the behavior (subjective norm), this results in a higher intention (motivations) and they are more likely to do so. A high correlation of attitudes and subjective norms to behavioral intention and subsequently to behavior, has been confirmed in many studies [10].

The notion of the behavioral intention; a person's intention of performing a given behavior is the best predictor of whether or not the person will actually perform the behavior. It is based on the premise that the best predictor of an actual behavior is the behavior a person actually intends to do. There are three models used in the theory; attitude toward the specific act or behavior, the normative component- our belief about what values others expect us to do and perceived behavior control, which is the degree to which a person can control the behavior.

The Theory of planned behavior maintains that these three models relate and end up influencing intentions and behaviors. Theory of Planned Behavior suggests that more favorable attitudes toward specific act, more favorable subjective norms and greater perceived behavioral control strengthen the intention to perform the behavior. This basically states that if there is a more favorable attitude towards a behavior, it is accepted socially and the person has more control over that specific behavior, they are more likely to perform that behavior. Such as joining an exercise program at the stadium or gym even though one might not find it funny. However, there can always be obstacles that keep someone from performing a behavior. You could "have the best intentions" such as trekking 30 to 60 minutes every day, but then you have extra work hours, a birthday party, or other things that prevent you from actually doing that.

The theory of planned behavior has been applied by researchers in various fields in other to influence people's attitude towards important issues. In particular, recently, several studies found that the theory of planned behavior would better help to predict health-related behavioral intention than the theory of reasoned action [6], given that the theory of Planned Behavior has improved the predictability of intention in various health-related fields such as condom use [4] [5] & [6]exercise,[7] and diet [8].In this research, the theory of planned behavior explains why participants under exercise and garlic therapy would want to adopt it. Although the daily practice of exercise like taking a long walk and trekking short distances might be difficult for someone to imbibe. The idea of the outward benefit of losing weight, combating insomnia and of perceived longevity attached acts as propeller of the action. Hence the individual who is sick and requires exercise to be alive develops interest in exercise (i.e. positive attitude). Almost everyone is aware and concurs at least verbally that exercise is beneficial to a wide range of health issues (i.e. normative component). The fact that the individual knows that he or she can at least get up and jug or engage in any form of exercise is important for action (perceived behavioral control).

Operant Conditioning Theory (E.L Thorndike, 1932): Operant conditioning was first discovered in the basement of a house in Cambridge, Massachusetts by a twenty four year old man, who later became one of the most influential psychologists, Edward L. Thorndike. Through operant conditioning, the organism associates his behaviors with consequences. Behavior followed by reinforcement increases; those followed by punishment decreases. In the aspect of engaging in long walks and garlic consumption, if the individual involved observes positive health changes as a result of the technique, there is every possibility of the behavior being strengthened and maintained. Operant conditioning teaches us the relations between environmental stimuli and our own behavior. The term operant refers to the fact that an organism learns through operating on the environment.

Thorndike propounded laws of effect, exercise and readiness: the law of effect stated that those behavioral responses that were most closely followed by a satisfying result were most likely to become established patterns and to occur again in response to the same stimulus. The law of exercise stated that behavior is more strongly established through frequent connections of stimulus and response. Thorndike's law of exercise has two parts; the law of use and the law of disuse. Law of use- the more often an association is used the stronger it becomes. Law of disuse- the longer an association is unused the weaker it becomes. The technique of exercise and garlic requires constant practice which in turn yields positive health benefits. Consequently the more the individual practices the better the results comes out and the stronger the link between the technique and the behavioral response which is feeling of mental relaxation and psychological wellbeing.

The Free Radical Theory of Aging (Denham Harman, 1950): Harman [9] conceived the free radical theory of aging when prevailing scientific opinion held that free radicals were too unstable to exist in biological systems. This was also before anyone invoked free radicals as a cause of degenerative diseases [9]. Two sources inspired Harman: (1) the rate of living theory, which holds that lifespan is an inverse function of metabolic rate which in turn is proportional to oxygen consumption, (2) Rebbeca Gershman's observation that hyperbaric oxygen toxicity and radiation toxicity could be explained by the same underlying phenomenon: oxygen free radicals [9]; [4]. Noting that radiation causes "mutation, cancer and aging", Harman argued that oxygen free radicals produced during normal respiration would cause cumulative damage which would eventually lead to organismal loss of functionality and ultimately death [9]; [4].

In later years, the free radical theory was expanded to include not only aging *per se*, but also age-related diseases [4]. Free radical damage within cells has been linked to a range of disorders including cancer, arthritis, atherosclerosis, Alzheimer's disease, hypertension and diabetes [4]. There has been some evidence to suggest that free radicals and some reactive nitrogen species trigger and increase cell death mechanisms within the body such as apoptosis and in extreme cases necrosis [11].

[4] modified his original theory to what became known as the mitochondrial theory of aging [4]. In its current form, this theory proposes that reactive oxygen species that are produced in the mitochondria, causes damage to certain macromolecules including lipids, proteins and most importantly mitochondrial DNA [13]. This damage then causes mutations which greatly enhances the accumulation of free radicals within cells [13]. This mitochondrial theory has been more widely accepted that it could play a major role in contributing to the aging process [12]. Since Harman first proposed the free radical theory of aging, there have been continual modifications and extensions to his original theory [3]. Free radicals that are thought to be involved in the process of aging include superoxide and nitric oxide [5]. Specifically; an increase in superoxide affects aging whereas a decrease in nitric oxide formation, or its bioavailability, does the same [5].

Antioxidants are helpful in reducing and preventing damage from free radical reactions because of their ability to donate electrons which neutralize the radical without forming another. Ascorbic acid for example, can lose an electron to a free radical and remain stable itself by passing its unstable electron around the antioxidant molecule [7]. This has led to the hypothesis that large amounts of antioxidants [2] with their ability to decrease the numbers of free radicals, might lessen the radical damage causing chronic diseases and even radical damage responsible for aging.

Empirical Review

Exercise and Blood Pressure Elevation Management: Exercise as a lifestyle modification is beneficial to a wide variety of health conditions. Moderate-intensity exercise such as: walking, bike riding and other activities that moderately raise the heart rate have been scientifically documented to effectively lower blood pressure in hypertensive patients, perhaps more so than vigorous-

intensity exercise [14]. Specific to hypertension, the benefits of exercise have been promoted by a number of organizations and agencies including the American Heart Association, the American College of Sports Medicine and the Surgeon General of the United States, the National Institutes of Health and the Centers for Disease Control [3].

Most exercise prescriptions for hypertensive patients include duration of 20-60 minutes of aerobic exercise performed 3-5 times a week [3]. Several studies confirm the results of low to moderate training being just as efficient in lowering blood pressure compared to high intensity cardiovascular exercise [15]. The fitness level of the individual may also play a central role in determining optimal intensity. A study of 49 middle-aged men with high normal (SBP = 130-139 mmHg; DBP = 85-89 mmHg) to Stage 1 (SBP = 140-159 mmHg; DBP = 90-99 mmHg) hypertension, randomly assigned to a light or moderate exercise protocol, found reductions in BP from the lower intensity were more prevalent in the older, less fit male participants; whereas the moderate intensity exercise was more effective in the physically fit men [16]. Although more research is needed to better specify an optimal exercise intensity to reduce BP, the general guidelines of moderate intensity exercise performed for 30 minutes or more on most days of the week are appropriate for successfully lowering elevated blood pressure levels and can be readily implemented for many populations of men and women. Moderate exercise programs are also maintained easier and impart less musculoskeletal injury for previously sedentary populations, who are not accustomed to vigorous physical exercise [15].

In addition, there is a significant amount of evidence that aerobic training helps to reduce elevated blood pressure. Example, in a meta-analysis (statistical technique that combines the results of several studies) of 54 clinical trials, findings (in hypertensive men and women) included a reduction in SBP by an average of 3.84 mmHg and 2.58 mmHg for DBP [17]. In addition to aerobic exercise, many people are now enthusiastically participating in rigorous exercise. Although there is relatively little research on elevated blood pressure and rigorous exercise as compared to aerobic training/ blood pressure studies, one meta-analysis found a decrease of 3.2 mmHg and 3.5mmHg for systolic and diastolic BP, respectively [18] [19] say, ‘there is debate on the BP benefits of rigorous training, as an association has been shown between vigorous training and reduced arterial compliance (meaning the arteries stiffen and do not expand as well to increased blood flow). The reduction in arterial compliance can lead to an increase in systolic BP. However, it has also been shown that aerobic training performed in conjunction with intensive training negated the decrease in arterial compliance [19]. This suggests that rigorous training be accompanied with aerobic training as a hypertensive intervention strategy, which is in agreement with the American College of sports medicine recommendations for the prevention, treatment and control of hypertension [20]. Aside from traditional aerobic and resistance exercise modalities, another Chinese study found that qigong (a series of relaxation, breathing, gentle movement and walking exercises) also resulted in the reduction of both systolic and diastolic BP [20].

Garlic and Self-Management of Hypertension: In a double-blind, randomized, placebo-controlled study conducted at National Institute in Melbourne published in the journal *Integrated Blood Pressure Control* in January 2016, [12] demonstrated that garlic extract was as effective as the standard blood pressure medication for hypertensive patients. In the study, 88 uncontrolled hypertensive patients received either an aged garlic extract or a placebo. Besides blood pressure, the aged garlic extract was also shown to benefit total cholesterol and low-density lipoprotein (LDL, or “bad”) cholesterol. A study conducted by researchers from the Russian Academy of Medical Sciences investigated the effects of time-released garlic powder tablets on men with mild to moderate high blood pressure. The research showed that taking a 600 mg time-released garlic tablet decreased blood pressure levels [21]. [22], has also cited several studies, mostly from the Soviet Union and Bulgaria, which indicate that garlic and its extracts exhibit antihypertensive activity. Besides subjective improvement, the results of these studies indicated a moderate hypotensive effect involving a drop in SBP of 20–30 mmHg and in DBP of 10–20 mm Hg. Another study in China on 70 hypertensive patients who were given garlic oil equivalent to 50gm of raw garlic/day, 47 patients showed moderate to marked reduction in blood pressure [23].

[23]’s review of effects of garlic on cardiovascular diseases note the following scientific statements: Raw garlic homogenate has been the major preparation of garlic subjected to intensive scientific study, as because it is the commonest way of garlic consumption. Raw garlic homogenate is essentially same as aqueous extract of garlic, which has been used in various scientific studies. Allicin (allyl 2-propenethiosulfinate or diallyl

thiosulfinate) is thought to be the principal bioactive compound present in aqueous garlic extract or raw garlic homogenate. When garlic is chopped or crushed, allinase enzyme, present in garlic, is activated and acts on alliin (present in intact garlic) to produce allicin. Other important sulfur containing compounds presents in garlic homogenate are allyl methyl thiosulfonate, 1-propenyl allylthiosulfonate and ã-L-glutamyl-S-alkyl-L-cysteine. The adenosine concentration increases several-fold as the homogenate is incubated at room temperature. The enzyme allinase responsible for converting alliin (S-allyl cysteine sulphoxide) to allicin is inactivated by heat. Thus the water extract of heat-treated garlic contains mainly alliin. Since garlic powder is a simply dehydrated, pulverized garlic clove, the composition, especially allinase activity of garlic powder is identical to those of fresh garlic.

However, dehydration temperature should not exceed 60°C, above which allinase is inactivated [24]. Another widely studied garlic preparation is aged garlic extract (AGE). Sliced raw garlic stored in 15–20% ethanol for 20 months is referred to as AGE [23]. This whole process is supposed to cause considerable loss of allicin and increased activity of certain newer compounds, like S-allylcysteine (SAC), S-allylmercaptocysteine, allixin and selenium which are stable, highly bioavailable and significantly antioxidant [25]. Another recently identified antioxidant compound of AGE is N-alpha-(1-deoxy-D-fructos-1-yl)-L-arginine (Fru-Arg) which is not present in raw or heat treated garlic [26]. [23] observe that medicinally used garlic oil is mostly prepared by steam-distillation process. Steam-distilled garlic oil consists of the diallyl (57%), allyl methyl (37%) and dimethyl (6%) mono to hexa sulfides. A typical commercial preparation of garlic oil contains diallyl disulfide (DADS, 26%), diallyltrisulfide (DATS, 19%), allyl methyl trisulfide (15%), allyI [23].

[27] notes that garlic supplements should only be used after seeking medical advice, as garlic can thin the blood or interact with some medicines. In a latest study, researchers from the University of Adelaide, Australia, looked at the effects of four capsules a day of a supplement known as aged garlic for 12 weeks. They found systolic blood pressure was around 10mmHg lower in the group given garlic compared with those given a placebo. Reid, [28], notes "Garlic supplements have been associated with a blood pressure lowering effect of clinical significance in patients with untreated hypertension [29], senior cardiac nurse at the British Heart Foundation, said using garlic for medicinal purposes dates back thousands of years, but it is essential that scientific research proves that garlic can help conditions such as raised blood pressure. She said: "This study demonstrated a slight blood pressure reduction after using aged garlic supplements but it is not significant enough or in a large enough group of people to currently recommend it instead of medication

Spinach (Spninacia Oleracea) is a wonderful green leafy vegetable often recognized as one of the functional foods for its nutritional, antioxidant and anticancer constituents (amongst numerous and medicinal value of spinach is good amount of minerals like potassium, magnesium, copper and zinc). Potassium is an important component of cell and body fluids that helps in controlling heart rate and pressure. Manganese and copper are used by the body as co-factor for the antioxidant enzymes, superoxide dismutase. Copper is required in the production of red blood cells. Zinc is a co-factor in many enzymes that regulate growth and development, sperm generation, digestion and nucleic acid synthesis. It is also rich in omega-3 fatty acid. Regular consumption of spinach in the diet helps prevent osteoporosis (weakness of the bone) besides it is believed to protect the body from cardiovascular disease and cancer of colon and prostate.

According to Justus Healthy Eating.com (2012) fluted pumpkin (ugu) leaf like every dark green leafy vegetable is rich in dietary properties such as calcium, iron, potassium and some levels of folic acid and manganese. The leaf equally contains high levels of vitamin A and K and also vitamins C, B2 and E. the leaf has great antioxidant capacities to help in restoring damaged cells and skin. Justus Healthy Eating.com (2012) has it that ugu-leaf protects the heart and liver from harmful toxins and painkiller like paracetamol. He notes that, it reduces the risk of heart disease because it contains a lot of natural anti-inflammatory. It has lots of phytonutrients which are thought to reduce the risks of breast and stomach cancers.

Waterleaf (talium triangulare) is a rich source of chemical substances (flavonoids, alkanoids and tannins) helpful in the management of cardiovascular diseases such as stroke and obesity [30]. They noted that the high level of flavonoids show that the vegetable is good for the management of cardiovascular diseases and oxidative stress, since flavonoids are biologic antioxidants. Traditional herbalists have long used waterleaf singly or in combination with other herbs in treatment of ailments. Example [2] recommends waterleaf roots for treatment of hypertension.

Onion (allium cepa), most often confined to the kitchen, specifically not used as medicinal herb, has a wide range of beneficial actions on the body and when eaten (especially raw) on a regular basis will promote the general health of the body. [31], indicates that the bulb is anthelmintic, antibiotic, ant inflammatory, anti-microbial, antirheumatic, antisclerotic, anti-septic, antispasmodic, carminative, depurative, digestive, diuretic, expectorant, febrifuge, fungicidal, hypocholesterolnic, hypoglycemic, hypotensive, lithontripic, stomachic, stimulant, rubefacient, antiviral, antibacterial, tonic and vermifuge among others.

The biochemical composition of onion is very high. Onion contains protein, calcium and vitamins A, B, C and E in valuable quantities [32]. Onion contains sulphides similar to those found in garlic, which may lower blood lipids and blood pressure. Onions are rich sources of flavonoids, the most studied is quercitin. Onionpossesses fibrinolytic agents. Onion has essential oil, aliypropyldisulphide, catechol, protocatechnic acid, thiopropiono aldehyde, thiocyanate, calcium, iron, phosphorus and vitamins [33]. Regular consumption of raw onion has like garlic been shown to lower high cholesterol levels and high blood pressure, both of which help prevent atherosclerosis and diabetic heart disease and reduce the risk of heart attack or stroke [31]. These beneficial effects are likely due to onion's sulphur compounds, its chromium and its vitamin B6; help prevent heart disease by lowering high homocysteine levels, another significant risk factor for heart attack and stroke [31].

Methodology

Participants: A total of three (3) married women within the age range of 30-60 and the mean age of 45 participated in the study. Purposive sampling method was used. The participants are public servants and residents of Enugu metropolis.

Instrument(s): A Henson (HS 126) tape recorder was used to record the responses of the three participants (Mrs. Okeke, Mrs. Frank and Mrs. Amadi).

Procedure: The researcher met the above-named women who had untreated hypertension, created rapport and informed consent and introduced the therapy to them. The women were instructed to engage in long walks most days of the week. They were also informed to radically consume 7-12 cloves of garlic 2-3 times daily. Sphygmomanometer was used by the nurses who were their health care providers to measure the participants' blood pressure counts every morning within the six months period of the study.

Design: Single-subject design and in-depth interview were employed to elicit responses from the clients.

Result: Case study reports of participants who benefited from exercise and garlic both as primary (primary in the sense that individuals no longer take antihypertensive drugs) and adjunctive therapy.

The Case of Mrs. Okeke (Real Name Withheld): Mrs. Okeke had lived on antihypertensive, sleeping and ulcer pills for almost 12 years. Her blood pressure counts were 160(diastolic)/100(systolic) and above. Different Doctors prescribed variations of drugs for her and nurses regularly measured her blood pressure. During those years, she routinely adhered to drug treatment, yet her blood pressure fluctuated from 200,180,175, 160 mmHg SBP and 120,110, 105,100 mmHg DBP respectively. The least she could achieve on drug treatment was 140mmHg SBP and 90mmHg DBP. Suddenly she had insomnia, anxiety and unusual heartbeat, accompanied by fear of death and other complications which include swollen legs and tingling pain under the foot, overweight and excessive complain of fear of impending doom which gave rise to occasional avoidance of situation and places. Fortunately, she was instructed to engage in long walks and garlic consumption. As soon as she commenced the therapy, she reported frequent and increased urination and ease of bowel movement. She began to sleep again, anxiety, fear of death and all other complication diminished gradually. For more than three years, she religiously adhered to the technique. Throughout the period of the technique her blood pressure was monitored and measured most mornings by nurses who were health care providers to the woman. Thereafter, her family was advised to purchase a digital sphygmomanometer set, which they did. Senior members of her family were instructed on how to measure, read and interpret her blood pressure, as well as report to her health care providers on high counts for drug therapy. She experienced gradual reduction of 10-40 SBP and 10-30 DBP.

The Case of Mrs. Frank (Real Name withheld): Mrs. Frank was a 38 year old lady who has had blood pressure elevation for a period of six years and had been on drug management intermittently. Her blood pressure elevation

at one time defiled all forms of Doctor's prescription. The least readings of her blood pressure were 140 (diastolic)/100 (systolic) and as such the victim had lost several nights sleep. In addition to experiencing insomnia, unusual heartbeat, swollen legs and numbness of toes, fear of death and fear of the unknown, the victim reported being anxious and afraid. The researcher instructed her to apply the technique of exercise (long walk) and garlic consumption. In the space of two days, the participant reported frequent and increased urination as well as free bowel movement. Her normal sleep pattern returned. All associated symptom diminished gradually. Shortly afterwards, she forgot the exercise and garlic issue. However, she realized that on every casual visit to the hospital, she never had normal counts. On a fateful day, she drove to the hospital from office because of a severe pain she felt on one side of her body. The nurse announced that her blood pressure was 150/100. The doctor prescribed antihypertensive drugs which seemed as if they were mere placebos. Her blood pressure remained high. This time around the insomnia became severe. Apparently, she became anxious of wanting to sleep, but sleep was nowhere to be found. She thought it was death coming to hit her, she felt it was madness. It was as if the whole world had deserted her. The insomnia, anxiety and confusion gradually began to fizzle away immediately she resumed regular exercise and garlic consumption, however in addition to antihypertensive drugs taken only once or twice a week. She had her blood pressure monitored and measured by nurses most mornings with the sphygmomanometer throughout the six (6) months which covered the research period. Her blood pressure counts reduced from 150/100 to 130/90 and eventually 120/80.

The Case of Mrs. Amadi (Real Name Withheld):

Mrs. Amadi, a 30 year old married woman, had the first report of blood pressure elevation during her first pregnancy. At the initial measurement, when her pregnancy was six months old, she reported to the hospital with the case of insomnia, restlessness and breathlessness, the sphygmomanometer measured her blood pressure to be 150 (diastolic)/100 (systolic). Though placed on sleeping pills (diazepam) until delivery, her blood pressure remained elevated and was never stable. Before she met with the researcher, she already lived with it for 3(three) years. The researcher practically instructed her on how to combine regular exercise and garlic therapy. Immediately, she adopted the therapy, her blood pressure which was constantly measured by the nurses in the morning dropped down to 110/70 and she remained on the therapy for six (6) months.

Blood Pressure Readings of Participants who engaged in Long Walks and Garlic Consumption as measured by their Health Care Providers (one month sample).

Week 1 (morning hours) (Medication & Therapy)

Client	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
Mrs. Okeke	200/120	180/110	175/105	160/100	160/100	150/100	150/100
Mrs. Frank	150/100	150/100	150/100	140/100	140/90	130/90	130/90
Mrs.Amadi	150/100	130/100	130/90	130/80	130/80	120/90	120/80
Week 2 (morning hours) (Medication & Self-Mgt)							
Client	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
Mrs. Okeke	150/90	140/100	140/100	140/90	130/90	130/90	130/80
Mrs. Frank	130/80	130/80	120/80	120/80	120/80	120/80	120/80
Mrs. Amadi	120/80	120/80	120/80	120/80	120/80	115/75	115/75
Week 3 (morning hours) (Self-Management Only)							
Client	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
Mrs. Okeke	130/80	130/80	130/80	120/80	120/80	120/80	120/80
Mrs. Frank	120/80	120/80	120/80	120/80	120/80	120/80	120/80
Mrs. Amadi	115/75	115/75	110/70	110/70	110/70	110/70	110/70
Week 4 (morning hours) (Self-Management Only)							
Client	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
Mrs. Okeke	120/80	120/80	120/80	120/80	120/80	120/80	120/80
Mrs. Frank	120/80	120/80	120/80	120/80	120/80	120/80	120/80
Mrs.Amadi	110/70	110/70	110/70	110/70	110/70	110/70	110/70

Discussion and Psychological Implication: The study is especially important and beneficial to individuals with primary (essential) hypertension. The review x-rays a solution to this one leading cause of death worldwide. It was demonstrated that with this technique the clients seized medication entirely and continued with the technique. Different people fall into different categories probably as a result of variations in body mechanisms and other factors which might include inability of proper diagnosis of underlying ailment(s) early. The study established that women who regularly engaged in exercise and radically consumed garlic within the stipulated dosage during the period of the study were able to control their blood pressure elevation and remained asymptomatic. The method immediately alleviated insomnia in these women, that, which is a major psychological symptom of hypertension. Hence if the therapy can trigger or induce sleep, consequently sustainable exercise and garlic programme might go a long way to replacing some prescription sedatives that might form part of antihypertensive medications as well as antihypertensive drugs. [14] recommends the use of non-pharmacological approaches in the primary and adjunctive treatment for hypertension. In that vein, the research is all about using what we already possess in the right proportion and right dosage to achieve a desired aim. The therapist here instructs and encourages the client to use a natural therapy (exercise and garlic) that already exist to achieve therapy.

Practically there are no yet standard details of the required amount of exercise, what mechanisms are behind the feeling of well-being exercise brings and why - despite all the benefits of physical activity – it is so hard to engage in sustainable exercise activity. But as evidence piles up, the exercise-mental health connection is becoming impossible to ignore. Evidence is mounting for the benefits of exercise, yet psychologists don't often use exercise as part of their treatment arsenal [34]. [34],agrees that exercise is something that psychologists have been very slow to attend to. He notes that, "there is much less awareness of mental health outcomes - and much, much less ability to translate this awareness into exercise action". Certainly, there are methodological challenges to researching the effects of exercise, from the identification of appropriate comparison groups to the limitations of self-reporting [34]. Despite these challenges, a compelling body of evidence has emerged; [34],reviewed eleven (11) studies investigating the effects of exercise on mental health. He determined that exercise could be a powerful intervention for clinical mental health. Based on those findings, he concluded, clinicians should consider adding exercise to the treatment plans for their mental health patients.

A formidable challenge facing many personal fitness trainers (PFTs) and other health and fitness professionals is finding new ways of motivating people to improve their well-being through consistent participation in physical activity and exercise. American college of sports medicine [35]; [6]recommends exercise prescription for hypertension as developed into the following: frequency: 3-5 sessions per week; duration: 20-60minutes; intensity: 40-70% maximal physical capacity. As indicated, significant health benefits can be obtained by engaging in moderate amounts of physical activity on most and preferably all, days of the week. There is a growing understanding of how certain levels of physical activity may positively affect cardiovascular, musculoskeletal, respiratory and endocrine function, as well as mental health (American College of Sports Medicine [35]; [6].

Garlic has been investigated extensively for health benefits, resulting in more than one thousand publications over the last decade alone [24]. It is considered one of the best disease preventive foods, based on its potent and varied effects. Midlife risk factors for cardiovascular diseases, such as high serum total cholesterol, raised low density lipoprotein (LDL), increased LDL oxidation, increased platelet aggregation, impaired fibrinolysis, hypertension and homocystinemia are important risk factors for dementia in later years. These risk factors play a major role in the genesis of atherosclerosis of vital arteries causing both cardiovascular and cerebrovascular disease. Garlic is best known for its lipid lowering and anti-atherogenic effects. Possible mechanisms of action include inhibition of the hepatic activities of lipogenic and cholesterogenic enzymes that are thought to be the genesis for dyslipidemias, increased excretion of cholesterol and suppression of LDL-oxidation. Oxidative stress caused by increased accumulation of reactive oxygen species (ROS) in cells has been implicated in the pathophysiology of several neurodegenerative diseases including Alzheimer's disease (AD). The broad range of anti-atherogenic, antioxidant and anti-apoptotic protection afforded by garlic may be extended to its neuroprotective action, helping to reduce the risk of dementia, including vascular dementia and AD [24].

The problem with garlic is its influence in interpersonal relationship and outright disdain for it by some individuals. After cutting garlic the smell is left on the hands if not properly washed it might become

unpleasant for people around. Bad breath is the bane of garlic lovers. Principally the root cause of garlic odor is various sulfuric compounds from the garlic. Initially, most of the bad breath resulting from eating garlic comes directly from the sulfuric compounds introduced into the mouth. There are individuals with lingering halitosis no matter the time of the day. Eventually if the individual is a raw garlic eater, the combination of natural mouth and garlic odor keep other people at a distance. The enzyme allinase responsible for converting alliin (S-allyl cysteine sulphoxide) to allicin is inactivated by heat [23]; therefore cooking reduces garlic smell [2]. In other to circumvent garlic smell and gain the wonderful usefulness of garlic for hypertension, garlic is cooked for not more than two minutes in combination with a handful each of other vegetables mentioned above. Rarely, garlic over relaxes the gastro intestinal tract (GIT) when consumed in excessively high quantity. Consequently, it becomes pertinent to restrict usage to dosage. Nevertheless, garlic helps control and normalizes pepsin secretion which is beneficial to GIT. [2] indicates that organs of elimination benefits most when garlic is consumed and GIT is one of these organs. Another issue with garlic is garlic allergy and intolerance. Garlic allergy may be comparatively "rare" but that doesn't mean people do not suffer from it. The culprits behind garlic reaction are often believed to be or diagnosed as allicin and sulphur.

The most interesting and innovative highlight of this technique include:

- The method is a therapy that eventually makes the individual to either reduce the quantity of chemotherapy or eliminate usage entirely, subsequently maneuvering substance–induced anxiety disorder characterized by prominent symptoms of anxiety that are judged to be a direct physiological consequence of a drug abuse, a medication or toxin exposure (American Psychological Association, APA; DSM VI TR, 2000).
- In addition to alleviating hypertension in these women, exercise and garlic also tend to combat psychological symptoms associated with hypertension for instance, insomnia, anxiety, overweight and obesity, also fear of death, fear of the unknown and swollen legs. The participants reported a sense of psychological wellbeing such as mental relaxation (e.g. relieve from nightmares and sleep satisfaction which rarely occurs with chemotherapy). The clients attested to finding it difficult to engage in other activities following an evening trek of 20-60 minutes and garlic consumption. They reportedly slept off even without a night's shower most nights throughout the period of the therapy, as a result of physical, mental and nervous exhaustion.
- The technique at least dealt with sleep dissatisfaction experienced by the participants. The participants attested to having good night's and anxiety free sleep especially that associated with feeling as if someone is falling from a height as a result of occasional sudden wake by noise or the unknown. This occurrence most times triggers rapid increased heartbeat, tremor, anxiety and phobia. Depending solely on drugs in hypertension and prolonged usage take away sleep satisfaction in the sense that affected person(s) wakes up wondering whether she really slept and would most times ask close persons this question," was I asleep" ?
- There is increased metabolism evidenced in frequent urination and ease of bowel movement which at the long run takes care of swollen legs and ulcer (induced probably by chemotherapy and/or as a result of release of harmful molecules associated with negative reactions and aging).These molecules present themselves inform of free radicals that ricochet around the cells. As free radicals bounce around cells they tend to deform the cells, deposit liquid and toxins that occupy as much as 20% of the cell space and eventually lead to a range of diseases including hypertension. By eliminating free radicals from cells through genetic means and dietary restriction, laboratories have extended the maximum age of laboratory animals [36].
- The reports of the participants explored that this therapy manages the symptoms associated with panic-attack as enlisted in DSM-IV-TR. which include sudden onset of intense apprehension, fearfulness/terror often associated with the feeling of impending doom; shortness of breath, palpitation, chest pain or discomfort, parasthesis (numbness or tingling), fear of dying, depersonalization, choking sensation and fear of "going crazy" or losing control.

CONCLUSION

Exercise and garlic have been shown to help dependently, yet exercise can be effective in lowering blood pressure, however slight. Hence, combination of exercise and garlic as effective means to facilitate blood pressure reduction is recommended. This might as well

lead to weight loss in addition to blood pressure reductions, if diet is modified accordingly. In conclusion, the encouragement of regular exercise is not only useful as a treatment method for individuals with elevated blood pressure, but should be advocated as a means for prevention and as well as supplementary management following due consultation of one's physician. Predictors that may be examined to evaluate the risk of developing elevated blood pressure include, resting blood pressure, family history and physical activity levels. Higher physical activity levels have shown an inverse relationship to the development of hypertension. Thus physical activity and regular exercise can protect against hypertension. Garlic contains hydrogen sulfide[2], a chemical compound that helps relax blood capillaries and vessels in the system by relaxing the smooth muscles in the cell membrane of the blood vessels [23]. Garlic is used when hypertensive drugs prove abortive, probably as a result of long usage or body make up as some people's blood pressure is still elevated with associated insomnia and anxiety even with pills.

Recommendations:

- The study encourages clinicians, counselors and those who have readily at the corridors of their clinics litany of clients with blood pressure elevation to instruct client with untreated hypertension (those who are on antihypertensive pills yet the blood pressure count is still high) to try this method. As earlier stated, it could be combined with drug therapy initially, gradually as the client responds he/she might withdraw chemotherapy.
- The researcher do hope that this research up-date will pique the interest of psychologists and at minimum, open their minds to review avenues of availing with exercise and numerous other strategies to bring about therapy.
- For the purpose of encouraging individuals to imbibe this method, the researcher suggests that clinicians should employ suitable theoretical principles (theory of planned behavior and reinforcement) that will enable them motivate affected persons to initiate, sustain and, maintain technique. People should use routine actions that they already possess and can at least perform with ease. For instance, knowing that dancing is a behavior almost everyone has in her repertoire, the instructor tries to spice up exercise by encouraging people to do interesting ones (dancing to an interesting music most days of the week). Part of the essence of this work is to circumvent inconsistency people indulge in taking drugs. Individuals might be inconsistent with swallowing pills, yet they are consistent with eating food two or three times every day. The instructor simply asks the person to add garlic to every cooked food just like other vegetables. Most importantly, there should be follow-up relationship with the client, which provides the instructor the opportunity to applaud positive actions and sing jingles that sustains technique to a reasonable extent whereby the individual begins to appreciate maintenance in other to remain reasonably healthy.
- People with different patterns of primary hypertension are required to adopt this method as it suits their condition's requirement. Usually when the physician diagnoses an idiopathic hypertension, he initiates prescription and follow-up recommendations on subsequent check-ups. The doctor determines the drug and its efficacy and in most instances might change medication, even several times for some individuals. Majority of the patients eventually discover suitable drugs while, some people might require the physician to change theirs. Again another category has depended on these drugs for years and their blood pressure has developed resistance to drugs, so to speak. Yet another group is with untreated hypertension (those who take drugs but still with elevated blood pressure). To safely adopt this method, the client is required to initiate therapy in combination with the already prescribed drug treatment. Furthermore the individual monitors blood pressure counts. Immediately there is stability, the client stops medication while continuing with the therapy as well as constant measurement of the blood pressure especially early in the morning. Any day the blood pressure goes up, the individual takes drug and continues to monitor while still on the therapy.
- The researcher suggests that for further studies, psychologists should explore other related variables.

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