

**Original article:**

## **Coffee-induced hypertension in a Nigerian medical worker: an unusual case**

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**Authors' contributions:**

This work was carried out in collaboration amongst all authors. Author MAC Odike designed the case report, took part in literature searches, wrote the final manuscript, and is the corresponding author. Author AI Odike wrote initial draft of manuscript, took part in literature searches, and reviewed the final manuscript. Authors M Apeleokha and K Mbanefo managed the patient, provided patient's information, and reviewed final manuscript.

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**Abstract**

Hypertension is a very common ailment world-wide, especially amongst blacks. Only 1-5% of sufferers are secondary to a known aetiology. Constituents of everyday beverages are rarely considered to be responsible. A case of 45-year old negroid medical personnel who developed hypertension after some months of consumption of coffee, and achieved cure when coffee was withdrawn, is discussed. We suggest that other hypertensives may benefit from adjustments in diet.

**Keywords:** Coffee, caffeine, hypertension

**Introduction**

Hypertension is a chronic medical condition characterized by sustained elevation of blood pressure beyond expected normal range.<sup>1</sup> The National Heart, Lung and Blood Institute of the USA is of the opinion that a sustained diastolic blood pressure greater than 89 mm Hg, or a sustained systolic blood pressure in excess of 139 mm Hg, is associated with a measurably increased risk of atherosclerosis, and is therefore felt to represent clinically significant hypertension.<sup>2</sup>

According to the World Hypertension League, an estimated 1.5 billion people are affected by elevated blood pressure.<sup>3</sup> Hypertension is classified by cause as either primary (essential) hypertension or secondary hypertension. About 90–95% of cases are categorized as primary hypertension, defined as high blood pressure with no obvious underlying cause.<sup>4</sup> The remaining 5–10% of cases is categorized as secondary hypertension, defined as hypertension caused by identifiable conditions such as kidney disease, narrowing of the aorta or kidney arteries, or endocrine disorders such as excess aldosterone or excess cortisol.<sup>5</sup> Among contributors to secondary hypertension, which is often overlooked, is lifestyle, including dieting.

Coffee is a widely consumed beverage, and small health effects of substances in coffee may have large public health consequences. According to Noordzij and colleagues, it has been suggested that caffeine in coffee increases the risk of hypertension.<sup>6</sup> Their meta-analysis concluded that regular caffeine intake increased blood pressure, but that when this was ingested through coffee the blood pressure effect of caffeine was small. This

supported the finding of Jee et al in a meta-analysis of 11 controlled trials, that coffee intake for more than one day led to a slight increase in BP.<sup>7</sup>

Despite these, some other researchers believe that the place of caffeine as a cause of secondary hypertension is not clear cut.<sup>8</sup> One study showed that the caffeine-blood pressure relationship may be more complicated than expected.<sup>9</sup> The study examined how the amount of coffee consumed affected the risk of developing high blood pressure. While the results showed that the risk of high blood pressure was the lowest for those who drank no coffee, it also showed that those who drank a lot of coffee have almost the same risk. In an unexpected twist, people who drank only small amounts of coffee (1-3 cups per day) seemed to have the highest risk. The researchers believed that over time, the body became tolerant to the stimulant effects of caffeine.

It is obvious therefore, that the topic of the effects of caffeine on the cardiovascular system has been a source of much debate.<sup>10</sup> From medical literature there appears to be strong disagreement about the role of coffee in the aetiology of hypertension. The purpose of this case report is to add to the body of evidence associating coffee intake with genesis of hypertension.

### **Case Report**

A 45 year old negroid male health worker presented to the General Out-Patient Department (GOPD) of Irrua Specialist Teaching Hospital (ISTH) with a 2-year history of recurrent attacks of headache and insomnia. The headache was generalized and gripping. Each attack lasted for 2-14 days. There were intervals of days or weeks before recurrence. It was worsened by involvement in vigorous activities, and associated with sleeplessness and palpitations. Tabs paracetamol 1kg start only produced minimal relief. Sleep was achieved with the help of 5mg diazepam stat. During that period patient consumed 1-2 spoons-full of coffee once daily, and for at least 5 times in a week. This habit was developed to enable him keep awake to study for his professional examinations. Other systems review showed nothing of note.

On examination he weighed 85 kg with a BMI of 28.3kg/m<sup>2</sup>. Blood pressure taken on different occasions ranged between 140/90 and 140/100 mmHg. Basic laboratory investigations (FBC, etc) and screening for common infections (malaria, typhoid) showed normal results. He was placed on weight reduction diets, mild exercise, and antihypertensive medications (Amlodipine and Atenolol; 10mg and 50 mg daily, respectively). These produced a reduction in blood pressure to normal (120/80mmHg).

Some 2 years after, he stopped taking coffee, having passed his examination, and therefore had no need to keep awake at night. He, however, continued taking the prescribed medication. About 4 weeks after stopping the ingestion of coffee, he started experiencing dizziness, and eventually one episode of fainting. Blood pressure taken at the time of fainting was 80/50 mmHg. Anti hypertensives were withdrawn. Patient made a smooth recovery, and was kept off anti-hypertensives. The blood pressure rose to 120/80mmHg over the next few days, and has remained normal up till date. The history of coffee ingestion and its stoppage was obtained only after the episodes of hypotension. Patient acknowledged that he had been on coffee for a few months before onset of symptoms.

### **Discussion**

Coffee is extracted from the fruit of *Coffea arabica* and related species. The active ingredient in coffee is caffeine. Caffeine is a naturally occurring CNS stimulant found also in cocoa beans, tea leaves, and cola nuts, in varying amounts. A cup of coffee contains 75 to 200 mg of caffeine depending upon the alkaloid content of the coffee bean and the method of brewing, Waking up in the morning with a cup of coffee is a part of Western

culture and caffeine has become one of the most popular and accepted stimulants. Caffeine has been recognized as the most widely used psychoactive drug in the world.<sup>11</sup> It has been estimated that 80% of U.S. civilian population above the age of 20 years take caffeine and related methylxanthines on a regular basis.<sup>12</sup> About 90% of this amount results from drinking coffee. Chronic daily consumption is the usual pattern of intake of caffeine, and although majority of these individuals drink one to three cups a day, the mean for all coffee drinkers is 3.2 cups, or 272 mg of caffeine per day.<sup>13</sup> In Nigeria, other caffeine containing beverages that are widely consumed include tea, cola-flavoured drinks, cocoa drinks, chocolates, kola nuts and energy drinks. Their contribution to the burden of hypertension in the country is yet to receive significant attention.

Reasons for intake of coffee in our environment range from enjoyment of its flavour and taste, to desires to elevate mood, eliminate fatigue, and increase capacity for work. The index case took coffee to fight sleep and increase capacity to study. He developed symptoms after some months of consumption, and suffered these for 2 years before his blood pressure was noticed to be high. He was to obtain cure for his hypertension following withdrawal of coffee from his diet, and has remained free from the condition more than 1 year after. Gilbert and co had indeed stated that dietary and lifestyle changes could improve blood pressure control and decrease the risk of health complications, although drug treatment was still often necessary in people for whom lifestyle changes were not enough or not effective.<sup>13</sup>

Caffeine is known to stimulate release of adrenalin and noradrenalin from the adrenals, and cause tachycardia. Tachycardia can manifest as palpitations, which was one of the presenting features in this case. Substantial increases in circulating epinephrine (+207%), norepinephrine (+75%), and plasma renin activity (+57%) have been documented after a 250 mg dose in normal subjects.<sup>14</sup> Yamada *et al*, in their study, concluded that caffeine mobilized  $Ca^{2+}$  from an intra-cellular storage site, and caused an increase in both adrenalin and nor-adrenalin secretion from cat adrenal chromaffin cells.<sup>15</sup> These 'fight or flight' hormones increase heart rate (HR), and therefore, blood pressure (BP) [BP = HR x CO]. Also, Denaro *et al* suggested that on average, dosing of caffeine for 5 days produced persistent activation of the sympathetic nervous system, an effect especially pronounced with high dose (12 mg/kg/day) caffeine.<sup>16</sup>

Sensitivity to caffeine varies; its effects on individuals are to varying degrees. For example, one person may experience heart rate increases from a small amount of caffeine than someone else.<sup>17</sup> This may be why not all regular consumers of coffee suffer increased blood pressure. Despite this, its effects on blood pressure cannot be sidelined. The observed differential effects of coffee on individuals may well be due to some yet unidentified factors such as race and genetics. For instance, the ability to develop tolerance to the stimulant effects of caffeine, as <sup>9</sup>Hartley *et al* put it, may be genetically determined; similar to observed tolerance to the intoxicating effects of alcohol seen in some individuals.

### **Conclusion**

This case aptly illustrates the principle of 'cause and effect'. It is possible that some other sufferers of elevated blood pressure in our society acquired this from dietary sources, and may benefit from adjustments in diet. Physicians are encouraged to pay closer attention to their patients' consumption of these identified dietary sources of caffeine, both as a preventive measure and a cure for already existing hypertension.

### **Consent**

All authors declare that written informed consent was obtained from patient, for publication of this case report.

**Ethical Approval :** Not applicable

**Competing Interests :** Authors declare that no competing interests exist.

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