Analgesic Properties of Crude Aqueous Extract of *Senna occidentalis* Leaves in Wistar Albino Rats by Tail Flick Method.

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Abstract- *Senna occidentalis* leaves were collected at Maiduguri Metropolitan Council (MMC) of Borno State, Nigeria and extracted in water by simple maceration method. The aqueous extract was tested for its analgesic activity in Wistar albino rats by tail flick method, where the result showed significant (P<0.01) increase in reaction time from 6.60±0.20 to 8.00±0.32 compared with the control (5.00±0.00) for the extract graded doses of 200 to 600 mg/kg, at 30 minutes post treatment; 7.20±0.37 to 8.60±0.24 compared with the control (4.60±0.24) for the same graded doses of the extract, 60 minutes post treatment; 5.60±0.24 to 7.60±0.24 compared with the control (4.60±0.24) for the same graded doses of the extract, 90 minutes post treatment; and 5.20±0.20 to 6.40±0.24compared with the control (4.60±0.24) for the same graded doses of the extract, 120 minutes. This study was carried out simultaneously with a standard drug (diclofenac 10mg/Kg) to compare the analgesic potency of *Senna occidentalis* crude extract, where 9.80±0.20, 11.40±2.04, 9.00±0.32 and 8.60±0.24 were recorded at 30, 60, 90 and 120 minutes respectively. The analgesic potency of *Senna occidentalis* leaves thus explains the successes seen when local people use it in treating different fever conditions. It was concluded that crude aqueous extract of *Senna occidentalis* has a good dose dependent analgesic activity in Wistar albino rats. It was recommended that use of *Senna occidentalis* leaves in the treatment of fever conditions should be encouraged, since the leaves are cheap, readily available and efficacious.

Index Terms- Analgesic activity, Aqueous extract, Senna occidentalis , tail flick met

I. INTRODUCTION

Plants are known globally as source of various types of drugs; this practice is common especially in traditional medicine (Bako *et al*., 2005). Plants are prepared in various forms in order to derive their medicinal benefits such as crude extracts, decoction, infusion or tincture to treat common diseases (Odeja *et al*., 2014).

Senna occidentalis (Linn.) (formerly *Cassia occidentalis*) is a weed of the *Leguminosae* family, and is common throughout the tropical and subtropical regions of the world (Ibrahim *et al*., 2010). It is mostly found in open fields and in farms cultivated with other crops such as groundnuts, soybean, sorghum, maize and others; thus, it is practically impossible to prevent this plant from mixing with the cultivated crops (Lar and Gupta, 1973; Barbosa-Ferreira *et al*., 2005).

Senna occidentalis is highly valued for its medicinal usage to treat different conditions by the locals in northern Nigeria. Scientific reports revealed several pharmacological properties of this plant. These include antibacterial (Odeja *et al*., 2014); antimalarial (Tona *et al*., 1999; Chukwujekwu *et al*., 2006); antitrypanosomal (Ibrahim *et al*., 2010); anti-inflammatory (Taiwo *et al*., 2013); hepatoprotective (Yadav *et al*., 2009) and anti-hyperglycemic (Usha *et al*., 2007) activities.

II. MATERIAL AND METHOD

Extraction of Plant Material

The leaves were first air-dried under shade and ground into powder using clean wooden pestle and mortar. Maceration method was used for the extraction. One hundred grams (100 g) of the powdered sample was blended with 2.5 litres of distilled water in a 5 litre round bottom flask for 48 hours with agitation, at room temperature. The mixture was decanted and the solution filtered using Whatman filter paper No. 1. Some fresh distilled water was added to the residue and allowed to stand for 24 hours, decanted and filtered. The solutions were combined and transferred into an open tray, and dried in an oven at 40^0C, for 24hours.

Experimental Animals

A total of Twenty (20) Adult Wistar albino rats of both sexes weighing between 105 - 158 g were used for the study. The animals were randomly divided into five (5) groups of four (4) rats per group. Rats were handled according to global best practices and were kept for two weeks for acclimatization to be achieved.

Procedure for Testing Analgesic Activity by tail flick (Tail Immersion Method)

The tail immersion method was used to evaluate the analgesic activity. In this method, pain reactions in animals were produced by thermal stimulus by dipping the tip of the tail in hot water (Upudha *et al*., 2007). The rats were divided into five (5) groups of four (4) animals each. Feed was withdrawn for 16 hours but water allowed *ad libitum*. Group 1 served as control and were

administered 1ml of distilled water orally. Group 2–4 were administered 200, 400 and 600 mg/kg of the extract, respectively. Group 5 served as reference control and were administered Diclofenac (10 mg/kg) orally. Before administration of the extract and the reference drug, the basal reaction time was measured. After administration of the extract and the drug, reaction times were measured at 30, 60, 90 and 120 minutes by immersing the tail tips of the rats (last 1-2 cm) in hot water heated at temperature of 55 ± 1°C. The actual flick responses of rats, that is, time taken in seconds, to withdraw tail from hot water source was calculated and results were compared with control group.

Data Analyses

The results were analysed using GraphPad Instat Version 3.05, 2000 and presented as means ± standard error of the mean (SEM). Differences between means were assessed using Analysis of variance (ANOVA) and post-test using Dunnett comparison test (Mead and Curnow, 1982). The $p < 0.01$ or $p < 0.05$

III. RESULTS

Table 1. The analgesic activity of crude aqueous extract of *Senna occidentalis* leaves in Wistar Albino rats by tail flick method

Group	Treatment	Dose (mg/kg)	Reaction time in seconds at 30 min. (mean ± SEM)	Reaction time in seconds at 60 min. (mean ± SEM)	Reaction time in seconds at 90 min. (mean ± SEM)	Reaction time in seconds at 120 min. (mean ± SEM)
Control	Water		5.00±0.00	4.60±0.24	4.60±0.24	4.60±0.24
Test – 1	Extract	200	6.60±0.24**	7.20±0.37**	5.60±024*	5.20±0.20
Test – 2	Extract	400	7.60±0.24**	8.40±0.24**	7.20±0.20**	6.20±0.20**
Test – 3	Extract	600	8.00±0.32**	8.60±0.24**	7.60±0.24**	6.40±0.24**
Standard	Diclofenac	10	9.80±0.20**	11.40±0.24**	9.00±0.32**	8.60±0.24**

* = Significantly different from the control at p<0.05 along the same column
** = Significantly different from the control at p<0.01 along the same column

The result of analgesic activity of *Senna occidentalis* leaves in Wistar Albino rats by tail flick method is presented in Table 1. The result showed significant increase in reaction time from 6.60±0.24 to 8.00±0.32 compared with the control (5.00±0.00) for the graded dose of the extract (200 to 600 mg/kg), 30 minutes post extract administration; 7.20±0.37 to 8.60±0.24 compared with the control (4.60±0.24) for the same graded dose of the extract, 60 minutes post extract administration; 5.60±0.24 to 7.60±0.24 compared with the control (4.60±0.24) for the same graded dose of the extract , 90 minutes post extract administration; and 5.20±0.20 to 6.40±0.24 compared with the control (4.60±0.24) for the same graded dose of the extract, 120 minutes post extract administration.

IV. DISCUSSION

Senna occidentalis plant is highly reputed by the local people of Northern Nigeria for the treatment of feverish conditions with magical successes. The result of analgesic activity study of *S. occidentalis* by tail flick method showed significant (p<0.01) increase in pain threshold compared with the control. This finding agrees with the reports of Reeta and Ravindra (2013), Taiwo et al. (2013), and Odeja et al. (2014) on the analgesic activity of *Senna. occidentalis*. The crude aqueous extract of *S. occidentalis* leaves showed dose dependent activity compared with the control where the effect increased to maximum at 60 minutes post the extract administration, and gradually decreased as the time increased from 60 minutes to 120 minutes following administration of the extract in all the doses used, including the standard drug (diclofenac). The gradual decrease in pain thresholds as the time increased following the extract administration could be due to the effects of drug metabolizing enzymes on the extract and the standard drug. The result of the study thus showed *Senna occidentalis* leaves is a potent analgesic source when compared with the increase in pain thresholds of the graded doses of the extract with the pain threshold of the standard drug (Diclofenac 10mg/kg) at different times following the extract administration. The analgesic potency of *Senna occidentalis* leaves also explained the successes seen when local people use *Senna occidentalis* leaves to treat different feverish conditions.

V. CONCLUSION

It was concluded that crude aqueous extract of *Senna occidentalis* has a good dose dependent analgesic activity in Wistar Albino rats.

REFERENCES

[1] Bako, S.P., Bakfur, M.J., John, I. and Bala, E.I. (2005). Ethno medicinal and phytochemical profile of some savanna plant species in Nigeria. Int J Bot.; 1(2):147-150.

[2] Barbosa-Ferreira, M., Dagli, M L., Maiorka, P.C. and Górniak, S.L. (2005). Subacute intoxication by Senna occidentalis seeds in rats. Food Chem Toxicol.; 43: 497-503.

[3] Chukwujekwu, J. C.; Coombes, P. H.; Mulholland, D. A.; Vanstaden, J. (2006). Emordin, an antibacterial anthraquinone from the roots of Cassia occidentalis. South Afr J Bot.; 72:295-297.

[4] Ibrahim, M.A., Aliyu, A.B., Sallau, A.B., Bashir, M., Yunusa, I. and Umar, T.S. (2010). Senna occidentalis leaf extract possesses antitrypanosomal activity and ameliorates the trypanosome-induced anemia and organ damage. Pharmacognosy Res.; 2(3): 175-180.

[5] Ibrahim, J. A.; Muazzam, I.; Jegede, I. A.; Kunle, O. F. and Okogun, J. I. (2007). Ethno-medicinal plants and methods used by Gwandara tribe of Sabo Wuse in Niger State, Nigeria, to treat mental illness. Afri. J. TCAM; 22(2): 211-218.

[6] Lar, J. and Gupta, P.C. (1973). Anthraquinone glycosides from the seeds of Cassia occidentalis Linn. Experientia.; 29: 142-143.

[7] Odeja, O.O., Obi, G., Ogwuche, C.E., Elemike, E.E. and Oderinlo, O.O. (2014). Phytochemical screening, Antioxidant and Antimicrobial activities of Senna occidentalis (L.) leaves. IJHM; 2(4): 26-30.

[8] Reeta, M. and Ravindra, S. (2013). Kasamarda (Senna occidentalis Linn): Ayurvedic Approach. JPSI; 2(2): 25-27.

[9] Taiwo, F.O., Akinpelu, D.A., Aiyegoro, O.A., Olabiyi, S. and Adegboye, M.F. (2013). The biocidal and phytochemical properties of leaf extract of Cassia occidentalis linn. 7(27):3435-3441

[10] Tona, L., Ngimbi, N.P., Tsakala, M., Mesia, K., Cimanga, K. and Apers, S. (1999). Antimalarial activity of 20 crude extracts from nine African medicinal plants used in Kinshasa, Congo. J Ethnopharmacol.; 68:193-203.

[11] Tona, L., Cimanga, R.K., Mesia, K., Musuamba, C. T., De Bruyne, T. and Apers, S. (2004). In vitro antiplasmodial activity of extracts and fractions from seven medicinal plants used in the Democratic Republic of Congo. J. Ethnopharmacol.; 93: 27-32.

[12] Upudha, A.L, Rathnakar, U.P, and Udupa, S. (2007). Anti-inflammatory, Anti- pyretic and Analgesic effect of Tamrindus indica. Indian Drug. 44(6) :466-470.

[13] Usha, K., Mary Katsuri, G. and Hemalatha, P. (2007). Analgesic and antipyretic activity of Cassia occidentalis Linn. Indian Journal of Clinical Biochemistry.; 22(2): 132-135.

[14] Yadav, J.P., Arya, V., Yadav, S., Panghal, M., Kumar, S. and Dhankhar, S. (2009). Cassia occidentalis: A review on its ethanobotany, phytochemical and pharmacological process. Fitaterapia. http://dx.doi.org/10.1016/j.fitote.2009.09.008.

[15] Yadav, R.N. and Satnami, D. K. (2011). Chemical constituents from Cassia occidentalis Linn. Ind. J. Chem.; 50: 1112-1118.

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