



# Traditional Dietary Therapy for Prevention and Management of Hypertension and Stroke in Africa. What Next?

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## Review Article

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## Abstract

Hypertension and Stroke are non-communicable diseases that have affected millions of people globally. In Africa, the prevalence of these diseases has increased tremendously. Globally, stroke is the second leading cause of death and in Sub-Saharan Africa its mortality rate has increased. Poor management and poor access to health care of stroke patients is also a reason for the high mortality rate. About 70% and 40% fatal rate a case in Mozambique and Ghana has been attributed to poor management of stroke. The prevalence of stroke in Sub-Saharan Africa has been estimated to be 14 per 1000 population and a monthly fatality rate of about 40%. Hypertension is one of the comorbidities of cardiovascular disease, stroke, diabetes mellitus, dyslipidemia and heart failure

**Keywords:** Dietary; Hypertension; Hypertension and Stroke

## Introduction

Hypertension and Stroke are non-communicable diseases that have affected millions of people globally. In Africa, the prevalence of these diseases has increased tremendously [1]. Globally, stroke is the second leading cause of death and in Sub-Saharan Africa its mortality rate has increased [2]. Poor management and poor access to health care of stroke patients is also a reason for the high mortality rate. About 70% and 40% fatal rate a case in Mozambique and Ghana has been attributed to poor management of stroke [3]. The prevalence of stroke in Sub-Saharan Africa has been estimated to be 14 per 1000 population and a monthly fatality rate of about 40% [4]. Hypertension is one of the comorbidities of cardiovascular disease, stroke, diabetes

mellitus, dyslipidemia and heart failure [5].

Non-pharmacological management of chronic diseases like hypertension and stroke has been adopted through traditional therapies and life style modifications [6]. The traditional utilization of plant parts, whole plants, roots, stems, flowers, fruits and vegetables as dietary therapy has been established in several African countries for several years for the management of hypertension and stroke. Majority of these plants are common and widely consumed however, some of them have been used in mixed combinations as therapy for the management of chronic diseases. Scientific research has proved the effectiveness of these plants due to their antioxidant, anti-hypertensive, neuro-protective, anti-diabetic, anti-obesity, anti-cancer, anti-microbial and anti-

inflammatory properties [7].

In this review, traditional dietary therapy for the prevention and management of hypertension and stroke was investigated from the African perspective. Several traditional remedies utilized by hypertensive and stroke patients would be investigated for their components and benefits.

### The Role of Nutrition on Hypertension and Stroke

Nutrition plays an important role in the prevention of hypertension and stroke [8]. Reports from several studies have shown nutritional factors that influence the risk of having stroke. Some of the nutritional risk factors are; consumption of foods high in saturated fatty acids, cholesterol, salt and alcohol consumption. These factors increase cholesterol levels, low density lipoprotein (LDL), platelet aggregation, blood pressure and free radical production [8]. However, studies have inconsistently shown an association between chronic coffee consumers and stroke [9].

Generally, foods rich in whole grains, fruits, vegetables, milk and dairy products, fish and oil such as olive oil have been investigated to provide protective effect against stroke and hypertension. The DASH (Dietary Approaches to Stop Hypertension) diet has been the most widely used strategy for managing hypertension globally [10]. The DASH diet consists of a diet rich in fruits, vegetables, low-fat dairy, low fat, sugar and salt which had significant effect in lowering blood pressure [11]. The Mediterranean diet (legumes, grains, vegetables, fruits, fish, cereals) which is quite similar to the DASH diet except for an increase in monounsaturated fat intake obtained from olive oil, seeds and nuts has also been adapted and it has significantly lowered blood pressure [12].

Furthermore, other dietary approaches in managing high blood pressure and hypertension include the consumption of foods high in protein and monounsaturated fats which several systematic reviews of randomized controlled trials (RCTs), observational studies and meta-analyses have proved from both short and long term clinical trials [13-15]. Flavonoid and carotenoid rich foods have been investigated to be beneficial to the body. Consumption of these foods has shown a reduction in stroke and cardiovascular diseases [9].

### Factors that Have Contributed to Hypertension in African Countries

In Nigeria, some of the perceived factors that caused hypertension were anxiety, high salt consumption, unhappiness and stress [16]. From other investigations

in South Africa; obesity, consumption of alcohol, high consumption of fats and pregnancy induced hypertension [17]. In Côte d'Ivoire salt and seasoning cubes consumption were the major cause of high blood pressure and hypertension cases [18].

### Modifiable risk factors for Stroke

Several modifiable factors are responsible for stroke in the African population. Factors such as hypertension, diabetes mellitus, stress, dyslipidemia and cardiac diseases which accounted for about 98.1% of all factors after adjusting the population attributable risks (PARs) according to the SIREN (Stroke Investigative Research and Educational Network study) study [4].

### Traditional Dietary Therapy

Several African countries believe in the use of traditional dietary therapies such as food, plant parts like roots, leaves, seeds, whole fruits, mixed vegetables, herbs and grains.

A study in Côte d'Ivoire showed several traditional remedy by respondents used to manage high blood pressure. Some of the medicinal plants include; soursop leaves, avocado leaves and core, coconut roots, lemon leaves, basil leaves, guava leaves, moringa leaves, clove basil leaves, corn hair, lemon grass leaves, bitter cola and coffee weed leaves [18].

In Nigeria, traditional remedies from plant or fruit extract used for hypertension management include: ginger, garlic, *Allium cepa* (Onion), bitter leaf (*Vernonia amygdalina*), aloe vera, *Tamarindus indica* (Tamarind), *Ocimum gratissimum* (basil), *Carica papaya* (pawpaw), *Adansonia digitata* (Baobab), *Ximenis americana* (hog plum), *Moringa oleifera*, *Acalypha godseffiana*, *Piper guineense*, *Loranthus spectabilis*, *Talinum triangulare*, *Senna occidentalis*, *Rauwolfia vomitoria*, *Psidium guajava* (Guava), *Euphorbia hirta*, *Persea Americana* (Avocado), *Peperomia pellucida* and *Aframomum melegueta* [16,19-21]. The investigation of this study showed that plants containing alkaloids, tannins and cardiac glycosides are effective for the management of hypertension [21].

In Tanzania, some traditional and herbal therapies used for the management of hypertension include; honey, carrots, ginger, garlic, avocado seeds, pawpaw seeds, lemon, onions, *Moringa oleifera* and aloe vera [1]. In Tanzania, garlic was the most consumed herb for hypertension prevention.

In South Africa, several novel and known plant species were identified and used for the management of hypertension. Some known plants used for the management

of hypertension were groundnut seeds, *Cannabis sativa* leaves, water melon fruit, lemon peels, pomelo fruits, banana red flower bracts, guava roots and leaves of African pumpkin (*Momordica balsamina*) which were the most consumed [17].

Several of these dietary therapies have been investigated for the management of hypertension. For instance, leaves of African pumpkin (*Momordica balsamina*) as documented by Thakur, et al. [22] are rich in potassium and thus good for managing hypertension. Garlic (*Allium sativum*) has been proven to have both medicinal and dietary impact on human health. The allicin and hydrogen sulphur components in garlic have been investigated to possess angiotensin inhibiting and vasodilating effect which aids blood pressure reduction [23]. Garlic has been used in the fresh form, in powdery form, as extract and as supplements for the management of hypertension [24,25]. Garlic has shown potentials to reduce blood pressure, cholesterol and triglyceride levels [1]. Bitter leaf (*Vernonia amygdalina*) is rich in zinc, calcium, iron, magnesium, Vitamin E, C and A. It has been investigated to have anti-hypertensive, anti-obesity, anti-diabetic and antioxidant properties [7,26]. Ginger (*Zingiber officinale*) has been investigated to lower blood pressure, low density lipoprotein and cholesterol levels [6]. It contains minerals such as magnesium, potassium, calcium, phosphorus which aids muscle contraction, formation of bones, heals muscle spasms, nausea, paralysis and it regulates the heart rate, blood circulation and blood pressure [27].

Avocado (*Persea Americana*) is rich in nutrients such as vitamin B, E, K, phosphorus, calcium, magnesium, sodium, iron, zinc, potassium, dietary fibre, MUFA, PUFA and phytochemicals such as gallic acid, tocopherols, anthocyanidins and flavonoids and associated with neuroprotective, cardioprotective and antioxidant properties [28,29]. Carotenoids such as  $\alpha$ - and  $\beta$ -carotene, lutein and zeaxanthin are free radical scavengers and are the core antioxidant present in avocado. The presence of lutein and potassium in avocado in high quantities controls inflammations and oxidative stress thus, managing blood pressure [30]. As well as a diet rich in MUFA improved blood pressure levels considerably [31]. Consumption of avocado has been associated with cardio-metabolic effect on human health. It has been investigated to lower blood pressure, cholesterol, blood glucose and aid weight loss. It also increases serum HDL- cholesterol concentration [32]. Extracts of avocado seeds and leaves have been investigated to manage hypertension through angiotensin-1-converting enzyme activities. The study showed that avocado seed inhibited angiotensin-1-converting enzyme than avocado leaves [29]. Likewise, another study on aqueous extract from avocado seeds on rats showed a reduction in blood pressure [31].

Guava (*Psidium guajava*) has nutritive and medicinal value which makes it widely consumed. It is widely utilized as anti-hypertensive, anti-diabetic, anti-obesity, anti-inflammatory, anti-cancer, and anti-diarrhoea therapy [33]. Guava fruit, leaves, pulp, seeds, roots, stems and bark have been used for the treatment of diverse diseases such as respiratory and gastrointestinal disorders. Guava contains bioactive compounds such as gallic acid, quercetin, ferulic, rutin, luteolin, kaempferol and caffeic acid which are secondary metabolite responsible for its therapeutic purpose [33,34]. A study by Ayub, et al. [34] using hypertensive rats as shown that pink guava puree has anti-hypertensive properties. In a study on normotensive guinea pigs, guava leaves extract reduced blood pressure significantly [36]. Guava leaves extract contain phytochemicals such as quercetin, rutin, chlorogenic acid and vanillic acid in abundance which could be responsible for the anti-hypertensive effect when investigated in rats [37].

Moringa Oleifera leaves are rich in vitamins, minerals and phytochemicals which have been investigated to potentially possess antimicrobial, anti-inflammatory, antioxidant, anti-cancer, anti-diabetic properties [38]. Moringa also possesses neuroprotective properties by reducing the reactive oxygen species in cerebral ischemia, thus protecting the brain. It has also been reported to decrease acetylcholine esterase activity in dementia patients [38,39]. The anti-hypertensive, cardioprotective, antioxidant and neuroprotective, effect of consuming moringa leaves has been investigated through animal studies [39]. Moringa was screened to contain phytochemicals such as chlorogenic acid, kaempferol-3-O-rutinoside,  $\beta$ -Sitosterol, stigmasterol and campesterol and investigated to reduce blood pressure in spontaneously hypertensive rats [40].

Pawpaw (*Carica papaya*) is a fruit rich in calcium, iron, vitamin A, B and K. The entire plant parts (fruit, root, seed, leaves, bark) has been known for its medicinal purpose over the years due to its anti-biotic, anti-hypertensive, antioxidant, anti-bacterial properties [41]. A study by Brasil, et al. [42] has shown that pawpaw contains the flavonoids; quercetin, rutin, nicotiflorin, clitorin, and manghaslin with anti-hypertensive potentials from its extract.

Basil (*Ocimum basilium*) has been investigated by several studies to possess antihypertensive potentials [43]. It has also been used in combination with other herbs/spice/plants such as cloves, peppermint, garlic as functional foods for the management of hypertension [44,45]. Basil possesses cardio-protective, antioxidant, anti-microbial, anti-diabetic, anti-inflammatory and anti-depressant properties amongst others [44]. Onion (*Allium cepa*) has been investigated in normotensive rats to reduce blood pressure [47]. Anwar Al Disi [48] in their review identified various less commonly

known plants which have been scientifically investigated for the management of hypertension such as common oat, safflower, cinnamon, sesame and tomatoes [49,50].

## Conclusion

In conclusion, the management of hypertension and stroke using various traditional therapies in Africa varying from fruits, leaves, roots, bark and stem have been scientifically investigated by numerous studies. However, the use of these natural sources must be trended with caution especially in the use of two or more plants combination. This is important because the dosage is not quantified and regulated thus, despite the efficacy of this non-pharmacological therapy which is rich in bioactive compounds with promising properties; adequate monitoring and further research should be done to prevent pharmacological drug interaction in the body.

There should also be sustainable plan and scientific efforts to upgrade and refine the processes involved in obtaining the various traditional products used in the management of Hypertension and Stroke in line with safe limits of active ingredients as stipulated by Food Drug and Administration as well as the World Health Organization especially if those products are to be globally acceptable in line with the United Nations Sustainable Development Goal by year 2030 for a healthy world

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