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<tbody>
<tr>
<td>Author 1</td>
<td>AGUWA, C. Nze</td>
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<td>Author 2</td>
<td>AKUBUE, P.I.</td>
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<tr>
<td>Author 3</td>
<td>MITTAL, G.C</td>
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<td>Title</td>
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PRELIMINARY PHARMACOLOGICAL STUDY OF SOME NIGERIAN MEDICINAL PLANTS

1. Introduction

Folk medicine has existed from the earliest times and even ancient man knew that some plant extracts could treat diseases. Galen said that there is no disease which plants cannot cure. Primitive man found the Therapeutic property of herbs by trial and error or by accident. The knowledge obtained has been carried from generation to generation with almost no written record. Such crude drugs are still applied today in native medicine in much the same way as primitive man did many centuries ago. No doubt some are useful, but it is a matter of concern that these natural products are being used by traditional medicine men and the local people without a knowledge of their pharmacology and toxicology.

During the last decade there has been a revival of interest in plants of medicinal value all over the world, especially in the plants of Africa. In our department, pharmacological study of certain locally used plants is being carried out with the assistance of our graduating students. A summary of the results obtained from such a study over a period of 4 years is presented here.

*To whom all reprint requests should be addressed.
<table>
<thead>
<tr>
<th>Local English Name</th>
<th>Latin Name</th>
<th>Family</th>
<th>Local Meanings</th>
<th>Part of the Plant Investigated</th>
<th>References</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aguia lafrota Otto &amp; Ovira</td>
<td>Agarista lafrota, Ovira</td>
<td>Compositae</td>
<td>Agara, Ovira, Ovira</td>
<td>Dry leaf</td>
<td>Deluxe (1963)</td>
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<td>Spondias mombin Linn.</td>
<td>Spondias mombin</td>
<td>Anacardiaceae</td>
<td>Spondias, Mombin</td>
<td>Aquous leaf extract</td>
<td>Deluxe (1963)</td>
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<tr>
<td>Ochna centrotum (sic) or Ochna gratissima Linn.</td>
<td>Ochna centrotum, Ochna gratissima</td>
<td>Labiatae</td>
<td>Ochna, Ekhle, Shafun (Fever plant), Juice (Mosquito plant)</td>
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<td>Deluxe (1963)</td>
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<td>Enterobius latifolius Linn.</td>
<td>Enteroberia latifolius</td>
<td>Euphorbiaceae</td>
<td>Enteroberia, Ogwebi</td>
<td>Purgative</td>
<td>Deluxe (1963)</td>
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<tr>
<td>Diospyros calabura (Pax) Prain</td>
<td>Diospyros calabura</td>
<td>Euphorbiaceae</td>
<td>Ogwe-ski</td>
<td>Aquous extract of seeds</td>
<td>Deluxe (1963)</td>
</tr>
</tbody>
</table>

References:
- Deluxe (1963)
- Olahajji and Sefarena (1975a)
- Irene (1968)
- Oliver (1978)
- Olahajji and Sefarena (1975b)
- Hutchinson and Dalziel (1963)
- Irvine (1968)
- Watt and Breyer-Brandwijk (1962)
- Olahajji and Sefarena (1975b)
- Hutchinson and Dalziel (1968)
- Watt and Breyer-Brandwijk (1962)
F. comosa
Leucas a.

Olo-ina, Nga

Stomach ache

Aqueous leaf extract

Hutchinson and
Dabriel (1959)

Combretum racemosum
Combretaceae

Olo-apwu

(1) Stomach ache
(2) Diarhhea
(3) Premature labour

Aqueous leaf extract

Irvinie (1955)

Dichapetalum barteri
Engl.

Challietiaceae
Ngbu-awu, Akwuna
Aheke

Rat poison

Aqueous leaf extract

Offenburger and
Bottger (1962)

Rycnospermum dichotomum
(R.) B. Fedt

Mimosaceae
Opwu-wakpa, Opwu-ba

Hypnotic

Aqueous extract of stem

Keay et al. (1960)

Cassia cassii de Candolle
Engl.

Thymeleaceae
Omiru, N=ke u-si

(1) Obesity
(2) Mental disorders
(3) Thrombosis

Aqueous extract of root bark

Hutchinson and
Dabriel (1959)

Anchistea diplomela
A. Chev.

Loganiaceae
Ogbodo, Nsuta,
Aguru

Scarletness and
dysentery

Alcoholic leaf extract

Hutchinson and
Dabriel (1959)

Sida saheliana Juan ex Cav.

Malvaceae
Ipeuno

Abortifacient

Aqueous extract of
seed

Hutchinson and
Dabriel (1959)

Rugosa leonardii De Wild.

Rutaceae
Uku, Uke

Intestinal problems
like colic,
diarhhea and
dysentery

Alcoholic extract of
root bark

Hutchinson and
Dabriel (1959)
Materials and methods

Local herbalists from Anambra State of Nigeria were interviewed and 13 commonly used plants were selected for this study. The plants were identified and a specimen preserved in the departmental herbarium. Their botanical names, family, local 'igbo' names, local uses, part of the plant used and references are tabulated in Table 1.

The plant material was dried under shade and suitable extracts were prepared in hot boiling water or 95% alcohol (Table 1) in such a manner that 1 ml of extract represents 1 g of crude plant material. The choice of water or alcohol in preparing the extract depended upon the choice of herbalist. Pharmacology of the extracts was studied on isolated preparations and intact animals using standard pharmacological techniques such as isolated guinea pig ileum and rabbit jejunum (Pharmacological Experiments on Isolated Preparations, 1970); isolated guinea pig vas deferens (Hukovic, 1961); isolated uterus of rats and guinea pigs (Turner, 1965); charcoal meal test (Janssen and Jagenaar, 1957) and other procedures mentioned in the text. For all isolated work a 90 ml organ bath was used containing a suitable aerated physiological solution. The effect of i.v. administration of extract on the blood pressure of anaesthetized cats and dogs was also studied by the method described in Pharmacological Experiments on Intact Preparations (1970). For this the animals were anaesthetized with sodium pentobarbital (35 mg/kg) given intraperitoneally. Acute toxicity studies were also conducted in mice in some cases. The extract was injected i.p. and the number of deaths over 24 h were noted. LD₅₀ was calculated by the method of Miller and Tainter (1944). Preliminary phytochemical studies were also conducted in some plants, using the methods described by Tressa and Evans (1978).

Results and discussion

The results of the phytochemical study and LD₅₀ data are summarized in Table 2.

Appling iluyipia

- Addition of 0.5-2 ml of pressed leaf extract to the tissue bath produced dose-related contractions of isolated guinea pig ileum and rabbit jejunum; these were partially blocked by atropine (5 μg) and hexamethonium (1 μg). It also caused contraction of non-pregnant rat uterus (0.5 ml). The extract (0.5 ml/kg) produced a rise in blood pressure in anaesthetized cats and dogs which was not blocked by hydrazine (0.25 mg/kg) or hexamethonium (0.4 mg/kg) indicating a direct vasocostricor action. Local application of extract significantly reduced the bleeding time in rabbits. The coagulation time was markedly increased in rats, rabbits, guinea pigs and...
<table>
<thead>
<tr>
<th>Name of plant</th>
<th>Alkaloids</th>
<th>Saponins</th>
<th>Tannins</th>
<th>Glycosides</th>
<th>Oils*</th>
<th>L'Die + S.R.M. (ml/3g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aquilegia flabellata</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td>ND</td>
<td>ND</td>
<td>ND</td>
</tr>
<tr>
<td>Scopolia remotà</td>
<td>-</td>
<td>+</td>
<td>ND</td>
<td>ND</td>
<td>ND</td>
<td>ND</td>
</tr>
<tr>
<td>Oxinum sinde</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>ND</td>
<td>ND</td>
<td>ND</td>
</tr>
<tr>
<td>Euphorbia katschbergiana</td>
<td>-</td>
<td>+</td>
<td>ND</td>
<td>+ (V)</td>
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<td>ND</td>
</tr>
<tr>
<td>Diapoglossus callosastrum</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>+ (P)</td>
<td>ND</td>
<td>ND</td>
</tr>
<tr>
<td>Pyrenacantha scotidita</td>
<td>+</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>+ (P)</td>
<td>3.00 ± 2.12</td>
</tr>
<tr>
<td>Convolvulus humilis</td>
<td>-</td>
<td>-</td>
<td>+</td>
<td>ND</td>
<td>-</td>
<td>17.75 ± 1.15</td>
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<tr>
<td>Didymopanax hori</td>
<td>-</td>
<td>+</td>
<td>ND</td>
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<td>-</td>
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<tr>
<td>Stephanus dinhagru</td>
<td>-</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>+</td>
<td>ND</td>
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<tr>
<td>Caesalpinia tridentata</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td>+</td>
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<td>ND</td>
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<td>Choristoneura cincta</td>
<td>-</td>
<td>-</td>
<td>+</td>
<td>-</td>
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<tr>
<td>Oxytropis futilia</td>
<td>+</td>
<td>+</td>
<td>ND</td>
<td>-</td>
<td>-</td>
<td>16.00 ± 1.96</td>
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<tr>
<td>Fugua lemairei</td>
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<td>-</td>
<td>-</td>
<td>ND</td>
<td>0.74 ± 0.01</td>
<td>3.02 ± 0.21</td>
</tr>
</tbody>
</table>

*V = volatile oil; F = fixed oil.

**ND** = not determined.

The bleeding time and coagulation time were determined by the method described by Dacie and Lewis (1970).

The drug is used locally as a haemostatic agent. The haemostatic action is thought to be due to two mechanisms: precipitation of proteins by tannins and vasocostriction. Ramstedt (1959) reported that tannins contract small blood vessels and they are endowed with a faculty to tan. The tanned bleeding surface forms a crust, thus stopping the bleeding.

**Scopolia remotà**

Up to 10 ml of aqueous leaf extract did not produce any contraction of isolated guinea pig ileum; however, 2 ml of extract completely blocked contractions due to 10 mg each of acetylcholine, 5-hydroxytryptamine (5-HT), histamine or 20 mg of nicotine. Addition of 1-2 ml of extract depressed the tone and amplitude of contractions in isolated rabbit jejunum: the depressant effect was partially modified by 20 mg of dihydroergotamine (DHE). The extract (up to 10 ml) did not produce any contraction of isolated
guinea pig was deferens. The addition of 2-3 ml of extract produced con-
tractions of pregnant and non-pregnant guinea-pig uterus. Oral ad-
ministration of 20 ml of extract to pregnant guinea pigs (30-40 days of
pregnancy) during the period in guinea pigs being 60 days) pro-
duced abortion on the 5th day; the mother remaining healthy.

These results support its use in folk medicine as an antidiarrhoeal and
abortion-inducing; however, further detailed studies are needed to reach a
definitive conclusion.

Ocimum nivale
Up to 5 ml of aqueous leaf extract did not produce any contraction of
isolated guinea pig ileum; however, 2-4 ml of the extract reduced contrac-
tions due to 10 µg each of acetylcholine, histamine, or 5-HT; and completely
blocked the contractions due to 50 µg of nicotine. Addition of 2-4 ml of
extract inhibited contractions in rabbit isolated jejunum. The extract
(0.5 ml/kg) produced a transient rise followed by a fall of blood pressure in
anesthetized cats and dogs. An oral dosage of 0.5 ml significantly (P <
0.05) reduced the motility of gut in rats and mice (charcoal meal test).

The results indicate that the extract has antispasmodic and smooth mus-
cle depressant activity. It delays the passage of gut contents so that there is
time for more water to be absorbed, and the faeces become firmer. Thus
the extract is useful in non-specific diarrhoeas and other intestinal colics.

Rhusophora heterophyllus
An addition of 0.2 ml of aqueous leaf extract produced immediate and
sustained contraction of isolated guinea pig ileum. The contractions were
prevented by phenoxybenzamine (5 µg) and blocked by atropine (5 µg). They
were not blocked by hexamethonium (0.1 mg) or meperazine (5 µg).
The extract (0.2 ml) also increased the tone of spontaneous contractions in
isolated rabbit jejunum; this effect was antagonized by 5 µg of atropine.
Oral administration of 0.5 ml of extract significantly (P < 0.05) increased the
intestinal motility in rats and mice (charcoal meal test). The extract
produced a purgative effect in guinea pigs, cats and rabbits. Oral ad-
mnistration of 10 ml/kg of extract significantly increased the number of
times the animals defaecated. The purgation started 6-8 h after ad-
ministration of drug. The extract was more effective and less toxic when
animals were allowed free access to food and water. Starved animals, the
same dose of the extract was toxic. 8 out of 10 guinea pigs died within 17 h.
Injection of 0.25 ml/kg of extract produced a fall in blood pressure in
anesthetized cats and dogs which was blocked by atropine (1 mg/kg).
The extract appears to have mucousant activity like that of acetylcholine,
and probably produces purgation by stimulating the peristalsis.
*Dicorynopsis* caloneura

Addition of 0.2-1 ml of aqueous extract of seeds produced dose-related contractions of isolated guinea pig ileum, which were blocked by 1 μg of mepramine. The extract (0.5-1 ml) also caused contractions of isolated gravid and non-gravid uterus of guinea pigs. A 0.5-ml dose of extract significantly (P < 0.01) increased intestinal motility in mice (charcoal meal test). Oral administration of 1 ml of oil obtained from seeds in the form of an oil-in-water emulsion to guinea pigs, significantly (P < 0.01) increased the frequency of defaecation and number of wet faeces. The relationship between log dose and number of wet faeces was linear. The oil (2 ml) produced watery stools in guinea pigs after 3 h of oral administration. Injection of 0.5 ml/kg of extract produced a fall of blood pressure in anaesthetized cats and dogs, which was blocked by mepramine (5 μg/kg).

It is suggested that the oil of the seeds of *Dicorynopsis* caloneura act as irritant purgative like other members of the family, e.g. Croton oil. Aqueous extract contained some histamine-like principle or liberated histamine which stimulated peristalsis.

*Pyrenoxantha staudtii*

Up to 10 ml of aqueous leaf extract did not produce any contraction of isolated guinea pig ileum; however, 2 ml of extract reduced the contractions produced by 2 μg of acetylcholine, histamine, 5-HT or 0.5 μg of nicotine. Spontaneous contractions of isolated rabbit jejunum were inhibited by 0.5 ml of extract; DHE and propranolol did not block this inhibitory effect. Up to 8 ml of extract had no effect on isolated guinea pig vas deferens. Oral administration of 1 ml of extract significantly (P < 0.05) reduced the incidence of histamine-induced gastric ulcers in rats (ulcers induced by the method described by Eagleton and Watta (1965)). The extract (0.5 ml/kg) reduced the blood pressure in anaesthetized cats.

The extract appears to have direct-acting smooth muscle relaxant and antispasmodic activity which contribute to its usefulness in gastric and intestinal discomforts.

*Combretum racemosum*

The aqueous leaf extract (up to 10 ml) did not produce contraction of isolated guinea pig ileum; however, 1 ml of extract reduced the contraction due to acetylcholine (5 μg), histamine (5 μg) or nicotine (60 μg). Additions + 0.2-1 ml of extract reduced the amplitude of spontaneous contractions in isolated rabbit jejunum; the inhibitory effect was partially blocked by DHE and propranolol (50 μg each). The addition of 0.5 ml of extract to the tissue bath produced contraction of isolated guinea pig vas deferens. The extract (1-2 ml) produced contractions of isolated guinea pig gravid and non-gravid uterus; hydrgine (10 μg) blocked the contractile effect. Oral administration of 10 ml of extract to pregnant guinea pigs produced abortion 7 days after administration. The injection of 0.5 ml/kg of extract produced a rise in blo-
pressure in anaesthetized cats, which was blocked by DHE (0.5 mg/kg).
In conclusion this has a relaxant effect on intestinal smooth muscles; probably it acts through adrenergic receptors. Its use in premature labour cannot be justified since it has a stimulant effect on pregnant and non-pregnant uterus and causes abortion in pregnant guinea pigs.

**Dichapetalum barteri**
The aqueous extract of the leaves (0.2-4 ml) produced dose-related contractions of isolated guinea pig ileum, which were completely blocked by atropine (5 μg) and potentiated by phystostigmine (5 μg). Inhibition of extract with blood abolished the contractile response. The addition of 0.5 ml of extract produced a depolarizing type of block in rat phrenic nerve diaphragm preparation (Bulbring, 1948). A 0.1 ml aliquot of extract inhibited the contractions in isolated rabbit heart (Langer's preparation) (Bunn, 1951) and the heart stopped in diastole; the effect was antagonised by 10 μg of atropine.

The pharmacological study shows that the extract has a strong muscarinic activity and needs further study for its value as a muscarinic agent.

**Stephania densiflora**
Up to 5 ml of aqueous extract of stems did not cause contraction of isolated guinea pig ileum; however, 0.2 ml of extract reduced the contractility due to acetylcholine (5 μg), histamine (2 μg) or nicotine (20 μg). Amplitude and tone of contractions in isolated rabbit jejunum were also reduced by 0.2 ml of extract. Barbiturate sleeping time in rats was significantly (P < 0.05) increased with a dose of 1 ml/kg. Pinna reflex was abolished in higher doses while corneal reflex was not abolished with doses up to 2 ml/kg. Fighting induced by weak electrical shock in pairs of male mice (Dandiyala and Meen, 1953) was abolished with 1 ml/kg of extract. Motor activity on an inclined plane was impaired with 2 ml/kg of extract. The extract (0.5 ml/kg) showed some anaesthetic activity using the hot-plate method in mice; it did not have any local anaesthetic activity as studied by corneal reflex (Chance and Lobstein, 1944) and intradermal anaesthesia (Bulbring and Wajda, 1945) in guinea pigs.

The plant has sedative and hypnotic activity and further pharmacological and toxicological studies are needed to determine its safety.

**Ctenanthe econdens**
The aqueous extract of root bark (up to 5 ml) did not produce any contraction of isolated guinea pig ileum. The effects of acetylcholine, histamine and nicotine on this preparation were not antagonised. The extract did not affect the spontaneous contractions in isolated rabbit jejunum and isolated gravid and non-gravid uteri of guinea pigs and rats. However, 1 ml of extract completely and specifically inhibited oxytocin-induced (0.1 unit) contractions in the gravid and non-gravid uterus of guinea pigs and rats. It
did not affect uterine contractions induced by acetylcholine or histamine. Daily oral administration of extract in doses of 1 ml/kg led to a significant (P < 0.05) reduction in weight of guinea pigs who were allowed free access to food and water. Sorbitrate sleeping time in mice was significantly (P < 0.05) increased with dose of 1 ml/kg.

Local use of plant for treatment of obesity and mental disorders appears to be based upon its central actions. Specific antagonism to oxytocin forms the basis of its use in threatened abortion; a central depressant action may also contribute.

Ancholeista diaphanosa

Up to 5 ml of alcoholic extract of leaves did not produce contraction in isolated guinea pig ileum; however, 1 ml of extract partially blocked the contractions due to 5 μg of acetylcholine, histamine or serotonin; and completely blocked the contractions produced by 50 μg of nicotine. The addition of 1 ml of extract reduced the amplitude and tone of rhythmic contractions in isolated rabbit jejunum; DHE and propranolol (50 μg each) did not antagonize the depressant effect. The extract (0.5 ml) completely inhibited the peristaltic reflex in isolated guinea pig ileum induced by increasing the intraluminal pressure (Trendelenburg preparation as described in Pharmacological Experiments on Isolated Preparations (1970)). A dosage of 0.5 ml significantly (P < 0.01) inhibited the gastro-intestinal motility in mice (charcoal meal test).

It is concluded that the extract has antispasmodic and smooth muscle relaxant activity which is useful in gastro-intestinal disorders like non-specific diarrhoea.

Sida linfolia

The aqueous extract of the weed (0.1 ml and above) produced dose-related contractions in isolated guinea pig ileum which were not blocked by atropine (0.1 μg) and hexamethonium (0.1 μg) but were completely blocked by meperidine (50 μg). Log-dose response curves of the extract and histamine were parallel. The addition of 2 ml of extract produced contractions of isolated gravid and non-gravid uterus of guinea pigs which were equal to 0.05 units of oxytocin. The uterine of rat was less sensitive. A dosage of 0.4 ml/kg of extract given i.p. to pregnant mice produced vaginal bleeding and foetal discharge in all the cases. Injection of 1 ml/kg of extract produced a fall in blood pressure in anaesthetized cats which was blocked by 1 ml/kg meperidine.

In conclusion, the extract seems to contain some histamine-like principle or liberate histamine and is a potent abortifacient.

Fagara lemmae

Up to 5 ml of alcoholic extract of root bark did not produce any contraction in isolated guinea pig ileum; however, 0.5 ml of extract blocked the
contractions due to 5 μg of acetylcholine, histamine, 5-HT or 65 μg of nicotine. The addition of 1 ml of extract markedly decreased the amplitude and tone of contractions in isolated rabbit jejunalm the inhibitory effect was usually blocked by DHE and propyramide (100 μg each). The extract (0.2 ml) produced contractions in the isolated guinea pig and non-gravid uterus of guinea pigs.

The extract relaxes the smooth muscles of intestine partly directly and partly due to some sympathomimetic activity.

Conclusions

Preliminary studies show that some of these herbs are promising. It is hoped that further pharmacological, toxicological and clinical studies will be done so that they can be rationally substituted for some of the expensive modern medicines. Such studies should encourage other investigators to study the usefulness of other herbal preparations. The use of certain plants can be encouraged while others will be discouraged. Further studies on antispasmodic activity of Pyrenacyntha standii are in progress in this department and results are encouraging (Agawa and Mittal, 1981).

References


