



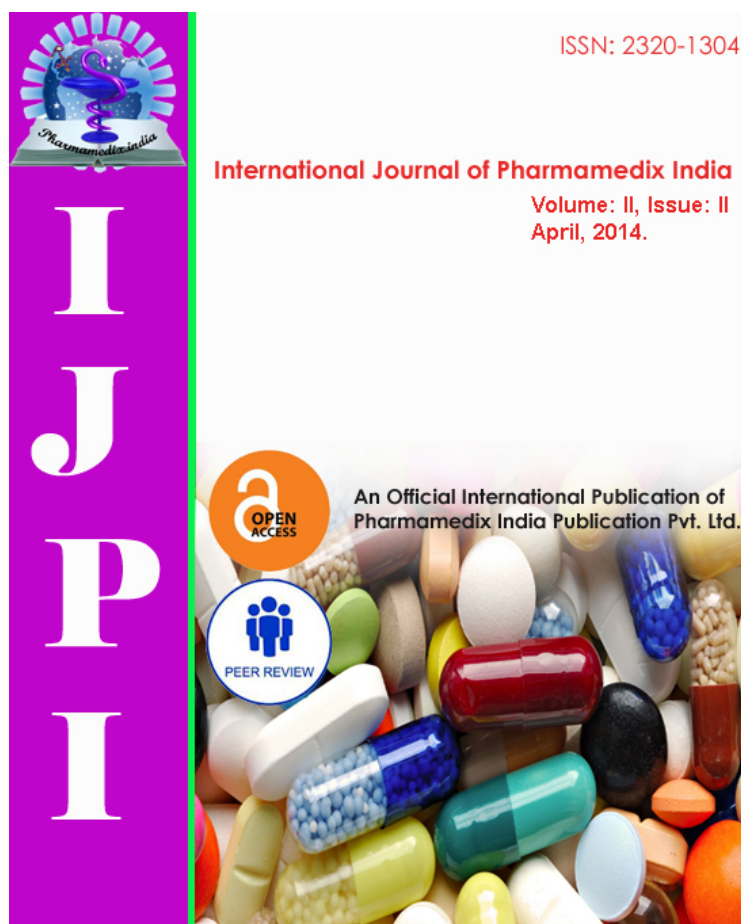
K. Venkateswarlu. et al.; International Journal of Pharmamedix India, 2014, 2(2), 688-93.

“Pharmacological Evaluations (Analgesic Activity) of ‘*Piper Betel*’.”

Kambham Venkateswarlu¹, N.Devanna²

*Author for correspondence

KambhamVenkateswarlu,
M.Pharm Scholar,
JNTUA-Oil Technological research Institute,
Beside Collector Office, Anantapur,
Andhra Pradesh, India.
Pin code: 515 001



Note- This article is property of International Journal of Pharmamedix India [ISSN: 2320-1304].

Published by: Pharmamedix India™ [www.pharmamedix.in]

This Open Access Article available on www.pharmamedix.in only for private and non-commercial use.

Abstract:

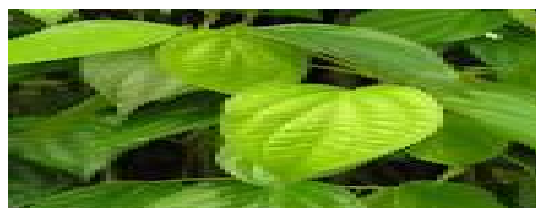
The aim of present study is to evaluate the analgesic activity of the piper betel leaf. Analgesic activity was proven using eddy's hot plate and heat conduction method. It is strong enough to its activity with dose response action is very much satisfied with the response with respect to the dose 100mg. Acute toxicity studies showed aqueous extract of Piper Betel Leaf was safe up to the dose of 1000 mg/kg (p.o.) body weight was proven.

Keyword: Analgesic activity, acute toxicity, Diclofenac sodium.

Introduction

Our country has a long heritage in the use of plant products as medicines. Several system of medicine like Ayurveda, Siddha and Unani cherish in different parts of our country and continue to give relief to the sufferings of majority of our population. Herbal medicine is traditionally used worldwide for the treatment of many infectious diseases. The use of medicinal plants as novel antibiotics have several other advantages related to safety, availability, and minimizing the risk of side effects and addiction. The World Health Organization (WHO) has adopted a major policy change in accepting that most developing nations would have to make use of more traditional medical practices for primary health care in recent years, multi drug resistance in human, animal and plant pathogens have developed due to misuse of antibiotics commonly applied in the treatment of infectious diseases.

Profile of the Plant:



The **Betel** (*Piper betel*) is the leaf of a vine belonging to the Piperaceae family, which includes pepper and kava. It is valued both as a mild stimulant ^[1] and for its medicinal properties. Betel leaf is mostly consumed in Asia and elsewhere in the world by some Asian emigrants, as betel quid or *paan*, always with tobacco, in an addictive psycho-stimulating and euphoria-inducing formulation with adverse health effects. The betel plant is an evergreen and perennial creeper, with glossy heart-shaped leaves and white catkin. The betel plant originated from South and South East Asia (India, Nepal, Bangladesh and Sri Lanka).

Medicinal Properties: The betel leaf is used in a number of traditional remedies and it has the properties like Healing power and curative properties (Stimulant and anti-flatulent):

1. Diuretic properties (used in scanty or obstructed urination)
2. General tonic (used in weakness of nerves)
3. Analgesic and cooling properties (used in the head aches)
4. Anti adherent effect
5. Anti adhesive effect
6. Anti oxidant activity
7. Anti bacterial
8. Anti platelet activity
9. Anti proliferative activity
10. Anti malarial activity
11. And also used in the Respiratory disorders, constipation, sore throat, inflammation, wounds, boils, lumbago, problem of breast milk secretion and Aphrodisiac.

II. Pharmacological Evaluation:

Acute Toxicity Testing: Acute oral toxicity assay was performed in healthy adult albino rats (100-150 g) divided into different groups. The test was performed using increasing oral dose of the APBL in water (100, 200 and 1000mg/kg body weight) in 20 ml/kg volume to different test groups. Normal group received water. The rats were allowed to feed *ad libium*, kept under regular observation for 48 h for any mortality or behavioural changes (Sanmugapriya and Venkataraman, 2006).

Analgesic activity procedure:

Analgesic activity: Analgesic activity of aqueous extracts of *Piper betel* was studied by eddy's hot plate and heat conduction method.

Eddy's hot plate method: The animals were divided into four groups of 5 animals each. Group I served as control. Group II served as standard Diclofenac sodium (10mg/kg) administered orally. Group III and IV were treated orally with aqueous extract of 100 and 200 mg/kg body weight respectively. The animals were individually placed on the hot plate maintained at 55°C, one hour after their respective treatments. The response time was noted as the time at which animals reacted to the pain stimulus either by paw Licking or jump response, whichever appeared first. The cut off time for the reaction was 15 seconds.

Heat conduction method: The animals were divided into four groups of 6 animals each. Group I served as control. Group II served as standard and were injected Diclofenac sodium (10 mg/kg) intraperitoneally. Group III and IV were treated orally with aqueous extract of 100 and 200 mg/kg body weight respectively. After one hour, the tip of tail was dipped up to 5 cm into hot water maintained at 58°C. The response time was noted as the sudden withdrawal of the tail from the hot water. Cut off time of 10 seconds was maintained to avoid damage to the tail for all groups. The time required for flicking of the tail, was recorded, to assess response to noxious stimulus.

Statistical analysis: All the values were expressed as the mean SEM of three replicate experiments. The analysis was performed using SPSS statistical package for WINDOWS (version 16.0; SPSS Inc, Chicago). Results related to the reducing power activities were statistically analyzed by applying the Student t-test and $p < 0.001$ were considered to be statistically significant. All *in vivo* data are subjected to ANOVA followed by Dunnett's test and $p < 0.05$ were considered to be statistically significant.

RESULTS:

Pharmacological Activity:

Acute toxicity studies: The acute toxicity studies mainly aim at establishing the

therapeutic index, i.e., the ratio between the pharmacologically effective dose and the lethal dose on the same strain and species. APBL was safe up to a dose of 1000 mg/kg (p.o.) body weight. Behaviour of the animals was closely observed for the first 3 h then at an interval of every 4 h during the next 48 h. The extract did not cause mortality in mice and rats during 48 h observation but little behavioural changes, loco motor ataxia, diarrhoea, and weight loss were observed. Result of hot plate test is shown both doses of the extract produced a dose-dependent increase in latency time when compared with the Vehicle. The result was found to be statistically significant ($p < 0.05$).

GROUP	DRUG DOSE	RESPONSE TIME IN SEC			
		0min	30min	60min	90min
I (Control)	-	2sec	2sec	3sec	3sec
II (Standard Control)	10mg/kg	3 sec	5 sec	10 sec	12 sec
III (100mg extract)	100mg/kg	3 sec	4 sec	6 sec	7 sec
IV (200mg extract)	200mg/kg	3 sec	5 sec	7 sec	10 sec

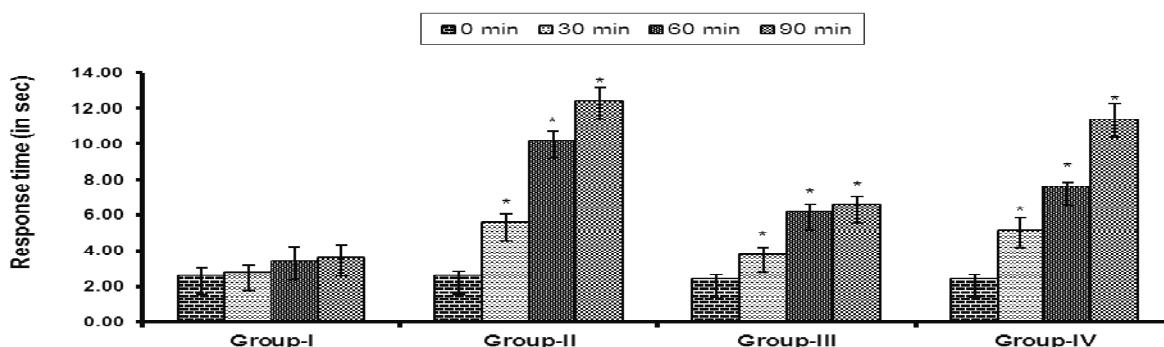


Figure: Effects of the APBL on latency to hot plate test. Values are mean SEM, (n=5); * $p < 0.05$ as compared with vehicle control (one-way ANOVA followed by Dunnett's test). Group I animals received vehicle (1% Tween 80 in water), Group II received DICLOFENAC SODIUM 10 mg/kg body weight, Group III and Group IV were treated with 100 and 200 mg/kg body weight (p.o.) of the crude extract of *P. betel*, respectively.

CONCLUSION: With the help of reports obtained from our work we would like to conclude that the aqueous extract of piper betel leaf has showing a good response for curing analgesic condition and with the evidence of animal activity we would like to extend our research towards clinical trial to dedicate and to extend the use of leaf for human ailments also. And it is the pleasure to state that “the focus towards herbal ailment is more advantages than the modern medicine” hence we hope and we give our hands to rise the piper betel as one of the herbal remedy in future.

REFERENCES:

- Hossain. MM., Ali MS, Saha A., Alimuzzaman., 2006, Antinociceptive activity of whole plant extracts of *Paederia foetida*. Dhaka Univ J Pharm Sci, 5: 67-69.
- Jayprakash, GK., Singh, RP., Sakariah KK., 2001, Antioxidant activity of grape seed extracts on peroxidation models *in vitro*. Food Chem, 73: 285-290.
- Kahkonen, MP., Hopia, AI., Vuorela, HJ., Rauha, JP., Pihlaja, K., Kulaja, TS., Heinonen, M., 1999, Antioxidant activity of plant extracts containing phenolic compounds. J Agric Food Chem, 47: 3954-3962.
- Kerstein, PC., Camino, DD., Morgan MM., Stucky, CL., 2009, Pharmacological blockade of TRPA1 inhibits mechanical firing in nociceptors. Mol Pain, 5: 19
- Khanam, S., Shivprasad, HN., Kshama, D., 2004, *In vitro* antioxidant screening models: a review. Indian J Pharm Edu, 38: 180.
- Kim HP, Son KH, Chang HW, Kang SS. 2004. Anti-inflammatory plant flavonoids and cellular action mechanism. J Pharmacol Sci 96: 229-245.
- Koblyakov, VA., 2001, Free radicals and inflammation (progress in inflammation research series, 1999). Biochem, 66: 937-938.
- Kooy, NW., Royal, JA., Ischiropoulos, H., Beckman, JS., 1994, Peroxynitrite-mediated oxidation of dihydrorhodamine 123. Free Radical Biology and Medicine, 16: 149-156.
- Label, CP., Bondy, SC., 1990, Sensitive and rapid quantization of oxygen reactive species formation in rat synaptosomes. *Neurochem Int*, 17: 435-441.
- Lompo, M., Dubois, J., Guissou IP., 2007, *In vitro* preliminary study of free radical scavenging activity of extract from *Khayasanegaleensis* A. Juts. (Meliaceae). *J Biol Sci*, 7: 677-680.
- Majumdar, B., Chaudhuri, SGR., Ray, A., Bandyopadhyay, SK., 2003, Effect of ethanol extract of *Piper betel* Linn leaf on healing of NSAID-induced experimental ulcer a novel role of free radical scavenging action. *Indian Exp Biol*, 41: 311-315.
- McNamara, CR., Mandel-Brim, J., Bautista, DM., Siemens, J., Deranian, KL., Zhao, M., Hayward, M., Chong, JA., Julius, D., Moran, MM., Fanger, CM., 2007, TRPA1 mediates formalin-induced pain. *Proc Nat Acad Sci USA*, 104: 13525-13530.
- Nakayama, T., Yamaden, M., Osawa, T., Kawakishi, S., 1993, Suppression of active oxygen-induced cytotoxicity by flavonoids. *Biochem Pharmacol*, 45: 265-267.
- Oladosu, IA., Ogundajo, AL., Alyalaagbe, OO., Emenyonu, N., 2011, Phytochemical and antituberculosis activity of *Coffea brevipes*, *hierne* extracts. *Res J Phytochem*, 5: 130-135.
- Ouattara, L., Koudou, J., Zongo, C., Barro, N., Savadogo, A., Bassole, IHN., Ouattara, AS., Traore, AS., 2011, Antioxidant and antibacterial activities of three species of *Lannea* from Burkina Faso. *J Appl Sci*, 11: 157-162.

16. Oyaizu, M., 1986. Studies on product of browning reaction prepared from glucose amine. *Jpn J Nut*, 44: 307-315.
17. Pal, S., Sen, T., Chaudhuri, AK., 1999, Neuropsychopharmacological profile of the methanolic fraction of *Bryophyllumpinnatum* leaf extract. *J Pharm Pharmacol*, 51: 313-318.
18. Pin, KY., Chuah, AL., Rashih, AA., Mazura, MP., Fadzureena, J., Vimala, S., Rasadah, MA., 2010, Antioxidant and anti-inflammatory activities of extracts of betel leaves (*Piper betel*) from solvents with different polarities. *J Trop for Sci*, 22:448-455.
19. Pritam SJ, Amol T, Sanjay BB, Sanjay JS. 2011. Analgesic activity of *Abelmoschusmonihot* Extracts. *Int J Pharmacol*, 7: 716- 720.
20. Ratnasooriya, WD., Premakumara, GAS., 1997. *Piper betel* leaves reversibly inhibits fertility of male rats. *Vidyodaya J Sci*, 7: 15-21.
21. Ratnasooriya, WD., Jayewardene, KGI., Premakumara, GAS., 1990. Anti motility effects of *Piper betel* (L) leaf extract on washed human spermatozoa. *J Nat Sic Council*, 18: 53-60.
22. Ribeiro, RA., Vale, ML., Thomazzi, SM., Paschoalato, AB., Poole, S., Ferreira, SH., Cunha, FQ., 2000, Involvement of resident macrophages and mast cells in the writhing nociceptive response induced by zymosan and acetic acid in mice. *Eur J Pharmacol*, 387: 111-118.
23. Sanmugapriya, E., Venkataraman, S., 2006, Toxicological investigations on *Strychnos potatorum* seeds in experimental models. *J Health Sci*, 52: 339-343.
24. Santhakumari, P., Prakasam, A., Pugalendi, KV., 2003, Modulation of oxidative stress parameters by treatment with *Piper betel* leaf in streptozotocin induced diabetic rats. *Indian J Pharmacol*, 35: 373-378.
25. Saravanan, R., Prakasam, A., Ramesh, B., Pugalendi, KV., 2002, Influence of *Piper betel* on hepatic marker enzymes and tissue antioxidant status in ethanol-treated wistar rats. *J Med Food*, 5: 197-204.
26. Sawadogo, WR., Boly, R., Lompo, M., Some, N., Lamien, CE., Guissou, IP., Nacoulma, OG., 2006, Anti-inflammatory, analgesic and antipyretic activities of *Dicliptera verticillata*. *Int J Pharmacol*, 2: 435-438.
27. Singh, M., Shakya, S., Soni, VK., Dangi, A., Kumar, N., Bhattacharya, SM., 2009, The n-hexane and chloroform fractions of *Piper betel* L. trigger different arms of immune responses in BALB/c mice and exhibit antifilarial activity against human lymphatic filarid *Brugia malayi*. *Int Immunopharmacol*, 9:716-728
28. Srivastava, RC., Husain, MM., Hasan, SK., Athar, M., 2000, Green tea polyphenols and tannic acid act as potent inhibitors of phorbol ester induced nitric oxide generation in rat hepatocytes independent of their antioxidant properties. *Cancer Lett*, 153: 1-5
29. Vaghasiya, Y., Nair, R., Chanda, S., 2007, Investigation of some piper species for antibacterial and anti-inflammatory property. *Int J Pharmacol*, 3: 400-405.