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# EVALUATION OF THE ANTICONVULSANT POTENCY OF THE COMBINED ETHANOL EXTRACT OF *GARCINA KOLA (BITTER KOLA)* AND PALM KERNEL OIL *(ELEAS GUINEENSIS)* IN MICE

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## ABSTRACT
Nigeria has a rich history of using various herbs, spices and herbal components for treating various diseases. Faced with the problem of non-compliance, cost of drug and toxicity experienced over the years from synthetic drugs, agents from plant source are expected to be less toxigenic and cheaper. Convulsion is a neuro-disorder in the brain function and is characterized by periodic and unpredictable occurrences of seizures. It is common in children especially during fever when the body temperature is high. Most local communities in eastern Nigeria make use of *Garcina kola* (bitter kola) and *Eleas guineensis* oil (palm kernel oil) either singly or concomitantly to manage convulsion in children. This work was aimed at investigating the anticonvulsant properties of these two plant products so as to give credence to this practice or otherwise. The palm kernel nuts and bitter kola fruits were collected, authenticated, dried and milled. The powdered *Garcina kola* (bitter kola) was macerated in ethanol for 72 hours, while the palm kernel was heated to obtain the oil. The crude extract obtained were concentrated and phytochemical test revealed the presence of flavonoids, tannins, saponins, alkaloids, glycosides, phlobannins, anthroquinone and deoxy-sugars in *G kola* and palm kernel oil respectively. Chemomicroscopic investigation revealed the presence of lignin, starch, protein, mucilage, cellulose, gutin and suberin. The palm kernel oil and *G. kola* singly and in combination were investigated for anticonvulsant activity in mice against pentylene tetrazol (PTZ) and isoniazid-induced convulsion models to assess their anticonvulsant activity. The various regiments were found to significantly ($p<0.005$ - 0.01) offer protection against PTZ- and isoniazid-induced convulsions in mice, but the activities of the combined products were lowers than that of the individual product.

**KEYWORDS:** Anticonvulsant, Eleas guineensis (Palm kernel oil), Garcina kola.

## INTRODUCTION
Convulsion is a medical condition where the body muscles contract and relax rapidly and repeatedly, resulting in uncontrolled twitching. Because epileptic seizures typically include convulsions, the term convulsion is often used as a synonym for seizure. However, not all epileptic seizures result in convulsions, and not all convulsions are caused by epileptic seizures.[1,2] Non-epileptic convulsions have no relation with epilepsy, and are caused by non-epileptic seizures. Convulsions can be caused by epilepsy, infections, brain trauma, or other medical conditions. They can also occur from an electric shock or improperly enriched air for scuba diving. Sometimes the convulsion can be caused by genetic defects or very low blood sugar or a deficiency of vitamin B6 (pyridoxine). The pathophysiology of convulsion remains ambiguous. In rare cases, it may be triggered by reactions to certain medications, such as antidepressants, stimulants, and antihistamines.[3]

Traditional medicine according to WHO is defined as the sum total of the knowledge, skills, and practices based on the theories, beliefs, and experiences indigenous to different cultures, whether explicable or not, used in the maintenance of health as well as in the prevention, diagnosis, improvement or treatment of physical and mental illness.[4] In some Asian and African countries, up to 80% of the population rely on traditional medicine for their primary health care needs, when adopted outside its traditional culture, traditional medicine is often considered as a form of alternative medicine.[5,6]

The increasing interest in natural compounds with potential health benefits has led to the investigation of various plant based sources. *Elaeis guineensis* and *Garcina kola* have been traditionally used for their medicinal properties, including their independent anticonvulsant potency.[7,8,9] However, there is lack of comprehensive scientific evidence regarding their concomitant use as anticonvulsant. Therefore, the present research was aimed at assessing the anticonvulsant effect of the combined *Elaeis guineensis* (palm kernel oil) and *Garcina kola*.

*Elaeis guineensis* yields two types of oil: palm oil from the fleshy mesocarp, and palm-kernel oil from the kernel, in a volume ratio of 10:1. Most palm oil is used in food preparation (margarines, and industrial frying oils used to prepare snack foods, etc.). Palm-kernel oil is similar in composition and properties to coconut oil, and is used in confectionery, where its higher melting point is particularly useful. The dark-brown to black palm kernel oil obtained by heat extraction is used extensively by Igbos in Eastern Nigeria and other tribes in the South-South Nigeria for treating various ailment including convulsion.[10,11]

*Garcinia kola* is chewed extensively in Southern Nigeria as a masticatory and it is readily served to visitors, especially among the Igbo tribe in Eastern Nigeria, as a sign of peace and acceptance of visitors. The root of the plant is used as favorite bitter chew-sticks in West Africa.[12] The stem bark is used in folklore remedies as a purgative among the natives of Eastern Nigeria and the latex is externally applied to fresh wounds to prevent sepsis, thereby assisting in wound healing. It is also popular among the people of Nigeria for nervous alertness and induction of insomnia. *Garcinia kola* is highly valued for its medicinal use. This plant has been referred to as a "wonder plant" because every part of it has been found to be of medicinal importance.[12,13] The seeds are chewed as an aphrodisiac or used to cure cough, dysentery, chest colds, liver disorders, diarrhea, laryngitis, bronchitis, and gonorrhea.[12,13,14] The seed is used to prevent and relieve colic, it can also be used to treat headache, stomach ache and gastritis.[15] It has also been reported for the treatment of jaundice, high fever, and as purgative.[16] In Sierra Leone, the roots and bark are taken as a tonic for sexual dysfunction in men. The bark is also added into palm wine to improve its potency.[12,15,16] Traditional medicine practitioners in Nigeria, particularly in the Ogoni area use a decoction of *Garcinia kola* stem bark for the treatment of dysmenorrhea, fever, inflammation and burns. Bitter kola is anti-poison and helps to detoxify the system.[14,15,16]

## MATERIALS AND METHODS

**Materials**: Conical flask, Water bath, Funnel, Cotton wool, Muslin cloth, Whatman no.1 Filter paper, Weighing balance, Petri dishes, Beaker, Analytical weighing balance, Test tubes and test tube racks, Conical flasks, Water bath, Cotton wool, Measuring cylinders, Aluminum foil, Chemicals, reagents and samples: Mayers reagent**,** Drangendroffs reagent**,** Wagners reagent**,** Felling's solution, Ferric chloride solution**,** Distilled water**,** Concentrated Hydrochloric acid**,** Iodine solution**,** Ammonia**,** Chloroform**,** Isoniazid, Ethanol, Distilled water, PTZ.

Samples: Fresh *Elaeis Guineesis* kernel and *Garcina Kola.*

**Collection and Identification of Plant Materials:** Fresh nuts of *Elaeis Guineesis* and fresh seed of *Garcina Kola* were bought from a food market in Elele, Rivers State, Nigeria and identified by a taxonomist in the department Pharmacognosy, Madonna University Elele and a voucher number was attached.

**Preparation of *Eleais guineensis* (Palm kernel oil**): Palm kernel 2.0 kg was weighed and crushed into smaller pieces. The crushed kernels were heated to release the oil, which was then collected and filtered with muslin clothes to remove impurities. The filtrate was transferred into a 1000 mL beaker.

**Preparation of *Garcina kola:*** *Garcina kola* 2.0 kg was weighed, crushed into smaller pieces and dried. The crushed kola was put in a conical flask and 95% (300 mL) of ethanol was added with continues stirring for 72 hours, it was then filtered. The liquid filtrate obtained was concentrated *in vacum* at 40 ℃ and all the ethanol was completely removed. The extract was stored in a refrigerator at 4$^{o}$C until used in the various studies.

**Phytochemical Analysis:** Preliminary phytochemical tests were carried out on the crude ethanol extract of *Elaeis guineensis* and *Garcina kola* using standard phytochemical screening procedures and reagents.[16]

**Qualitative Chemo-Microscopic Evaluation and Proximate Analysis:** Chemo-microscopic evaluation and proximate analysis were carried out using standard techniques.[16,17]

**Experimental design:** Albino Swiss mice (19 – 28 g) of either sex were obtained from the Madonna University Animal house. They were maintained on standard animal pellets and water *ad libitum*. They were kept in plastic cages in a well-ventilated room. The mice were randomly assigned into eight groups of five mice per group two of which served as the positive and negative control, and the rest as the treatment group to receive various concentration of *Eleasia guineensis* and *Garcina kola* separately and combined.

**Acute toxicity:** This was done using Lorke's method as modified**.** In phase one, nine animals were divided into three groups of three animals each. Each group of animals were administered different doses (10, 100, 1000 mg/kg) of *Eleasia guineensis* and *Garcina kola* (separately and in combination). The animals are placed

under observation for 24 hours to monitor their behavior as well as if mortality will occur. In the second phase, three animals, were distributed into three groups of one animal each. The animals are administered higher doses (1600, 2900 and 500 mg/kg) of *Eleasia guineensis* and *Garcina kola* (separately and in combination) and then observed for 24 hours for behavior as well as mortality.[18,19]

**Anticonvulsant activity**

**(i) Pentylene tetrazol-induced Convulsion:** Anticonvulsant effect of the extract was assessed using a modified method of Vellucci and Webster (1984) on overnight fasted mice.[20] The mice were divided into eight groups of five animals each and treated with various combinations of palm kernel oil and Garcinia kola extract. Group I, were given distilled water alone (10 mL/kg), group 2 were orally treated with phenobarbitone, 40 mg/kg, group 3 animals were concommitantly treated with Palm kernel oil (5 mL/kg) and Garcinia kola (100 mg/kg), group 4 was administered with Palm kernel oil (10 mL/kg) and G. kola (100 mg/kg), animals in group 5 were orally given palm kernel oil (5 mL/kg) and G. kola (200 mg/kg), group 6 mice were treated orally with palm kernel oil (10 mL/kg) and G. kola (200 mg/kg), while animals in groups 7 and 8 were respectively administered orally with palm kernel oil (10 mL/kg) and G. kola (200 mg/kg). All the treatments were done one hour before induction of convulsion. Seizure was induced in each set of the mice with pentylene tetrazol (PTZ) (70 mg/kg i.p). The onset of Clonic/tonic convulsion and the mortality rate were recorded and compared with the respective control groups. The ability of the various treatments/ combinations to prevent or delay the onset of the hind limb extension exhibited by the animals was taken as an indication of anticonvulsant activity.[24] The animals were observed for 120 minutes after the administration of PTZ and the following parameters were noted: (1) Time to onset of myoclonic jerks in minutes**,** (2) Time to onset of tonic convulsions in minutes, (3) Time to death during experimental time of 120 minutes and (4) Number of mice dead/alive after 30 minutes.[20,21]

**(ii) Isoniazid (INH)-induced seizures in mice:** The method of Madhu (2009) was used to evaluate the effect of the various treatments against isoniazid-induced convulsion with slight modifications.[22] The mice were divided into eight groups of five animals each and treated with various combinations of palm kernel oil and Garcinia kola extract. Group I, were given distilled water alone (10 mL/kg), group 2, were orally treated with phenobarbitone, 40 mg/kg, group 3 animals were concommitantly treated with Palm kernel oil (5 mL/kg) and *Garcinia kola* (100 mg/kg), group 4 was administered with Palm kernel oil (10 mL/kg) and *G. kola* (100 mg/kg), animals in group 5 were orally given palm kernel oil (5 mL/kg) and G. kola (200 mg/kg), group 6 mice were treated orally with palm kernel oil (10 mL/kg) and G. kola (200 mg/kg), while animals in groups 7 and 8 were respectively administered orally with palm kernel oil (10 mL/kg) and G. kola (200 mg/kg). All the treatments were done one hour before induction of convulsion. Seizure was induced in each set of mice with isoniazid (300 mg/kg i.p). The onset of clonic/tonic convulsion and the mortality rate were recorded and compared with the respective control group. The following parameters were noted: (1) Time to onset of myoclonic jerks in minutes**,** (2) Time to onset of tonic convulsions in minutes, (3) Time to death during experimental time of 120 minutes and (4) Number of mice dead/alive after 30 minutes.[22,23,24]

## RESULTS

**Table 1: Qualitative phytochemical analysis for *Eleasia guineensis* and *Garcina kola.***

| TEST | RESULT |
|---|---|
| Flavonoids | + |
| Tannins | + |
| Carbohydrates | + |
| Saponins | + |
| Alkaloids | + |
| Glycosides | + |
| Phlobatannins | - |
| Anthraquinone | + |
| Deoxy-sugars | + |

**Table 2: Qualitative chemo-microscopic evaluation for *Eleasia guineensis.***

| TEST | RESULT |
|---|---|
| Lignin | + |
| Starch | - |
| Calcium oxalate | + |
| Mucilage | - |
| Cellulose | + |

**Table 3: Qualitative chemo-microscopic evaluation for *Garcina kola.***

| TEST | RESULT |
|---|---|
| Lignin | + |
| Starch | + |
| Calcium oxalate | - |
| Mucilage | + |
| Cellulose | + |
| Cutin | + |
| Suberin | + |

**Table 4: Proximate analysis results of *Garcina kola.***

| | ANALYTICAL STANDARD | COMPOSITION (%) |
|---|---|---|
| **ASH VALUES** | Total ash value | 40.00 |
| | Acid insoluble ash | 20.00 |
| | Water insoluble ash | 23.75 |

**Acute Toxicity Test for Phaes 1:** Acute toxicity test ($LD_{50}$) result of phase 1 using Lorke's method, (Lorke, 1983). In this phase, there were no deaths recorded after 24 hours of administration.

**Table 5: Acute Toxicity Test Phase 1 Result.**

| DOSE ADMINISTERED (mg/Kg) | NUMBER OF DEATHS |
|---|---|
| 10 | 0/3 |
| 100 | 0/3 |
| 1000 | 0/3 |

**Acute Toxicity Test for Phase 2:** Acute toxicity test result of phase 2 using Lorke's method, (Lorke, 1983). In this phase, there were no deaths recorded after 24 hours of administration.

**Table 6: Acute Toxicity Test for Phase 2 Result.**

| DOSE ADMINISTERED (mg/Kg) | NUMBER OF DEATH |
|---|---|
| 1500 | 0/3 |
| 2600 | 0/3 |
| 5000 | 0/3 |

**Results for anticonvulsant activities**

**PTZ –induced convulsion:** The effect of concomitant administration of palm kernel oil and *Garcinia kola* combinations on PTZ-induced convulsion is as shown in Table 7. The administration of palm kernel oil and *G. kola* provided considerable protection for mice against seizure induced by PTZ. The combination of *G. kola* and palm kernel oil provided significant ($p<0.05$) delay in the onset of myoclonic convulsion in all the treated groups when compared to control and the group treated with palm kernel oil (10 mg/kg) and *G. kola* (100 mg/kg) having the highest effect. However, the group treated with palm kernel oil (10 ml/kg) alone had effect that was significantly ($p<0.01$) higher than the groups treated with the various combination, while treatment with *G. kola* (200mg/kg) alone inhibited the onset of myoclonic convulsion in the group so treated. Significant delay ($p<0.001$) in the onset of tonic convulsion was observed in all the groups treated with the combination of palm kernel oil and *G. kola* and the group treated with palm kernel oil (10 mg/kg) and *G. kola* (100 mg/kg) having the highest delay. Palm kernel oil (10 ml/kg) only treated group had total inhibition of tonic convulsion, while *G. kola* (100 mg/kg) only treated had effect that was significantly ($p<0.05$) higher than those treated with the various combinations of palm kernel oil and *G. kola* (Table 7). The times of death of the mice treated with the various combinations of palm kernel oil and *G. kola* were significantly ($p<0.001$) longer than that of control with the group treated with palm kernel oil (10 mg/kg) and *G. kola* (100 mg/kg) having the longest time. The group treated with palm kernel oil (10 ml/kg) alone had a time of death that was longer than all the groups treated with the combinations, *G. kola* (100 mg/kg) only, and standard drug, phenobarbitone (40 mg/kg). Moreover, mice treated with palm kernel oil alone did not die throughout the duration of the experiment (Table 7).

**Table 7: Effect of combined administration palm kernel oil and *Garcinia kola* seed extract on Pentylene tetrazol-induced convulsion.**

| TREATMENT mg/kg | Dose | Onset of myoclonic | Onset of Tonic | Time of death | No. of death |
|---|---|---|---|---|---|
| Control | - | 0.32 ±0.08 | 1.32 ± 0.02 | 2.89±0.01 | 5/5 |
| Phenobarb | 40 | 1.23 ±0.09c | 18.28±1.82c | 30.09±0.01c | 2/5 |
| KO +GK | 5ml+100 | 4.10±0.34c | 5.55± 0.82c | 22.38±2.76c | 3/5 |
| KO+GK | 10ml+100 | 4.20±0.33c | 9.24± 1.60c | 24.71±5.28c | 1/5 |
| KO+GK | 5ml+200 | 4.14±0.29c | 7.23± 4.51c | 22.71±2.78c | 2/5 |
| KO+GK | 10ml+200 | 3.93±1.21c | 6.55± 2.07c | 9.24±2.51b | 5/5 |
| KO | 10ml | 13.4±0.98c | 0.00± 0.00c | 60.00±0.00c | 0/5 |
| GK | 200 | 0.00±0.00c | 15.09± 1.41c | 17.98±1.18c | 5/5 |

Data are expressed as MEAN ± SEM, Significant at ap < 0.05; bp < 0.01; cp<0.001, when compared to control. (n=5).

**Isoniazid-induced convulsion:** Administration of palm kernel oil and *G. kola* concomitantly to mice offered significant ($p<0.001$) protection against convulsion induced by isoniazid. The group treated with palm kernel oil (10 mL/kg) and *G. kola* (200 mg/kg) were observed to have the most significant ($p<0.05$) delay in the onset of myoclonic and tonic convulsion when compared to control and higher than that of the standard drug, diazepam, treated group. The group also had the longest time of death which was significant ($p<0.01$) when compared to control though shorter than that of the standard drug group. However, the group treated with palm kernel oil (10 mL/kg) alone was found to suppress the onset of tonic convulsion and protected the animals throughout the duration of the experiment with no recorded mortality. This effect was higher than that of the standard drug group, diazepam (Table 8).

**Table 8: Effect of combined administration palm kernel oil and *Garcinia kola* seed extract on Isoniazid-induced convulsion.**

| TREATMENT mg/kg | Dose | Onset of myoclonic | Onset of Tonic | Time of death | No. of death |
|---|---|---|---|---|---|
| Control | - | 2.53±0.28 | 11.50 ± 0.95 | 25.82±2.92 | 5/5 |
| Diazepam | 5 | 4.17±0.10a | 26.19 ± 0.53b | 84.09±4.05c | 5/5 |
| KO +GK | 5ml+100 | 3.44±0.27 | 29.13± 0.87c | 36.01±2.75 | 5/5 |
| KO+GK | 10ml+100 | 3.75±0.45 | 23.63± 2.91 | 36.32±1.70 | 5/5 |
| KO+GK | 5ml+200 | 3.12±0.10 | 26.96± 2.33b | 31.41±1.93 | 1/5 |
| KO+GK | 10ml+200 | 4.70±1.89a | 32.22± 1.60c | 76.21±1.51b | 2/5 |
| KO | 10ml | 3.40±0.73 | 0.00± 0.00c | 120.00±0.00c | 0/5 |
| GK | 200 | 2.55±0.69 | 19.03± 1.23 | 36.74±3.25 | 5/5 |

Data are expressed as MEAN ± SEM, Significant at ap<0.005; bp<0.01;cp < 0.001, when compared to control. (n=5).

## DISCUSSION

Palm kernel oil and *Garcinia kola* are two important ethno medicines employed in the treatment of various diseases such as fever and convulsion especially in children. The anticonvulsant activity of the concomitant administration of *G. kola* and palm kernel oil was evaluated in this study against experimentally-induced convulsions. The combination of palm kernel oil and *G. Kola* seed extract was found to provide a significant degree of protection against seizures induced by pentelyene tetrazol and isoniazid. However, it was observed that the anticonvulsant activity of *G. kola* alone was better than that of the various combinations. Moreover, the anticonvulsant activity of palm kernel oil alone against the two experimentally-induced seizures was better than that of the various combinations, *G. kola* alone and that of the standard drug in some cases. The lower activity of the combinations than *G. kola* alone or palm kernel oil alone suggest some levels of antagonism. It therefore implies that combining the two natural products in the treatment of convulsion reduces the efficacy of the medicines. However, De Sarro *et al*., (1999)[23], suggested that pentylene tetrazol (PTZ) exert its anticonvulsant effect by inhibiting the activity of gamma aminobutyric acid (GABA) at GABA receptors. Gamma aminobutyric acid is the major inhibitory neurotransmitter which is implicated in epilepsy. The enhancement and inhibition of the neurotransmission of GABA attenuate and enhance convulsion respectively.[25,26,27] Phenobarbitone and diazepam, standard epileptic drugs, have been shown to exert their antiepileptic effects by enhancing GABA-mediated inhibition in the brain.[26,27] These drugs are reported to antagonize PTZ-induced convulsion[24] by enhancing GABA neurotransmission. Phenytoin was unable to prevent PTZ- induced seizure because it is thought to exert its antiepileptic effect by blocking sodium ions into brain cells thus inhibiting generation of repetitive action potential.[28,29] Since the combination of palm kernel oil and *G. kola* as well as the individual products were able to delay PTZ – induced convulsion and protect the animals, this also confirm their CNS depressant effect and its ability to enhance GABA-mediated inhibition in the brain especially palm kernel oil which exerted the highest activity.

Isoniazid, an anti-tuberculosis drug, induces status epilepticus by depleting brain level of Gamma-Aminobutyric Acid (GABA), a major inhibitory transmitter substance in the mammalian brain, through inhibition of pyridoxal-5-phosphate-dependent Glutamic Acid Decarboxylase (GAD).[30,31,32] Pyridoxal-5-phosphate is the active form of pyridoxine, a cofactor for GAD, and an enzyme required for GABA synthesis.[31,32,33,34,35] The decrease in GABA levels results in recurrent seizures that characterized status epilepticus.[31,32] Although isoniazid-induced seizure is known to respond poorly to currently available anticonvulsant drugs, intravenous diazepam is still used to control the seizure episodes in the absence of pyridoxine.[31,32,36,37] The various combinations of palm kernel oil and *G. kola* extract were found to significantly protect the treated mice against INH-induced convulsion, though lower than the effect of the individual product. This action further confirmed the antagonistic activity of the components of the two products. Their anticonvulsant activities therefore may have been due to their ability to enhanced GABA synthesis in the brain through the activities of their phytoconstituents.

Secondary metabolites from plants such as flavonoids have been severally reported to possess antiepileptic activity by modulating the GABA-Cl-channel complex, as they are structurally similar to benzodiazepines.[38] Some flavonoids, as well as their glycosides, have been reported to exert anxiolytic, sedative, and anticonvulsant effects on the central nervous systems (CNS).[39] Flavonoids such as rutin, quercetin, and isoquercitrin have been shown to have anticonvulsant effects on experimental epilepsy models.[40] Flavonoids are known to exert antiepileptic activity by modulating the GABA-Cl-channel complex, as they are structurally similar to benzodiazepines.[38] Also apigenin, a flavonoid, has been characterised as a centrally acting benzodiazepine ligand and was active against picrotoxin-induced convulsions.[41] *G. kola* seed extract are known to be rich in flavonoids and other phenolic compounds which are potent antioxidants such as flavonoids; garcinoic acid, garcinol, and tocotrienol and polyunsaturated fatty acids; 9-octadecenoic acid methyl ester, 9, 12-octadecadienoic acid (Z, Z), stearic acid methyl ester, and hexadecanoic acid methyl ester.[39,41] These metabolites are likely to

act by scavenging free radicals and modulating the GABA-Cl-channel complex in the CNS, thereby exerting its anticonvulsant activity. Also, straight chain or medium fatty acids such as capric, lauric, myristic, palmitic and stearic acid as well as omega-3- fatty acids have been reported to exert anticonvulsant activity.[41] The palm kernel oil has been reported to contain many fatty acids such as caproic, caprylic, capric, lauric, myristic acids, palmitic, linoleic, behenic, stearic, oleic, arachidonic, palmitoleic and linolenic acids.[8,12] These fatty acids may be responsible for its anticonvulsant activity as observed in this study and this results corroborate earlier report of Alaribe *et al*. (2016) and Amagon *et al*. (2021)[8,12] confirming the anticonvulsant of the palm kernel oil.

The results of this study have confirmed the anticonvulsant potential of palm kernel oil and *G. kola* seed extract combination which is used local in the treatment of convulsions in children but observed a high level of antagonism between the two natural products which leads to reduction of their combined efficacy in the treatment of convulsion.[42] Therefore, it is recommended that either of the products should be used alone especially palm kernel oil in the treatment of convulsion.

## CONCLUSION

The finding of this study evaluates the use of Nigerian herbs as anticonvulsant, *Garcina kola* and *Eleas guineensis* kernel oil can be considered a promising complementary approach to managing convulsion individually. The combined products of palm kernel oil and *Garcina kola* possess anticonvulsant activity but mild. So, the combination is used mostly during healing crisis to produce a better theraupeutic use especially in neonates and children and this supports its use in ethnomedicine for the treatment of central nervous system disorders but it is better to use the individual product to achieve a better efficacy.

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