Journal of Medicinal Plants Research Vol. 4(9), pp. 722-725, 4 May, 2010
Available online at http://www.academicjournals.org/JMPR
ISSN 1996-0875© 2010 Academic Journals

Full Length Research Paper

Evaluation of analgesic and anti-inflammatory activities of n-butanol phase of the leaves extract of *Microtrichia perotitii* DC (Asteraceae)

Abdullahi M. Nuhu[1]*, N. Ilyas[2] and H. Ibrahim[2]

[1]Department of Applied Science, CST, Kaduna Polytechnic, Kaduna Nigeria.
[2]Department of Pharmacognosy and Drug Development Ahmadu Bello University Zaria Nigeria.

Accepted 20 April, 2010

The n-butanol phase of the methanolic leaves extract of *Microtrichia perotitii* DC was studied for its analgesic and anti-inflammatory activities. Both percent inhibition obtained from analgesic (59.30% for 100 mg/kg, 33.90% for 50 mg/kg and 69.20% for 25 mg/kg i.p) and anti-inflammatory (values for 25, 50 and 100 mg/kg were found significantly different at P < 05, P < 0.01 and P < 0.001) (mean paw diameter in hours) studies has shown that the leaves have very strong activity to prevent pains (writhing) in the central system and motor performance of the mice as well as the growth of oedema in the hind paw of the rats respectively. The analgesic effect is dosage independent while the anti-inflammatory effect is dosage dependent and all these activities could be associated with the type of phytochemicals likely to be present in the leaves of plant.

Key words: *Microtrichia perotitii, n*-butanol phase, analgesic, anti-inflammatory.

INTRODUCTION

Microtrichia perotitii DC belongs to the family Asteraceae or Compositae (Hutchinson, 1973). Locally, the plant is called " mai jankai" because of the yellowish appearance of it's flowers or "sawun keke" because of it's crawling nature by the indigenous Hausa speaking people in communities where the plant is grown (Magaji, 2003). The plant is widely distributed in West Africa. In Nigeria, the plant is found in the North in swampy areas of places such as Zaria province which extends up to Birnin Gwari in the present Kaduna state of Nigeria (Hutchinson and Dalziel, 1963). The plant, *M. perotitii* is a diffused, much branched pubescent annual plant and varies between 1 foot or more in height (Watson and Dallwitz, 1992). The leaves are obovate, cuneately narrowed into petiole, coarsely toothed and 1/3 - 1 inch broad, the flowers are florate while the fruits are drupes (Daniel, 1887). The Compositae herbal plants were commonly used as natural remedies by many natives around the world and many of its useful natural properties and compounds have been produced commercially and marketed as natural healthcare products as either natural medicines or supplements (Herbal portal, 2009).

Similar biological studies were conducted on some plants of the Compositae family. These include *Lactuca scariola, Artemisia absinthium* and *Tithonia diversifolia* which proved potent in both analgesic and anti-inflammatory studies. Some bioactive compounds isolated from these studies include sesqueterpenes, saponins and alkaloids (Fayyaz et al., 1992; Victor et al., 2003).

Traditionally, the wet or dried leaves and flowers are used for the treatment of toothaches. The leaves are used for the treatment of rashes in children. However, classical Yoruba spiritualists use the herb to dispel evil spirit (Magaji, 2003).

This study was conducted to ascertain the claim by tradomedical practitioners for the use of the plant to treat pain related sicknesses especially in persons with

*Corresponding author. E-mail: amnuhu2006@yahoo.com.

toothaches as well to identify the compounds responsible for the efficacy of the plant.

EXPERIMENTAL

Plant collection

Fresh sample of the plant was collected at the swampy areas of Rigasa village, a sub-urban settlement in Kaduna metropolis around April, 2005. The plant was authenticated by Mallam Musa Muhammad at the Herbarium of the Department of Biological Sciences Ahmadu Bello University Zaria and given a herbarium no of 998.

Plant sample preparation

The leaves from the aerial part of *M. perotitii* were removed (plugged) and allowed to dry under shade for about two weeks. The dried leaves were ground into coarse powder using pestle and mortar.

Extraction

300 g of the powdered leaves were extracted with 5 L of methanol. The aliquot was gradually concentrated in vacuo and allowed to dry. A yield of 20 g (6.7%) of a hard cake was obtained (Ahmed et al., 1981).The residue was further extracted by partitioning between, Ether (F1), water (F2), Butanol (F3/F4) and HCl (F5) phases. The F4 portion of n-Butanolic phase was used for the studies from the preliminary investigation carried on it.

Animal

Male and female swiss albino mice (18 - 25 g) and adult Wister rats (180 - 250 g) were used for all pharmacological studies. The animals were kept under standard laboratory conditions and fed with standard feeds (Excel feeds Plc Zaria) and provided with drinking water *ad-libitum*.

Analgesic studies

The acetic acid induced writhing test in mice as described by Koster et al. (1959) was employed. Swiss albino mice were divided into 5 groups of 6 mice each. The first group was given 10 ml/kg of normal saline *i.p* and served as control, groups 2, 3 and 4 received 25, 50 and 100 mg/kg of body weight *i.p* respectively, while the fifth group was given 10 mg of Proxicam per kg body weight *i.p*. Thirty minutes later, mice in all groups were treated with Acetic acid (0.06% 1 ml Acetic acid of 1ml per 100 g *i.p*). Five minutes after Acetic acid injection mice were placed in individual cage and the number of abdominal contractions was counted for each mouse for a period of 10 min. Percentage inhibition of writhing was calculated using the expression:

$$\text{Inhibition (\%)} = \frac{\text{mean number of writhings (control) - mean no of writhings (test)} \times 100}{\text{Mean number of writhing (control)}}$$

Anti-inflammatory studies: acute inflammation

The Formaldehyde (2.5% v/v) induced inflammation was used as described by Winter et al. (1962). Therefore, Wister rats were divided into 5 groups of 5 rats each. Thirty minutes before injection of formalin, the groups were treated Intraperitoneally thus: group 1 received 10 mg of ketoprofan per kg (+ve control), group 2 received 1ml normal saline per kg (-ve control), groups 3, 4 and 5 received 25, 50 and 100 mg of n-Butanol extract per kg body weight *i.p.* , respectively. The increase in paw diameter was measured using vernier caliper. The difference in weight of the right hind paw and the left hind paw indicates inflammation. Measurement was done immediately before and after 1 - 5 h following formalin injection. The percentage inhibition of the growth of oedema was calculated from the expression:

$$\text{Inhibition (\%)} = \frac{\text{mean control (N/S) - mean treated} \times 100}{\text{Mean control (N/S)}}$$

RESULTS

Analgesic studies

The result of the analgesic studies is presented as mean ± SEM and considered significant when compared to students' *t*-test. However, the percentage inhibition obtained for both 25 and 100 mg/kg were higher than the value obtained for Proxicam 10 mg/kg used as standard drug for the studies (Table 1). The percentage inhibition was highest at the lowest dosage (25 mg/kg) and was closely followed by the highest concentration (100 mg/kg) both of which are remarkably higher than the standard drug used (Proxicam 10 mg/kg) (Table 1). The analgesic activity exhibited by the n-butanol phase is thus dosage independent.

Anti-inflammatory studies

The result of anti-inflammatory studies was also presented as mean ± SEM. In the anti-inflammatory studies, the value obtained showed a significant reduction in the growth of oedema in the hind paw of the rats. The values were higher than that of ketoprofen 10 mg/kg *i.p* which was used as a standard drug in the studies. The values at 25 and 100 mg/kg were similar meaning that the activity is dosage dependent (Table 2).

DISCUSSION

The analgesic properties and ant-inflammatory effect of n-butanol phase of the crude extract of the leaves of *M. perotitii* were investigated in this study. In the analgesic studies acetic acid writhing test was used because of its sensitivity that could provide different grades of noxious stimuli in chemically induced tissue damage. The acetic acid test has an ability to mimic human clinical pain conditions and production of tonic stimulus (Victor et al., 2003). Similarly, the acetic acid induced writhing has

Table 1. Analgesic Activity studies 0f the n-butanol phase of crude extract of the leaves of *M. perotitii*.

Treatment (mg/kg)	No of abdominal writhings	% inhibition
N/saline	22.2 ± 2.7	00.00
100	7.7 ± 1.0	59.30
50	12.5 ± 2.3	33.90
25	5.8 ± 1.5	69.20
Proxicam 10	10.3 ± 2.4	45.00

Table 2. Anti-inflammatory activity studies of the n-butanol phase of crude extract of the leaves of *M. perotitii*.

Treatment (mg/kg)	Mean paw diameter (cm) in hours				
	1	2	3	4	5
N/ saline	0.20 ± 0.03	0.16 ± 0.02	0.15 ± 0.01	0.15 ± 0.01	0.13 ± 0.01
25	0.16 ± 0.01	0.16 ± 0.02	0.14 ± 0.01	0.11 ± 0.02[a]	0.09 ± 0.02[a]
50	0.18 ± 0.02	0.13± 0.02	0.12 ± 0.01[a]	0.10 ± 0.01[b]	0.10 ± 0.01[a]
100	0.15 ± 0.02	0.14 ± 0.01	0.12 ± 0.02[a]	0.11 ± 0.01[a]	0.09 ± 0.01[a]
Ketoproten (10 ml)	0.13 ± 0.02[a]	0.12 ± 0.02	0.11 ± 0.01[a]	0.08 ± 0.01[c]	0.07 ± 0.01[b]

Data presented as mean ±SEM, n=5 for all groups. a, b and c are significantly different from control at $P < 0.05$, $P < 0.01$ and $P < 0.001$ respectively in a students' *t* –test.

been used to evaluate analgesic effects of drugs and the response is thought to be mediated by peritoneal mast cells, acid sensing ion channels and the prostaglandin pathways (Ranjit et al., 2006) The acetic acid induced writhing allows the acid to act via central mechanisms and motor performance of the animal. Therefore, the n-Butanol phase of the crude leaves extract of *M. perotitii* has a significant inhibition in the duration of the writhing in each mouse (Hossein et al., 2003; Formukong et al., 1988). The intraperitoneal injection of acetic acid produces an abdominal writhing response due to sensitization of chemo-sensitive nociceptors by prostaglandins. Increase level of protanoids as well as lipoxygenase products have been found in the peritoneal fluid after the injection of the acetic acid. The analgesic effect of any plant extract may therefore be due to either its action on visceral receptors sensitive to acetic acid, to the inhibition of the production of algogenic substances or the inhibition at the central level of the transmission of painful message(Magaji et al., 2008). In this study, the % inhibition at the at the lowest concentration of 25 mg/kg was the most effective as was observed in some members of the family (Hossein et al., 2003; Chakraborty et al., 2004; Adeolu et al., 2008) (Table 1).

In the Anti-inflammatory studies, the Formaldehyde induced oedema is believed to be a multimediated phenomenon that liberates diversity of mediators which could be in two phases, the first being the release of serotonin and histamine while the second after the one hour is mediated by prostaglandins. The cyclooxygenase products and the continuity between the phases are provided by kinins (Ageel et al., 2005; Adeolu et al., 2008). In this study, the result obtained showed a significant reduction in the growth of oedema in the hind paw of the rats. There is correlation between reduction in oedema and the concentration of the drug which therefore suggest that the activity is dosage dependent which also was corroborated with the values obtained from Feldene (10 mg/kg *i.p)* used as a standard drug (Hossein et al., 2003) (Table 2). The extract of some members of the Asteraceae (Compositae) family were found to exhibit active anti-inflammatory activity either in mice or rats. These include, *Achyrocline satureioides, Ageratum conyzoides, Bidens pilosa, Mikana glomerata*; *Vernonia cinerea etc* (Mazumder et al., 2003; Heloina et al., 2005).

Conclusion

The traditional use of *M. perotitii* for the treatment of toothache which most often is associated with swellings at the gums could be ascertain to some certain extent as shown from the results of this study which significantly showed degree of % inhibition of preventing pains (analgesic) as well as swellings of the gum(anti-inflammatory effects). The activity of the leaves could be associated with the type of Phytochemicals such as flavonoids, alkaloids and saponins isolated from some members of the Asteraceae (compositae)family that were found to exhibit analgesic and anti-inflammatory activities.

ACKNOWLEGEMENTS

The authors deeply appreciate the contributions of Mal Abdullahi Yaro of the Department of Pharmaceutics, Ahmadu Bello University, Zaria and Mal Adamu Mansur of the Department of Pharmacognosy and Drug Development, ABU, Zaria.

REFERENCES

Ahmed AS, Douglas AK, Geoffery AI, Norma RF (1981). Isolation of Bergapten and Mermesin from *Balanites aegyptiaca*.Plant medica. J. Med. Plant Res. 43. 92-103.

Adeolu AA, Margaret OS, Viola M, Busani M, Patrick JM, Anthony JA (2008). Anti-inflammatory and Analgesic activities of the aqueous extract of *Cussiona paniculata* stem bark. Rec. Nat. Prod. 2(2): 46-53.

Ageel AM, Parmar NS, Mossa JS, Al-Yahaya MA, Al-Said MS, Tariq M (2005). Anti-inflammatory activity of some Saudi Arabian Medicinal plants. Inflam. Res. 17: 383-384.

Chakraborty A, Devi RKB, Sharatchandra Kh, Singh Th (2004). Prelminary studies on anti-inflammatory and analgesic activities of *Spilanthes acmella* in experimental animal models. Indian J. Pharmacol. 36(3): 148-150.

Daniel D (1887). Flora of Tropical Africa. L.Reeve and Co. Lloyds.Bank Street Ashford. London pp. 302-303.

Fayyaz A, Rafeeq AK, Shahid R (1992). Study of Analgesic and Anti-inflammatory activity from plant Extracts of *Lactuca scarriola* and *Artemisia absinthium*. J. Islam. Acad. Sci. 5(2): 111-114

Formukong EA, Evans AT, Evans FJ (1988).Analgesic and Anti-inflammatory Activity of constituents of *Cannabis sativa* L. Inflam. 12(4): 1-10.

Heloina De SF, Falcao IOL, Vanda L, Dos S, Harlan De FD, Margareth De FFM, Jose MB, Leonia MB (2005). Review of the Plants with anti-inflammatory activity studied in Brazil. Brazilian J. Pharmacognosy. 15(4): 381-391.

Hutchinson J, Dalziel JM (1963). Flora of west tropical Africa 2nd edn. Crown Agent overseas Government and Administration. Millbank London SW 1. 12: 325-397.

Hutchinson J (1973). The Families of Flowering Plants. Oxford University Press. Clavendon. 3rd edn. pp. 95-596.

Hossein H, Hatri MY (2002).Antinociceptive and Anti-inflammatory effects of *Croces sativa* L. Stigma and Petals extracts in mice. BMC Pharmacol. 2: 1471-2210-7.

Koster R, Anderson M, Debee EJ (1959). Acetic acid Screening. Fed. Proc. 18: 412-417.

Magaji MG, Anuka JA, Abdu-Aguye I, Yaro AH, Hussaini IM (2008). Preliminary studies on Anti-inflammatory and Analgesic activities of *Securinega virosa*(Euphorbiaceae) in experimental animal models. J. Med. Plants Res. 2(2): 39-44.

Mazumder UK, Gupta M, Manikandn L, Bhattacharya S, Haldar PK, Roy S (2003). Evaluation of anti-inflammatory activity of *Vernonia cinerea* Less. Extract in Rats. Phytomed. 10: 185-188.

Natural Herbal Remedies (2009). A herbal Portal for Natural and Alternative Herbal Remedies. Retrieved on February, 23, from http://www.naturalherbal-remedies.com/compositae-asteraceae-medicinal/.

Ranjit KS, Akm MR, Mesbahuddin A, Sitesh CB, Achinto S, Samar KG (2006). Bioacitive Alkaloid from Sida cordifolia Linn. With Analgesic and Anti-inflammatory Activities. Iran. J. Pharmacol. Ther. 5(2): 175-178

Victor BO, Caleb OW, Ayodele OS, Samuel BO (2003). Studies on the anti-inflammatory and analgesic properties of *Tithonia diversifolia* leaf extract. J. Ethanopharm. 90: 317-321

Watson L, Dallwitz M (1992). The families of flowering plants: Descriptive, Illustration, Identification and Information. Retrieval version 14: 121.

Winter CA, Risley EA, Nuss GW (1962). Carrageenan induced edema in hind paw of therat as an assay for anti-inflammatory drugs. Proc. Soc. Exp. Biol. Med. 111: 544-547.