



RESEARCH ARTICLE

AN ANTHELMINTIC STUDY OF *BUCHHOLZIA CORIACEA* AND *GYNANDROPSIS GYNANDRA* (FAM. CAPPARIDACEAE)

¹Ogunmefun O. T. and ²Ajaiyeoba E. O.

¹Biological science Department, College of Natural and Applied Sciences, Achievers University,
Owo, Nigeria

²Department of Pharmacognosy, Faculty of Pharmacy, University of Ibadan, Nigeria

Received: 11th, August, 2011; Received in Revised form: 21st, September, 2011; Accepted: 19th, October, 2011; Published online: 27th, November, 2012

ABSTRACT

This paper describes an anthelmintic study of two members of the Capparidaceae family which are *Gynandropsis gynandra* and *Buchholzia coriacea*. The worms used in this study were of three types namely *Fasciola gigantica*, *Pheritima pasthuma* (earthworm) and *Taenia solium* (tapeworm). They were used for assessing the anthelmintic activities of the two plants. Piperazine citrate solution (Antepar) (10mg/ml) was included as a reference standard while distilled water was used as the control.

Key words: Anthelmintic, *Buchholzia coriacea*, *Fasciola gigantica*, *Gynandropsis gynandra*, *Pheritima pasthuma*, Piperazine citrate.

INTRODUCTION

The family Capparaceae (Capparidaceae) is described from Cape Verde Islands. It comprises of 45 genera and approximately 1000 species, distributed in the tropical and sub-tropical regions, especially East Africa and South America. Plants in this family are annual, biennial and perennial herbs or shrubs, sometimes climbers or trees. Among the members of this family are *Cleome aculeate*, *C. scaposa*, *C. gynandra*, *C. rutidosperma*, *C. brachycarpa* and *C. viscosa*. *C. viscosa* is used as pasture for goats. The first two species are ruderals (Duarte, 1995). The seeds contain 18.3% oil, a mixture of 5 fatty acids, 7 amino acids and sucrose. Acute toxicity (LD50) was determined in mice by the oral route, and sub-acute toxicity was evaluated in a 14 day, repeated – dose study. The results indicated that the seeds are enough to be considered for edible purposes {Naheed – Parveen et al (1994)}.

Gynandropsis gynandra

Botanical name Spider flower, bastard, cat's whiskers:
Common (English) name

Description

A herb of about 60cm high, a common plant of waste places and weed of cultivated land, and often itself cultivated, occurring throughout all territories of the Region, and pan-tropics generally. The plant is eaten as spinach and in Soups (Ainslie, 1937; Adjanohun and Ake Assi, 1972). The

leaves are made into sauces in Gabon (Walker & Sillans, 1961). In Senegal, they are added to cuscus (Trochain, 1940). They are considered very good for the stomach and to have antiscorbutic properties (Ainslie, 1937). Their vitamin C content has been recorded at 6.0mg per 100gm dry weight. Though the plant is everywhere considered edible it is curious that it has been used as a fish poison (Watt & Breyer – Brandwijk, 1962). The leaves have medical uses everywhere the plant occurs, most commonly as counter – irritant for local pain, the leaves being merely rubbed on the part affected or applied as a poultice (Dalziel, 1937; Kerharo & Adam, 1974). The leaves are considered disinfectant and a good remedy for rheumatism in Nigeria (Oliver, 1960), and pounded are applied externally for rheumatism, lumbago etc, but if left too long blisters are produced – indeed, this preparation is used in Nigeria as a vesicant (Ainslie, 1937). A leaf macerate with pimento is given in the Ivory Coast as an enema for rheumatism (Hauman & Wilczek, 1951). A leaf- mash is warmed and laid on swollen armpit bubos on the Ivory Coast (Adjanohun and Ake Assi, 1972) and over the kidneys and poulticing is known and practiced in SE Asia (Burkill, 1935). The leaves are rubbed on hands and inhaled like smelling salts for headache in West Africa (Dalziel, 1937), while leaf-sap is given in nasal instillation in the Ivory coast (Bouquet and Debray, 1974). Widespread use is made of the leaves for ear trouble. The juice expressed after heating, alone or mixed with oil, is dripped into the ear for ear ache (Dalziel, 1937). Leaf-sap is instilled into the ears for otitis in the IC – Upper Volta (Adjanohun and Ake Assi, 1972; Bouquet and Debray, 1974). This treatment is said to be painful to both ears and eyes, the administration requiring some caution elsewhere in Africa, Congo (Bouquet, 1969) and East and South Africa (Watt & Breyer-Brandwijk, 1962) and in India and SE Asia,

*Corresponding author: yinkatayo_08@yahoo.com

the same application is known (Burkill, 1935). Leaf – Sap is used in minute quantities in Nigeria as an Eye wash (Oliver, 1960) and in Tanganyika for inflamed eyes (Haerdi, 1964), while in general it is recognized as a revigorant and defatigant especially in treating debilitation of old man, hence the Wolof name gor bu di daw, meaning ‘old man’ (Kerharo & Ada, 1974). The seed, and the plant as a whole, contains a volatile oil rich in senevol with properties resembling sulphur derivative found in garlic and mustard oils (Kerharo & Adam, 1974). An acid fixed oil and a brown resin are also present (Watt & Breyer-Brandwijk, 1962). The concentration of the oil is about 17.6% (Kerharo & Adam, 1974) and it is regarded as edible and suitable for soup-making. A thick greenish drying oil has been reported in the seeds (Walt & Breyer-Brandwijk, 1962). The seeds have anthelmintic property (Walker, 1953; Walker & Sillans, 1961) and their oil is furthermore used as a fish poison. In Tanganyika, they are used to facilitate childbirth and for internal disorders (Bally, 1937) in undisclosed ways. They are recorded as cyanogenetic (Bouquet, 1969) with no other active principle present in the plant. For many of these uses, the whole plant is also used. It is like enough to *Cleome viscosa* Linn, *C. monophylla* Linn and *C. afrospinosa* in appearance to be confused with them and doubtless all are to a greater or lesser degree interchangeable in usage.

***Buchholzia coriacea*: Botanical Name**

Musk tree: English / Common Name

Description

An evergreen understory tree of the lowland rainforest, to 20m high occurring from Guinea to West Camerouns, and in E. Cameroun and Gabon. The wood is yellowish white, soft and somewhat fibrous (Aubreville, 1959; Keay *et al*, 1960). The closely related *B. macrophylla* Pax is used in construction work in Gabon (Walker & Sillans, 1961). The bark- slash is deep red, and the sap exudes with a violently spicy, oungent smell that cause sneezing (Aubreville, 1959). The bark is made in the Ivory Coast into a pulp for inhalation (Adjanohun and Ake Assi, 1972) or into a snuff to relieve headache, sinusitis and nasal congestion in headcolds, also otitis and ophthalmus (Bouquet and Debray, 1974). A bark decoction is applied externally as a general reconstituent (Adjanohun and Ake Assi, 1972). or as a revulsive for pains in the chest, bronchitis, pleurisy and kidney pains; a bark-decoction is used to wash persons with small-pox (Bouquet and Debray, 1974). In Liberia, the seeds are used on skin-eruption and internally for worms and pains (Dalziel, 1937), while when crushed up they are pasted over the stomach in Ivory Coast for difficult child birth (Adjanohun and Ake Assi, 1972). In Gabon, the fruit is considered anthelmintic (Walker, 1953). The fruit has a disagreeable smell on cutting open. The seeds have a hot spicy flavour. In South Nigeria, the Edo boil and eat the fruit after storage for few days (Irvine, 1961). The fruit has no recorded usage in the Region. In Gabon, it is considered poisonous while a number of chemical substances have been isolated from the plant and the substances determined (Bouquet and Debray, 1974).

Helminthic Diseases

The term “helminth” was originally derived from the Greek and means “worm”. As usually interpreted the word connotes several groups of parasitic worms which are the round worms or Nematoda and the flat worms or Platyhelminthes divided

into two groups parasitizing man – the trematodes (Trematoda) and the cestodes (Cestoda) or tapeworms. The term “helminth” could be broadly interpreted to include the leeches (Hirudinea and Annelida) which are actually free-living worms (Hunter *et al.*, 1976).

MATERIALS AND METHODS

The plant materials used in this research work were collected from Edo and Oyo states in Nigeria. *Buchholzia coriacea* was collected from a forest in Edo state through the help of Forestry Research Institute of Nigeria (FRIN) herbarium workers while *Gynandropsis gynandra* was collected from Olodo in Oyo state through the help of a herb seller and were authenticated at the Botany and Microbiology Department herbarium of the University of Ibadan. The two plants belong to the family Capparidaceae. The local names are Uworo and Ekuya respectively. *Fasciola gigantica*, Earthworms (*Pheritima pasthuma*) and Tapeworm (*Taenia solium*) used were collected from the Bodija market abattoir in Oyo state and were identified at the Department of Zoology, University of Ibadan. These three types of worms were used for assessing the anthelmintic activities of the two plants. Piperazine citrate solution (Antepar) (10mg/ml) was included as a reference compound, 4-5mls of each specific concentration was taken into Petri dishes (4cm³) and two worms were placed. The anthelmintic activity was assessed using the method of Hukkeri *et al* (1993). The time required for paralysis (P) and death (D) of the worms were recorded. The death of the worms was ascertained by dipping them in hot water at 50⁰C which induced movements if the worm was alive. 4-5ml of distilled water was used in control groups. Five concentrations between 100-10mg/ml were used for each worm type. All solutions were made in distilled water, and duplicate plates were made for each concentration of sample reference and control.

RESULTS

For *Fasciola gigantica*, control worms were alive up to over 50 minutes. For Earthworm, control worms were alive and reference worms did not die after 90 minutes. The weight of the worm used as reference is 0.6g with length of 100mm. However, all earthworms died before the next day. Only the methanolic extracts are used against helminthes.

DISCUSSION AND CONCLUSION

The anthelmintic study carried out on the two members of the Capparidaceae family is a proof to justify their folkloric uses as being used internally for worms and pains. It was found out that the higher the concentration of the extracts, the greater the activity against helminthes (worms) and the faster the time of paralysis leading to death. The plant extracts at 80mg/ml and 100mg/ml were seen to kill the worms faster than the reference standard in the case of tapeworm while in the case of *Fasciola gigantica*, the reference standard is just about twice as active as the extracts at concentrations 80 and 100mg/ml. For earthworm, the last two highest concentrations were also seen to kill the worms faster than the reference standard. The average weights of the worms used could be seen as a factor to their being paralysed before finally killed.

Table 1

Product concentration (mg/ml)	(A) <i>Fasciola gigantica</i>				(B) Earthworm (<i>Pheritima pasthuma</i>)			
	Time in minutes for Paralysis(P) & Death (D)				Time in minutes for Paralysis (P) & Death (D)			
	<i>Gynandropsis gynandra</i>		<i>Buchholzia coriacea</i>		<i>Gynandropsis gynandra</i>		<i>Buchholzia coriacea</i>	
	Leaves				Stem			
	P	D	P	D	P	D	P	D
10	26±0.1	38 ±0.5	28± 0.2	40±0.9	15± 0.1	90++	40 ±0.9	90++
20	23± 0.3	35± 0.2	25± 0.2	39±0.5	12± 0.5	50± 0.5	30 ±0.5	90++
50	15± 0.8	30± 0.1	20 ±0.1	35±0.5	7± 0.3	10± 0.3	20 ±0.1	90++
80	8± 0.2	10± 0.1	7± 0.3	9± 0.1	4± 0.5	8 ±0.2	5 ±0.8	10± 0.2
100	3± 0.5	5± 0.2	3± 0.8	6 ±0.9	2 ±0.4	5± 0.3	2± 0.2	5± 0.1
10	1± 0.02	3± 0.05					20± 0.3	60± 0.5

Piperazine citrate (RS)

Table 2

Product concentration (mg/ml)	(C) Earthworm (<i>Pheritima pasthuma</i>)				(D) Tapeworm (<i>Taenia solium</i>)			
	Time in minutes for Paralysis (P) and Death (D)				Time in minutes for Paralysis (P) and Death (D)			
	<i>Gynandropsis gynandra</i>		<i>Buchholzia coriacea</i>		<i>Gynandropsis gynandra</i>		<i>Buchholzia coriacea</i>	
	Leaves				Stem			
	P	D	P	D	P	D	P	D
10	15± 0.5	60++	16± 0.2	60++	45± 0.05	70± 0.02	52± 0.03	78± 0.05
20	10± 0.3	55± 0.2	13± 0.5	58± 0.2	36± 0.04	60 ±0.01	41± 0.06	65± 0.07
50	8± 0.2	40± 0.6	10± 0.3	50± 0.5	18± 0.05	55± 0.03	22± 0.05	60± 0.02
80	3± 0.5	20± 0.5	7± 0.8	40± 0.3	8± 0.02	30± 0.03	10± 0.02	35± 0.05
100	2± 0.9	8± 0.2	5± 0.5	35± 0.1	5± 0.01	11± 0.02	6± 0.03	13± 0.04
10							15± 0.05	40± 0.01

Piperazine citrate (RS)

sss

60++ = Over 60 minutes before dying

90++ = Over 90 minutes before dying

Reference Standard = Piperazine citrate (Antepar)

Control = Distilled water

Acknowledgement

My gratitude goes to the Almighty God who was, who is and who is to come, my present help in times of trouble. I am also indebted to Dr. (Mrs.) E.O. Ajaiyeoba now Prof. (Mrs.) E.O. Aiaiyeba for her guidance and encouragement and the special interest shown in this work. I am grateful for her meticulous supervision. I can not but mention the love, care and interest shown by my family members which go a long way in making this a success. My profound gratitude also goes to other members of Pharmacognosy Department, Faculty of Pharmacy, University of Ibadan in persons of Dr. J.O. Moody now Prof. J.O. Moody, Dr. K.A. Abo and Dr. J.O. Adeboye who saw to the reading and the approval of this write ups. May God bless you all.

REFERENCES

- Adam, 1996; les pasturages naturels et postcultureux de senegal, bull: inst franc.afr.noire, a 28:450-537.
- Adjanohun, e and I. Ake assi (1972) [?]: plantes pharmaceutiques de cote d'ivoire, abidjan, ivory coast(mimeographed) pp.78,81.
- Ainslie j.r. 1937: a list of plants used native medicines in nigeria, imp. Forest inst. Oxford, inst paper 7 (mimeographed).
- Bally p.r.o. (1937): native medicinal and poisonous plants of east african, bull misc. Int., pp.10-26.
- Bouquet, a., 1969; feticheurs et medecines traditionnelles du congo (brazzaville), mem o.r.s.t.m.36.
- Burkill, h.m.1935: a dictionary of the economic products of malay peninsula, crown agents for the colonies, london.
- Burkill h.m.1985: the useful plants of west tropical africa vol.1 royal botanic gardens kew 960pp and all references therein.
- Dalziel, j.m.1931: the hairs lining the loculi of fruits of species of parinarium. Proc. Linn. Soc. London p.99.
- Duarte - mc 1995 in flora-de-cabo-verbe no.35 17pp.hauman, l. And r.wilczek, 1951: fam. 41 capparidaceae, r. Boutique, flore du congo-beige et du ruanda urundi spermatophytes, 2, i.n.e.a.c., brussels pp.519-21.
- Haerdi, f. In haerdi, f., f.j. Kerharo & j.g. Adam, 1964: afrikanische Heilpflanzen, basel p.75.
- Hunter/swartzwelder/clyde (1976); tropical medicine (fifth ed.) W.b. Saunders company p.451.
- Kerharo, j & j.g. Adam, 1974: la pharmacopee senegalaise traditionnelle. Plants medicinales et toxiques.vigot freres, paris.
- Keay, r.w.j., c.f.a. Onochie & d.p. Stanfield, 1960: nigerian trees, vol, government printer, lagos p.10, 79.
- Kerharo, j & j.g. Adam, 1974: la pharmacopee senegalaise traditionnelle. Plants medicinales et toxiques.vigot freres, paris.
- Naheed-parveen; afaq-sh; amin-kmy; parveen-n (1994); ethnobiology in human welfare: abstracts of the fourth international congress of ethnobiology lucknow, uttar parish, india p.24.
- Oliver, bep, 1960: medicinal plants in nigeria, nigeria college of arts, science and technology (unpublished work).
- Oliver-bever bep (1986): medicinal plants in tropical west africa, cambridge university press, cambridge pp169-175.

Trease, g.e. And evans, w.c. (1983) pharmacognosy (11th ed.)
Oxford university press, london, pp 183-185.

Trochain, j. (1940): la vegetation du senegal, mem, inst. Afr.
Noire 2.

Walker, a.r. And r. Sillans (1961): les plantes utiles du gabon,
paul lechevalier, paris pp117-118.

Watt, j.m. & m.g. Breyer-brandwijk, 1962: the medicinal and
poisonous plants of southern and eastern africa. (2nd ed.)
Livingstone edinburgh and london pp.164-165.
