



Activities of Principal Elements in *Juglans nigra* (Walnut) Ameliorating Blood Pressures and Some Biochemical Indices in Male Psychotic Subjects in Emene Enugu State.

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ABSTRACT

The active principal elements in *Juglans nigra* (Walnut) ameliorating blood pressures and some biochemical indices in male psychotic subjects were investigated using 20 male sick subjects and 12 apparently healthy male control subjects. Result indicates that walnut possesses the principal elements that could normalize hypertension in psychotic subjects. It also has the ability to bring down the concentration of serum cholesterol in the subjects. The results obtained before intake of walnut in the sick subjects (Group A) were 230 ± 10.00 mmHg systolic, 120 ± 8.0 mmHg diastolic in blood pressure measurement 180 ± 9.0 in cholesterol concentration, 180 ± 12.0 meq/L in sodium concentration and 150 ± 0.8 meq/L. But with the short term administration of walnut meal within 5 days, the results of the psychotic subjects came down to 120 ± 0.5 mmHg ($P < 0.05$) systolic, 80 ± 1.7 mmHg ($P < 0.05$) diastolic, 160 ± 8.5 mg/dl in cholesterol concentration, 133 ± 0.8 meq/l in sodium conc and 10.5 ± 0.6 meq/l in chloride concentration. It could be deduced that *Juglans nigra* possess active elements that ameliorates hypertension in psychotic subjects.

INTRODUCTION

From Noolithic time man has proved to be the most stable creature that survives, restructure the environment and governs the earth where he exists with other creatures including animals in the sea and land. He can only do these because he is endowed with well developed and mature brain system.

The brain is a complex organ that controls thought, memory, emotion, touch, motor skills, vision, breathing, temperature, hinges, and every process that regulates our body. The brain and spinal cord altogether make up the central nervous system (CNS)

Weighing about 3 pounds in the adult the brain is composed of white matter (inner portion) and gray matter (dark outer portion)

The gray matter is primarily composed of neuron, somas and it is responsible for processing and interpreting information. While the white matter is mostly made up axons and it transmits that information brought by the gray matter to other parts of the nervous system.

How the brain work:

The brain sends and receives chemical and electrical signals throughout the body. Different signals controls different processes and the brain interprets each signal. Some messages are kept within the brain, while others are relayed through the spine and across the body's vast network of nerves to distant extremities. To do this, the central nervous system relies on billions of neurons (nerve cells). Some of the signals when interpreted makes one feel tired while others may make one feel pain. Among the different parts of the brain, the cerebrum is mostly connected with psychosis. It is situated in front of the brain comprising of gray matter (the cerebral cortex) and white matter at its center. It is the largest part

of the brain. It initiates, coordinates movement and regulates temperature. (Ackerman, 2022). Other areas of the cerebrum enable speech, judgment, thinking and reasoning problem-solving, emotions and learning, visions, hearing, touch etc. In essence it is responsible for the brain functions that allows us to interact with our environment and make us who we are. It is instrumental to everything we do in day-to-day life ranging from thoughts to actions.

As earlier mentioned, psychotic disorders are a group of serious mental illnesses that all have signs of psychosis. Psychosis itself is a cluster of symptoms, not illness. (Arciniegas, 2015). It is sometimes described as "losing touch with reality". What is likely happening during psychosis is that the person has disruptions in their thoughts and the way they interpret their thoughts that makes it hard for them to recognize what is real and what isn't.

Symptoms and signs:

Psychosis is when a person has abnormalities in thoughts and perceptions in any of these ways:

- Delusions, which are false beliefs that the person can't tell are false
- Hallucinations, which are sensory experiences that other people don't or can't share.
- Disorganized thinking or speech, which are patterns of thought that aren't logical, linear or goal-directed
- Disorganized behavior, which are patterns of behavior that are unpredictable or inappropriate.
- Negative symptoms, which are a decrease or loss of normal functioning e.g the person may stop expressing any emotions, or they may

speaking only certain phrases or stop speaking altogether.

iv. Unusually high levels of stress or anxiety (Gelder, 1983).

Types of psychotic disorders:

- a. **Schizophrenia:** A very serious psychiatric condition involving delusions, hallucinations, disorganized speech, or catatonic behavior, negative symptoms such as diminished emotional expression or a lack of motivation to start and keep doing goal-directed activities.

Other types are

- b. Delusional disorders
- c. Brief psychotic disorders This is a brief psychiatric condition where you have sudden onset of psychosis that lasts less than 1 month and then goes complete into remission when you take an antipsychotic sometimes this may be triggered by a stressful event or trauma
- d. Psychotic disorder due to underlying medical condition that affects the brain function such as Parkinson's disease, Alzheimer's disease and other dementias, delirium, head injury, brain tumor and stroke.
- e. Substance/medication: induced psychotic disorder caused by use of or withdrawal from substances such as hallucinogens and crack cocaine and some medications. (Black burn, 2005)
- f. Schizo effective disorder
- g. Schizophreni form disorder
- h. Schizotypal (personality) disorder

Causes

The American psychiatric Association diagnostic and statistical manual of mental disorders 5th Edition (DSM – 5) has categories of the causes

1. Schizophrenia
2. Brief psychotic disorder
3. Delusional disorder
4. Schizoaffect disorder
5. Schizophreniform disorder
6. Schizotypal (personality) disorders
7. Substance/medication induced psychotic disorder
8. Psychotic disorder due to another medical condition

Other causes of psychosis:

- i. Misuse of alcohol, prescription medications or recreational drugs
- ii. Severe head injuries (Concussions and traumatic brain injury)
- iii. Traumatic experiences (past or present)

Some plants have been discovered to have medicinal value (Olaleye et al 2000). These plants have been used as a source of various drugs where man can get a relief.

Substances and active elements have been implicated by extraction from these natural herbs. These active elements are mostly.

Phytochemicals like alkaloids. Our curiosity is stimulated to study the activities of active elements present in *Juglans nigra* (walnut) in ameliorating blood pressures and some biochemical indices in psychotic disorder male subjects in Enugu State.

Juglans nigra (walnuts) are rounded simple seeded stone fruits of the walnut tree of the genus juglans especially the Persian or English walnut, *Juglan regia*.

That of the Eastern black walnut is called *Juglans nigra*. They are highly density source of nutrients particularly proteins and essential fatty acids. The walnut fruit is enclosed in a green, leatherly fleshy husk. This husk is in edible. The nutrient profile (Nutrient data 2010) noted that it contains carbohydrates, proteins, fiber, calcium, iron zinc, vitamin B6 and unsaturated fatty acids.

Medical value and content of walnut compared to certain other nuts, such as almonds, peanuts and hazel nuts, walnuts (especially in their raw form) contain the highest total level of antioxidants including both free antioxidants and antioxidants bound (Retrieved doc, 2011). Feeding trial has shown cholesterol lowering trends in walnut-enriched diets compared with control diets (Feldman, 2002). Clinical trials suggest reduction in cardiovascular disease (CVD) risk and mortality associated with increased nut consumption. The nut has effects on CVD risk factors such as lipid profiles vascular inflammation and blood pressure after various interventions that have included nuts.

MATERIALS AND METHODS

Subjects:

The subjects consist of 20 young adult males with age range 20-25 years who were diagnosed of a mental illness and high blood pressure attending clinic at Enugu State University of Science and Technology Teaching Hospital Parklane Enugu.

They are group A subjects (20) and the control subjects (Group B) are 12 apparently healthy subjects.

Diagnosis of Psychosis:

To make a diagnosis of a mental illness in someone with psychosis, other potential causes must be excluded

(Cardinal, 2011). An initial assessment includes a comprehensive history and physical examination by a health care provider. Tests may be done to exclude substance use, medication, toxins, surgical complications or other medical illnesses. Delirium should be ruled out, which can be distinguished by visual hallucinations, acute onset and fluctuating level of consciousness, indicating other underlying factors including medical illnesses.

Excluding medical illnesses associated with psychosis is done by using blood tests to measure a) thyroid-stimulating hormone to exclude hypo-or hyperthyroidism.

- Vitamin B₁₂ serum and urinary MMA to rule out pernicious anaemia or vitamin B₁₂ deficiency.
- Basic electrolytes and serum calcium to rule out a metabolic disturbance.
- Full blood count including ESR to rule out a systemic infection or chronic disease and serology test to exclude syphilis or HIV infection.

Other investigations to type down psychosis include EEG to exclude epilepsy and an MRI or CT scan of the epilepsy and AN MRI or CT scan of the head to exclude brain lesions.

Because some dietary supplements may also trigger psychosis or mania, but cannot be ruled out with laboratory test, a psychotic individual's family, partner or friends should be asked whether the patient is currently taking any dietary supplements.

$$LD_{50} = \sqrt{\frac{\text{Dose killing all animals in the group} \times \text{dose killing none of the animals in the group}}{2}}$$

Phytochemical analysis of walnut

The aqueous extract of the walnut fruit was screened for the presence or absence of metabolites using standard phytochemical screening procedures as described by Harbourne (1973), Trease and Evans (1996). The extract was tested for saponins, alkaloids, flavenoids, resins, calcium, reducing sugars glycosides, carbohydrates, steroids, acidic compound, fats and oils.

Determination of blood pressure and some biochemical indices

5ml blood samples were collected from the cubital fossa of sedated psychotic subjects and placed into plain tubes. Serum sample was expressed from the clotted samples and used to conduct serum cholesterol tests, and serum electrolyte tests by Baker et al (1985).

Preparation of walnut fruits

To remove husk from kernel can lead to hand staining. Walnut husk contain phenol that stain hands and can cause irritation (Cosmulescu et al 2010). Mature walnut fruits were selected and boiled with hot water till they cook very well to avoid staining hands. Ten (10) nuts were given to the test subjects to eat every day for 5 days added to their antipsychotic drug treatment after taking their initial high blood pressure measurement, cholesterol measurement and electrolyte concentration measurement while the control subject were not given walnut.

Toxicity studies

The LD₅₀ of the extract of walnut in mice was determined using Lorke's method (1983). Mice (60-80g) were fasted overnight for 22 hours and doses of the extract of walnut (10mg) was administered intraperitoneally to the groups of the mice (n=3) and observed for 24-48 hours. When no death occurred, subsequent doses (15mg/1kg, 29mg/1kg body weight) were administered to fresh groups of mice (n=3) and observed for another 24-48hrs. the mice that served as control received normal saline only. The LD₅₀ for the extract was calculated by geometric mean of the dose killing none of the three mice in the group and dose killing all the animals in the group.

Blood pressures of psychotic subjects were measured with the use of sphygmomanometer and cuff.

Statistical analysis

The results obtained in the study for the biochemical analysis were represented as mean and standard deviation (mean ±S.D) while student T-test was used to compare the result of the control and the test. A P-value of less than (P<0.05) OR equivalent to (P=0.05) was considered statically significant.

RESULT

The results obtained in the study are shown in tables 1-2 and Figure 1.

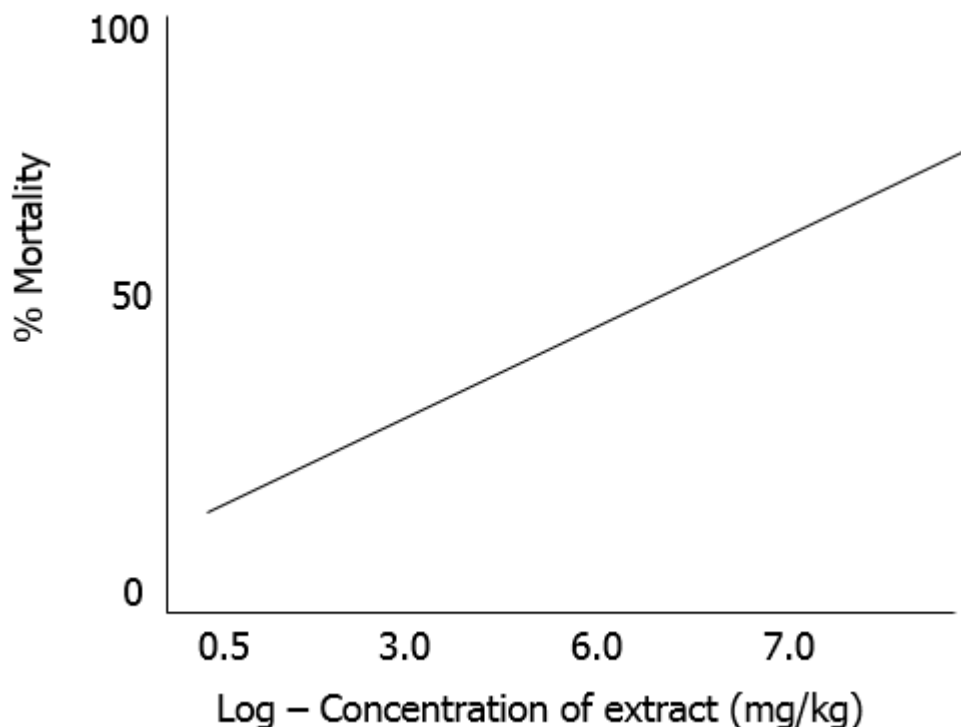
Table 1: The phytochemical study of walnut (*Juglans nigra*)

Substances	Alkaloids	Phenols	Flavenois	Reducing sugar	Calcium	Tanins	Resin steroids terpenoid
Degree of concentration	-	++	+++	+	++	++	-

Key: - Negative, + present in small concentration, ++ present in moderate concentration, +++ present in high concentration

Table 2: The result of blood pressure measurement and some biochemical analysis of phychotic subjects during episode after 5 days ingestion of walnut (*Juglams nigra*).

Group	Blood pressure systolic mmhg±S.D	Blood pressure diastolic mmhg ± S.D	Cholestral mg/dl ± S.D	+Na ± S.D meq/L	K+ ± S.D meq/L	cl-mf/dl ± S.D meq/L	HC0 ₃ ± S.D meq/L
Control subjects n=12	110±2.0	105±1.7	155±20	130±0.4	4.2±0.4	101±0.6	22±0.5
Psychotic subject B before walnut n=20	230±10.0	120±8.0	180±9.0	180±12.0	12±0.4	150±0.8	32±1.4
Psychotic subjects B after walnut n=20	120±0.5	80±.17	160±8.5	133±0.8	3.8±0.2	105±0.6	21±0.2
P. value	P<0.05	P<0.05	P<0.05	P<0.05	P<0.05	P<0.05	P<0.05

**Figure 1: Lethality dose (LD₅₀) of mice fed with walnut**

DISCUSSION

This study have elucidated the activities of Principal elements in *Juglans nigra* (walnut) in ameliorating blood pressures and some biochemical indices of male psychotic subjects in Enugu metropolis.

The phytochemical analysis carried out on the seeds of *Juglans nigra* revealed the presence of high concentration of flavenoids followed by calcium, saponin, tannins and phenols that occurred moderately. The elements that were absent are resin, steroids, terpenoids, alkaloids, glycosides and carbohydrates (Table 1). Principal elements in walnut such as phenolic acid consists of chlorogenic acid, neochlorogenic acid, frolic acid, P-coumatic acid, vanillic acid, gallic acid all have antioxidant, anti-inflammatory and anti-diabetic properties. Flavonoids also contained in walnut consist of catechin, epicatechin gallate, quercetin-3-O-arabinoside, naringin, quercetin-3-O galactoside and rutin have also antioxidant, anti-inflammatory and neuro protective effects as well as tannins.

Phytosterols present in walnut consists of B-sitosterol and campesterol which can help lower serum cholesterol levels and alleviate oxidative stress (Table 2).

Other Principal elements are tocopherols which may help prevent cancer and cardiovascular diseases.

Juglans nigra does contain dietary fiber which have potential benefits for mental health including psychotic disorders. It contains both soluble and insoluble fiber. This fiber content is of immense important as it permeates into the gut-brain axis and a healthy gut micro biome supported by fiber compositively impact brain function and potentially alleviate symptoms of psychotic disorder. (Megen, 2017)

Fiber's anti-inflammatory properties may help reduce inflammation associated with psychotic disorders (Jiongxing, 2022). The biochemical analysis provides physiological information on a proper blood pressure and serum electrolytes which normalized after 5 days infection of walnut shows the consumption of walnut and meals containing walnut can help hypertension and lowering cholesterol in the body that can predispose one to cardiovascular diseases.

Researchers on nut consumption and risk of cardiovascular diseases (Hu et al, 1999) discovered through feeding trials that there are cholesterol-lowering trends in walnut-enriched diets compared with control diets as revived by Feldman 2022. The macronutrients (chemical composition) and the micronutrients (Table 1) composition of walnuts confers walnuts the natural ability to improve health conditions of male hypertensive subjects (Oguwike et al, 2014). The dividing line between normal and high blood pressure (BP) is arbitrary and is defined by the point above which reduction of PB reduces cardiovascular risk (Solomon 2001).

In addition to short term walnut enriched food, there should be a modification in the life style of hypertensive subjects, such as reduction in table salt intake, cessation of smoking and avoidance of feed with

high animal fat and cholesterol content. Also reduction or complete avoidance of alcohol intake has anti-hypertensive and anti-psychotic effect in the body.

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