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IMPACT OF AQUEOUS LEAF EXTRACTS OF SOME MEDICINAL PLANTS (FOUND IN SOUTHWEST NIGERIA) ON BLOOD PRESSURE IN MALE WISTAR RATS

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Abstract

Lately, it is crucial to look for a more efficient method of treating hypertension, which is a leading cause of death worldwide. The decays of nature can cause or inspire the creation of brand-new, tiny chemical entities used as medicines. This may be the reason more individuals seek therapy for hypertension with herbal medication than with allopathic medicine. This study focused on assessing the effectiveness of several medicinal plants on male Wistar rats' blood pressure (BP). The aqueous leaf extracts of the medicinal plants (Phyllanthus amarus, Momordica charantia, Moringa oleifera, Jatropha curcas, Rauwolfia vomitoria and Vernonia amygdalina) at a dose of 150mg/kg body weight was administered for 21 days. Sixty-five adult male Wistar rats weighing between 150-200gm were distributed into three broad groups: control (five rats), test (thirty rats, five per leaf), and recovery (thirty rats, five per leaf). The control group received normal food and water, test groups received 0.3 ml (150mg/kg body weight) of aqueous leaf extracts orally for 21 days and the recovery group received 0.3 mL (150 mg/kg body weight) of aqueous leaves extract for 21 days and allowed to recover for another 21 days without extract administration.

Oral administration of aqueous leaves extract at a dose of 0.3 mL (150 mg/kg body weight) caused a non-significant decrease ($p > 0.05$) in systolic blood pressure (SBP) in the test group and recovery group when compared with the control group in all the leaves with the exception of a non- significant increase ($p > 0.05$) in Phyllanthus amarus. It was also observed that Momordica charantia, Moringa oleifera, and Jatropha curcas caused a non-significant ($p > 0.05$) increase in diastolic blood pressure (DBP) and there was a non-significant ($p > 0.05$) decrease in Vernonia amygdalina, Phyllantus amarus, and Rauwolfia vomitoria. It was also observed that there was a non-significant increase ($p > 0.05$) in pulse rate (PR) of rats treated with and allowed to recover from effects of Momordica charantia, Moringa oleifera, and Vernonia amygdalina when compared with the control group while there was a non-significant ($p > 0.05$) decrease in PR of rats treated with Jatropha curcas, Phyllantus amarus, and Rauwolfia vomitoria. The study revealed that aqueous leaves extract from the six medicinal plants utilized in this study caused a change in BP and pulse with Rauwolfia vomitoria being the most effective plant showing hypotensive or antihypertensive properties.

KEYWORDS: Medicinal plants, blood pressure, pulse rate, Wistar rats, aqueous leave extract

IMPACT DES EXTRAITS DE FEUILLES AQUEUSES DE CERTAINES PLANTES MEDICINALES (TROUVEES DANS LE SUD-OUEST DU NIGERIA) SUR LA PRESSION ARTERIELLE CHEZ LES RATS WISTAR MALES

Resume

Dernièrement, il est crucial de rechercher une méthode plus efficace de traitement de l'hypertension, qui est une cause de décès dans le monde. Les désintégrations de la nature peuvent provoquer ou inspirer la création de petites entités chimiques nouvelles et nouvelles utilisées comme médicaments. C'est peut-être la raison pour laquelle plus de personnes recherchent une thérapie pour l'hypertension avec des médicaments à base de plantes qu'avec la médecine allopathique. Cette étude s'est concentrée sur l'évaluation de l'efficacité de plusieurs plantes médicinales sur la pression artérielle (PA) des rats Wistar mâles. Les extraits de feuilles aqueux des plantes médicinales (Phyllanthus amarus, Momordica charantia, Moringa oleifera, Jatropha curcas, Rauwolfia vomitoria et Vernonia amygdalina) à une dose de 150 mg / kg de poids corporel ont été administrées pendant 21 jours. Soixante-cinq rats Wistar mâles adultes pesant entre 150 et 200 g ont été distribués en trois grands groupes: le contrôle (cinq rats), le test (trente rats, cinq par feuilles) et la récupération (trente rats, cinq par feuilles). Le groupe témoin a reçu des aliments et des eaux normaux, les groupes de test ont reçu 0,3 ml (150 mg / kg de poids corporel) d'extraits de feuilles aqueuses oralement pendant 21 jours et le groupe de récupération a reçu 0,3 ml (150 mg / kg de poids corporel) d'extrait de feuilles aqueux pour 21 jours et autorisé à récupérer encore 21 jours sans extraire d'administration.

L'administration orale d'extrait de feuilles aqueuses à une dose de 0,3 ml (150 mg / kg de poids corporel) a provoqué une diminution non significative (p> 0,05) dans la pression artérielle systolique (PAS) dans le groupe de test et le groupe de récupération par rapport au contrôle groupe dans toutes les feuilles à l'exception d'une augmentation non significative (p> 0,05) dans Phyllanthus amarus. Il a également été observé que Momordica charantia, Moringa oleifera et Jatropha curcas ont provoqué une augmentation non significative (p> 0,05) de la pression artérielle diastolique (PAD) et il y a eu une diminution non significative (p> 0,05) de Vernonia amygdalina, Phyllantus (P> 0,05) de Vernonia Amygdalina, Phyllantus (P> 0,05) Amarus et Rauwolfia Vomitoria. Il a également été observé qu'il y avait une augmentation non significative (p> 0,05) dans le taux de pouls (TP) de rats traités avec et autorisé à se remettre des effets de Momordica charantia, de Moringa oleifera et de Vernonia amygdalina par rapport au groupe témoin pendant que Il y a eu une diminution non significative (p> 0,05) des TP de rats traités avec Jatropha curcas, Phyllantus Amarus et Rauwalifia vomitoria. L'étude a révélé que les feuilles aqueuses extraites des six plantes médicinales utilisées dans cette étude ont provoqué un changement de PA et de pouls, Rauwolfia vomitoria étant la plante la plus efficace montrant des propriétés hypotensives ou antihypertensives.

Mots-clés: plantes médicinales, pression artérielle, pouls, rats Wistar, extrait de congé aqueux

تأثير مستخلصات الأوراق المائية لبعض النباتات الطبية (الموجودة في جنوب غرب نيجيريا) على ضغط الدم في فئران ويستار لدى الذكور

نبذة مختصرة

في الآونة الأخيرة ، من الضروري البحث عن طريقة أكثر فعالية لعلاج ارتفاع ضغط الدم ، وهو سبب رئيسي للوفاة في جميع أنحاء العالم. يمكن أن يتسبب اضمحلال الطبيعة في إنشاء كيانات كيميائية صغيرة جديدة تمامًا أو مصدر إلهام لها كأدوية. قد يكون هذا هو السبب في أن المزيد من الأفراد يسعون إلى علاج ارتفاع ضغط الدم باستخدام الأدوية العشبية مقارنة بالطب الوباتشيك. ركزت هذه الدراسة على تقييم فعالية العديد من النباتات الطبية على ضغط الدم لدى ذكور جرذان ويستار (BP). تم إعطاء المستخلصات المائية للنباتات الطبية (فيلانثوس أماروس ، موموردیکا شارانتیا ، مورينجا أوليفيرا ، جاتروفا كركاس ، راوفولفيا فوميتوريا وفيرنونيا أميجداليا) بجرعة 150 مجم / كجم من وزن الجسم لمدة 21 يومًا. تم توزيع 65 جرذًا بالغًا من ذكور ويستار يتراوح وزنها بين 150-200 جرامًا على ثلاث مجموعات عريضة: مجموعة التحكم (خمسة فئران) ، واختبار (ثلاثون فأرًا ، خمسة لكل ورقة) ، والتعافي (ثلاثون فأرًا ، خمسة لكل ورقة). تلقت المجموعة الضابطة طعامًا وماءًا عاديين ، تلقت مجموعات الاختبار 0.3 مل (150 ملجم / كجم من وزن الجسم) من مستخلصات الأوراق المائية عن طريق الفم لمدة 21 يومًا ، وتلقت مجموعة الاسترداد 0.3 مل (150 مجم / كجم من وزن الجسم) من مستخلص الأوراق المائية لمدة 21 يومًا تسبب تناول مستخلص الأوراق المائية عن طريق الفم .يومًا ويسمح لها بالتعافي لمدة 21 يومًا أخرى دون إعطاء المستخلص في (SBP) في ضغط الدم الانقباضي ($p> 0.05$) بجرعة 0.3 مل (150 مجم / كجم من وزن الجسم) في انخفاض غير معنوي مجموعة الاختبار ومجموعة الاسترداد عند مقارنتها مع مجموعة التحكم المجموعة في جميع الأوراق باستثناء الزيادة غير Jatropha وMoringa oleifera وMomordica charantiaفي فيلانثوس أماروس. لوحظ أيضًا أن ($p> 0.05$) المعنوية ($p> 0.05$) وكان هناك انخفاض غير معنوي (DBP) في ضغط الدم الانبساطي ($p> 0.05$) تسبب في زيادة غير معنوية curcas ولوحظ أيضًا أن هناك زيادة غير .Rauwolfia vomitoriaأماروس وPhyllantus وVernonia amygdalinaفي (0.05 Momordica charantiaللفئران المعالجة بالسماح لها بالتعافي من تأثيرات (PR) في معدل النبض ($p> 0.05$) معنوية عند مقارنتها مع مجموعة التحكم بينما كان هناك انخفاض غير معنويVernonia amygdalina وMoringa oleiferaو .Rauwolfia vomitoria في العلاقات العامة للفئران المعالجة بالجاتروفا كركاس ، فيلانتوس أماروس ، و ($p> 0.05$) كشفت الدراسة أن مستخلص الأوراق المائية من النباتات الطبية الستة المستخدمة في هذه الدراسة تسبب في حدوث تغير في باعتباره النبات الأكثر فاعلية حيث أظهر خصائص خافضة للضغط أو خافضة Rauwolfia vomitoriaضغط الدم والنبض مع للضغط.

الكلمات الرئيسية: النباتات الطبية ، وضغط الدم ، ومعدل النبض ، وفئران ويستار ، ومستخلص الأوراق المائية

Introduction

The force that the heart and arteries apply to keep blood flowing through the body, supplying all cells with oxygen and nutrients and removing waste materials, is known as blood pressure (BP). This typically happens in men with average systolic and diastolic blood pressures of 120 and 80 mm Hg, respectively (Beevers *et al*., 2001).

Cardiovascular diseases (CVDs) are a major contributor to ill health and early mortality and are consequently a major public health concern (Al Disi *et al*., 2015). It is the leading cause of acute myocardial infarction risk factors (HTN) and the cause of roughly 16.5% of deaths worldwide each year. High blood pressure (BP), which is referred to as a silent killer, is brought on by a variety of reasons, such as the disruption of BP regulation caused by the combination of genetic and environmental variables (Wang *et al*., 2012). Additionally, it accounts for the majority of CVD-related morbidity and mortality (Anwar *et al*., 2016). By 2025, it is anticipated that 29% of adults worldwide, or about 1.56 billion individuals, will have HTN (Roger *et al*., 2011). According to the mean of two or more suitable measures of sitting blood pressure, HTN is defined as systolic blood pressure (SBP) 140 mm Hg and diastolic blood pressure (DBP) 90 mm Hg (Hashemi *et al*., 2017). HTN is treated with a variety of antihypertensive medications, including diuretics, sympatholytics, renin inhibitors, ACE inhibitors, calcium channel blockers, -adrenergic antagonists, and vasodilators (Sinha *et al*., 2019). These medications can cause adverse effects of edema, impaired vision, skin rashes, vomiting, kidney failure, excessive fatigue, and muscular cramping (Singh *et al*., 2015). Traditional medications for the treatment of CVDs have come under scrutiny due to the present increase in the acceptability of

alternative medicines and natural goods (Rastogi *et al*., 2016). Approximately 75% to 80% of the world's population, predominantly in developing countries, uses herbal medicines for primary healthcare because of their better compatibility with the human body, lower costs than novel pharmaceuticals, and fewer side effects (Agrawal *et al*., 2010).

Concerning the treatment of illnesses and conditions, the African Traditional Medicine system used plants and plant products (Joel-Lewis *et al*., 2010). Africans have been using whole plants as well as plant components of roots, leaves, and stem bark for generations before European colonization. Due to oral style of knowledge transfer, certain essential components of this knowledge have been lost. The foundation of ethno-medical practice in Africa in the 20th and 21st centuries has been built by a very small amount of the surviving information. In-depth study of Africa's untapped plant natural resources, particularly in West Africa, is necessary for this therapeutic system (Eghianruwa *et al*., 2016).

According to the World Health Organization [WHO] (Zhang, 2001), for their primary healthcare requirements, 80% of the population in several African nations rely almost exclusively on traditional medicines, herbal medicines in particular (Zhang and Moller, 2000; Calixto, 2000). The continent makes up around 25% of all higher plants in the world, and more than 5,400 medicinal plants were estimated to have more than 16,300 medicinal uses. This is related to the perceived efficacy of plant-based therapies as well as the accessibility of these plants (Van *et al*., 2008). Many medicinal plants have been used for treating various diseases and ailments in the past and present (Oridupa *et al*., 2011; Oridupa, 2013). With some of these herbal remedies, hypertension and associated diseases were predominant (Tapsell *et al*., 2006). Over 150 types of plants, including about 100 that are obtained in the wild and more than 30 that are grown, are recommended as food out of the total number of medicinal plants used by ethno-traditional healers (Odugbemi, 2006). Many of these medicinal plants have been proven to reduce heart rates, blood pressure readings (both systolic and diastolic), and other signs of cardiovascular illness. It has been demonstrated that some medicinal plants can improve or correct disordered cardiovascular parameters, particularly high blood pressure and other consequences linked to these diseases (Ojewole, 2005; Nwanjo *et al*., 2005; Taiwo *et al*., 2010). In Nigeria, several plant species have been employed for the treatment of these conditions with appreciable patient response. Some scientific studies have verified the claims made by these traditional healers or patients themselves (Eghianruwa *et al.,* 2016).

In developing countries, a considerable percentage of the population relies on herbal remedies for primary health care. Due to the relative safety, industrialized countries have also developed an interest in natural remedies (Wachtel-Galor and Benzie, 2011), expanding the use of herbs and ethnobotanicals as medicines beyond developing nations. Nevertheless, despite the promising effects of herbal preparation in lowering blood pressure, hypertension is still a major clinical challenge in Nigeria (Mansurah *et al*., 2021) hence this study was designed to assess the effect of some medicinal plants found in southwest Nigeria on blood pressure using animal models.

Materials and methods

Materials

The following materials and instruments were used for the experiment: 65 adult male Wistar rats, Leaves of *Vernonia amygdalina*, *Momordica charantia, Moringa oleifera, Jatropha curcas, Phyllantus amarus, and Rauwolfia vomitoria*, Weighing Scale, Rat restrainer (RTV180), and Electronic Sphygmomanometer (CONTEC08A-VET) with smaller cuff

Collection of plants materials

The fresh leaves of all the medicinal plants used mentioned above were purchased from Falawo market, Shagamu, Ogun State obtain and were authenticated by Egunjobi AJ and Adeniyi KA at Federal Forest Research Institute, Ibadan.

Preparation of aqueous leaves extract

The method of Mukhallad *et al.* (2009) was modified for the aqueous extraction. The leaves were air dried by spreading under the shade at room temperature with no direct exposure to sunlight and constantly turned over for 14 days to avoid mold formation till they were crispy to

touch, while still maintaining their green color. Afterwards, the leaves were grinded to powder form using a mechanical grinding machine.

Sixty gram leaf powder of each medicinal plant was dissolved in 300 ml of distilled water in a plastic bottle and left for 24 hours. It was then filtered using a white sieve cloth, and the dissolved aqueous leaves extract was collected into an empty plastic. The residue was dried and reweighed to 47g which was finally deducted (60g - 47g = 13g); this implied that 13g of the leaf dissolved in 300mL. The aqueous extract was then refrigerated till it was needed.

Experimental Animals

Sixty-five adult male Wistar rats weighing between 180 - 200 g were obtained from the animal house, Faculty of Basic Medical Sciences, Olabisi Onabanjo University, Ogun State, Nigeria. The rats were kept in 13 different cages (5 per cage) and allowed to acclimatize to their environment for 14 days before the commencement of extract administration. Rats were all fed with rat cubes.

Administration of Aqueous Leaf Extract

The administration was done orally by giving 0.3ml of each extract dosage calculation from 150 mg/Kg body weight to the different adult male Wistar rats using an oral cannula for 21 days.

Experimental Analysis

Sixty-five adult male Wistar rats in total were used in the experiment. The rats were divided into 3 broad groups and kept in different cages:

Group 1: 5 rats in the control group received feed and water only.

- Group 2: 30 rats (five rats per leaf) in the test group received 0.3ml of aqueous leaves extract from the medicinal plants at 150mg/kg per body weight dosage calculation for 21 days.
- Group 3: 30 rats (five rats per leaf) in the recovery group received 0.3mL of aqueous leaves extract of the medicinal for 21 days and were allowed to recover for another 21 days without extract administration.

Procedure for applying the cuff

The measurement was carried out by applying the cuff on the left or right forelimb.

Blood Pressure Measurement

The rats were restrained with the use of rat restrainer. Then the use of START/STOP button to start the blood pressure monitor for blood pressure measurement was done.

Statistical Analysis

Calculations were done using the SPSS-VIS statistical software package (Norusis, 1998) for the analysis of the data. The data were presented as Mean ± Standard Error of Mean (SEM) and statistical analysis was carried out using the student's t-test and ANOVA. Values were considered to be statistically significant when $p < 0.05$.

Results

Table 1: Effect of Some Medicinal Plants on Systolic Blood Pressure (mmhg)

Groups	CONTROL	TEST	RECOVERY	SIGNIFANT VALUES
Jatropha curcas	133.33±17.17	126.67 ± 11.79	115.00±18.151	0.818
Phyllantus amarus		133.67 ± 16.17	104.67±5.24	0.877
Rauwolfia vomitoria		111.00±2.08	127.00±16.17	0.687
Mormodica charantia		111.00±6.03	112.67±8.09	0.989
Moringa olifera		119.33±15.76	126±14.46	0.856
Vernonia amygdala		104.00±6.25	91.33±7.69	0.44

*P < 0 .05 is significant

From Table 1 above, there was a non-significant decrease ($p > 0.05$) in systolic blood pressure in the mean values (mmHg) *Jatropha curcas, Rauwolfia vomitoria, Mormodica charantia, Moringa olifera* and *Vernonia amygdala* when the test groups and recovery groups were compared to control group. Also, there was a slight non significance increase ($p > 0.05$) in

Phyllantus amarus test group when compared to control group.

Table 2: Effect Of Some Medicinal Plants On Diastolic Blood Pressure (mmhg)				
Groups	CONTROL	TEST	RECOVERY	SIGNIFICANT VALUE
Jatropha curcas	92.00±17.04	105.33±8.51	90.00±14.11	0.705
Phyllantus amarus		73.33±22.24	80.33±3.51	0.726
Rauwolfia vomitoria		85.67±3.71	99.67±22.26	0.687
Mormodica charantia		94.33±6.17	88.67±6.70	0.938
Moringa olifera		98.00±14.36	99.33±16.05	0.942
Vernonia amygdala		81.33±7.54	69.67±6.84	0.44

*P < 0.05 is significant

From the table 4.2 above, there was a non-significant increase (p <0.05) in *Jatropha curcas, Mormodica charantia* and *Moringa olifera* in test groups when compared to control groups. In addition, there was an insignificant decrease in *Phyllantus amarus, Rauwolfia vomitoria* and *Vernonia amygdala* in diastolic blood pressure of test and recovery groups when compared to control group. Subsequently there was an insignificant decrease (p > 0.05) in diastolic blood pressures in *Jatropha curcas, Mormodica charantia* and *Moringa olifera* in recovery group when compared to control group.

Table 3: Effect of Some Medicinal Plants On Pulse Rate (bpm)				
Groups	CONTROL	TEST	RECOVERY	SIG
Jatropha curcas	92.67±25.40	83.00±7.23	66.33±9.33	0.296
Phyllantus amarus		88.67±4.97	86.67±1.20	0.892
Rauwolfia vomitoria		83.00±17.04	90.67±10.48	0.883
Mormodica charantia		99.33±11.01	78.33±4.61	0.9336
Moringa olifera		109.67±18.32	80.33±15.34	0.481
Vernonia amygdala		97.33±12.10	79.33±16.50	0.517

*P < 0.05 is significant

In Table 3 above, there was an insignificant decrease (p > 0.05) in pulse rate (bpm) as seen in *Jatropha curcas*, *Phyllantus amarus* and *Rauwolfia vomitoria* in test group and recovery groups when compared to control group. Also, there was an insignificant increase (p > 0.05) in *Mormodica charantia, Moringa olifera* and *Vernonia amygdala* in test group when compared to control group, however, there was an insignificant decrease in recovery groups as compared with control group from these leaves

Discussion

Since industrialized countries have also acquired an interest in natural remedies due to their relative safety, the use of herbs or ethno-botanicals as medicines is not just limited to underdeveloped countries (Wachtel-Galor and Benzie, 2011). Nevertheless, despite the promising effects of herbal preparation in lowering blood pressure, hypertension (HTN) is still a major clinical challenge in Nigeria (Mansurah *et al*., 2021) hence this study was designed to assess the effects of some medicinal plants (*Vernonia amygdalina*, *Momordica charantia, Moringa oleifera, Jatropha curcas, Phyllantus amarus, and Rauwolfia vomitoria*) found in southwest Nigeria on blood pressure using animal models.

In this study, administration of the different medicinal leaves produced a non-significant decrease (p > 0.05) in SBP in the test group and recovery group when compared with the control group and a non-significant increase (p > 0.05) in *Phyllanthus amarus.* Also, it was observed that *Momordica charantia, Moringa oleifera, and Jatropha curcas* caused a non-significant increase (p > 0.05) in DBP while there was a non-

significant decrease ($p > 0.05$) in *Vernonia amygdalina, Phyllantus amarus, and Rauwolfia vomitoria*. It was also observed that there was an increase ($p > 0.05$) in pulse rate of rats treated with *Momordica charantia, Moringa oleifera, and Vernonia amygdalina* in the test and recovery groups when compared with the control group and a non-significant decrease ($p > 0.05$) in pulse rate of rats treated with *Jatropha curcas, Phyllantus amarus, and Rauwolfia vomitoria.*

In this study, the result showed that *Rauwolfia vomitoria* reduced BP which implies that it can be used to manage hypertension and this correlates with the report by Tarawanti *et al*. (2021) that the plant is mainly used to treat hypertension; by slowing down the activity of nervous system which results in decreases in heart rate and dilation of blood vessels (Tarawanti *et al.,* 2021). Dolealkaloids make up the majority of the phytochemicals in Rauwolfia, with the plant also containing fatty acids, alcohols, sugars and glycosides, steroids, phytosterols, flavonoids, oleoresins, and tannins. All plant components contain indole alkaloids, although the root bark is the main source. The identified different indole derivatives were ajmalinine, ajmalidine, ajmalicine, ajmaline, coryanthine, aricine, deserpidine, canescine, lankanescine, isoserine, isoajmaline, isoserpiline, rauhimbine, neoajmaline, raubasine, papaverine, raucaffricine, reserpine recanescine, reserpiline, rauwolfinine, rescinnamine, thebaine, serpentinine, reserpinine, serpentine, yohimbine, sarpagine and yohimbinine (Lobay, 2015). The most common indole derivative, reserpine, has antihypertensive properties and can lower both systolic and diastolic blood pressure (Lobay, 2015; Soni *et al*., 2016; Kiran *et al*., 2018). Reserpine has the ability to bind to vesicular monoamine transporter 2 proteins (VMAT2) irreversibly, which lowers levels of biogenic amines such as serotonin, noradrenaline, and dopamine in the nucleus accumbens, hypothalamus, and VTA (ventral tegmental area). According to the molecular process, the VMAT2 protein binds to storage vesicles in the cell in an irreversible manner, causing a "leak" of the vesicles' contents, such as monoamine, into the cytosol, where MAO-A enzymes then contaminate it. This process explains how monoamine renovation is age-independent (Hedgecock *et al*., 2019).

A previous research study stated that current guidelines recommendation represents a paradigm change in favor of SBP. This change of emphasis has been influenced by the increase in human life expectancy (Kalache and Keller, 2000), by the result of numerous analyses showing that SBP is a better predictor of cardiovascular risk than DBP (Lewinton *et al*., 2002; Benetos *et al*., 2003; Black, 2004), and by the recognition that poor control of SBP is largely responsible for the prevailing low rates of BP control (Lloyd-Jones *et al*., 2000; Hyman and Pavlik, 2001). These factors have led to the emphasis on the importance of SBP as a cardiovascular risk factor in the treatment guidelines of the JNC VII and the World Health Organisation/International Society of Hypertension (WHO-ISH) (Chobanian *et al*., 2003; Whitworth 2003). From the report of this research, all the medicinal plants reduced SBP when compared with the control and later recovered while only pulse rate remained the same for the treated group and recovered. Hence these leaves have hypotensive or antihypertensive properties.

Conclusion

In conclusion, this study highlighted various medicinal plants that can be used in the southwest for the management of hypertension. This research asserted that extract from the six different plants utilized in this study caused a change in blood pressure and pulse with *Rauwolfia vomitoria* being the most effective plant to have shown hypotensive or antihypertensive properties. Most of these plants are readily available and affordable in various regions of the countries.

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