International Journal of Biotechnology and Clinical Medicine ISSN 2583-4665
Vol.1, No.3, Oct - Dec 2022, pp. 80~83

STUDY OF ANALGESIC ACTIVITY OF PLANT EXTRACTS IN RATS

K. Satheesh and G. Jayalakshmi*
Department of Microbiology, Sri Lakshmi Narayana Institute of Medical Sciences, Puducherry - 605 502, India

Article Info

Article history:

Received September 14th, 2022
Revised October 12th, 2022
Accepted October 24th, 2022

Keyword:

Albino rats
analgesic activity
Cinnamomum
Plant extracts
Health sciences

ABSTRACT

After injecting the animal's hind paw with formalin, the analgesic effectiveness of the alcohol-based Cinnamomum verum bark extract was assessed by watching the animal for nociceptive behavior, such as licking and biting the limb. It has repeatedly been observed that licking and biting occur in two separate phases. Phase 1 is a brief but quick response that lasts for the first five minutes after the injection of the hind paw; phase 2 is a more extended response that begins at around minute 11 and peaks between 15 and 30 minutes before diminishing 50 minutes after the injection. Occasionally, between minutes 6 and 10, little nociceptive activity is seen between phases 1 and 2. The two unique phases represent two substantially different kinds of pain. Formalin directly stimulates the nerve in phase I, and phase II is an inflammatory response or pain brought on by dorsal horn neurons.

Corresponding Author:

Dr. G. Jayalakshmi,
Sri Lakshmi Narayana Institute of Medical Sciences,
Puducherry - 605 502, India.
Email: jayalakshmi.2k15@gmail.com

How to Cite:

Satheesh & Jayalakshmi. Study of analgesic activity of plant extracts in rats. IJBTCM. 2022; Volume 1 (Issue 3): Page 80-83.

1. INTRODUCTION

"An unpleasant sensory and emotional experience connected with existing or probable tissue damage, or defined in terms of such harm," according to the dictionary definition of pain [1]. The sensation results from incidents like bumping the "funny bone," burning a finger, applying iodine to a cut, and stubbing a toe [2]. Pain encourages us to avoid potentially harmful circumstances, protect an injured body part while it heals, and retreat from them [3]. The majority of pain quickly goes away when the painful stimulus is removed and the body has recovered. Still, occasionally pain lingers even after the stimulus has been removed and the body appears to have healed [1]. Other times, pain develops without any obvious stimulus, damage, or disease. Of the 5,424 respondents in a poll of 6,636 kids (0–18 years old), 54% reported discomfort in the previous three months. On average, a third of those who reported experiencing frequent and severe pain said they had endured it for three months or longer. Girls reported chronic pain more frequently and with greater intensity than boys between the ages of 12 and 14 [4].

The most common categories of noxious stimulation are "thermal" (heat or cold), "mechanical" (crushing, tearing, etc.), and "chemical" (iodine in a cut, chilli powder in the eyes). Nociceptive pain is caused by stimulation of peripheral nerve fibres that respond only to stimuli approaching or exceeding harmful intensity (nociceptors) [5]. Visceral, deep somatic, and superficial somatic pain are further categories for nociceptive pain. Visceral pain comes from the viscera (organs) and is frequently very difficult to pinpoint. Some visceral regions also create "referred" pain when the sensation is felt elsewhere than where the stimulus was first felt [6]. Deep somatic pain is a dull, agonizing, poorly localized pain triggered by nociceptors' stimulation in ligaments, tendons, bones, blood vessels, fasciae, and muscles. Sprains and shattered bones are two examples. Sharp, well-defined, and localized superficial pain is brought on by activating nociceptors in the skin or superficial tissues. Small wounds and minor (first-degree) burns are examples of injuries that cause superficial somatic pain [7].

Cinnamon true Linn bark (family: Lauraceae) is frequently used as a food ingredient around the world, with South Asia and China being their primary markets [8]. It is frequently referred to as cinnamon. It also goes by the names Ceylon and True cinnamon. Most cinnamon used as a spice and flavouring in commercially available items (such as toothpaste) comes from grown plants. It is a bushy, evergreen tree. It grows as long, thin, flexible sticks that are 6 mm broad and 1 metre long, with multiple channelled parts or solitary quills that are 1-2 cm wide when flattened. The individual bits of bark are dull, pale brown, and only 0.5mm thick [9,10]. The taste is warm, sweet, and delightful, and the perfume is subtle, fragrant, and aromatic. Ancient physicians were aware of the cinnamon tree as early as 2700 BC. The bark of this tree was utilized as medicine by the Chinese. The therapeutic benefits of this bark were well known to the Romans.

2. MATERIALS AND METHODS

Wistar strain albino adult male or female (not pregnant) rats weighing 200 g were used for the investigation. The Central Animal House of the Bharath Institute of Higher Education and Research in Chennai, India, houses the animals obtained from the King Institute of Preventive Medicine in Guindy, Chennai. The animals were kept separately in polypropylene cages under temperature control and sanitary conditions. They all receive water and a typical pellet feed. The institutional animal ethics committee authorized the experimental protocol, and the Committee for the Control and Supervision of Experiments on Animals approved the animal home where the animals were kept following established procedures (CPCSEA).

Saline and every other medication used in this experiment will be injected intraperitoneally (i.p.). Six animals (N=6) from the control group received 0.5 ml of carboxymethylcellulose in sterile saline. There are three subgroups within the Cinnamomum verum experimental group: 150,300, and 600 mg/kg. Cinnamomum verum subgroups each contained six animals (N = 6).

Group A: Control (Carboxymethylcellulose, 0.5ml, i.p) Group B: Cinnamomum verum bark (150mg/kg) Group C: Cinnamomum verum bark (300mg/kg) Group D: Cinnamomum verum bark (600mg/kg)

Part 2: Comparison of an effective dose of Cinnamomum verum with Pethidine, Ketorolac, Cinnamomum verum + Naloxone and control group

Groups

Group A Control (Carboxymethylcellulose, 0.5ml, i.p)

Group 1 (B/C/D): Cinnamomum verum bark (effective dose, i.p)

Group 2 Pethidine (5 mg/kg, i.p)

Group 3 Ketorolac (10 mg/kg, i.p)

Group 4 Cinnamomum verwn (effective dose, i.p) + Naloxone (l mg/kg, i.p).

3. RESULTS

In this study, the analgesic activity of Cinnamomum verum was compared to that of Pethidine, Ketorolac, and Naloxone, three common medications. The study's findings are compiled in the table below. The formalin test results were expressed as the length of time the animal spent licking the paw and are shown in tables 1, 2, 3, and 4. A mean, standard deviation, standard error, 95% confidence interval, mean difference, and significance of six animals in each group have been provided as the results of estimations. Each parameter was examined independently to determine the intergroup difference's significance, and a one-way analysis of variance (ANOVA) was conducted. The means of each group were determined using descriptive statistics (Tables 1 and 3), and post hoc multiple comparisons (LSD) were performed to determine the significance and difference between the groups (Table 2, 4). A "p" value of 0.05 or less was regarded as significant. Comparing the mean reaction time (seconds animal spent licking the paw) in both the phases of Cinnamomum verum l 50mg/kg, 300mg/kg and 600mg/kg with the control group, it showed analgesic effect (P<0.000) with a mean difference of 41.33sec, 50.66sec and 51.83sec respectively in phase 1 and 82.83sec, 106.83sec and 105.50 sec respectively in phase 2 to the control group.

Table 1: Mean, Std. Deviation, Std. Error and 95% Confidence Interval (Reaction time in seconds) of both Phase 1 and Phase 2 in the formalin test after intraperitor1eally administered of Cinnamomum verum l 50mg/kg, 300mg/kg, 600mg/kg and control group.

Phase	DRUG	N	Mean of reaction time in seconds	Standard Deviation	Standard Error	95% Confidence Interval for Mean	
						Lower Bound	Upper Bound
Phase	Control	6	66 . 50	13.58	5.54	52.25	80.74

I	*Cinnamomum* I 50mg/kg	6	25.1 7*	3.49	1.42	21.5	28.82
	Cinnamomum 300mg/kg	6	I 5.83*t	4.02	1.64	11.61	20.05
	Cinnamomum 600mg/kg	6	I 4.67*t	2.34	0.95	1 2.21	17.12
Phase 2	Cont rol	6	1 22.33	33.71	1 3.76	86.95	1 57.71
	Cinnamomum 1 50mg/kg	6	39.50*	3.08	1.25	36.26	42.73
	Cinnamomwn 300mg/kg	6	1 5.50*t	I 1 . 09	4.52	3.85	27.14
	Cinnamomum 600mg/kg	6	16 .83*t	9.19	3.75	7.18	26.48

N Number of animals
* P<0.000 when compared to the Control group
t P<0.05 when compared to the cinnamomum verum J 50mg/kg group.

3.1. COMPARISON OF CINNAMOMUM VERUM 300MG/KG AND 600MG/KG WITH CINNAMOMUM VERUM LS0MG/KG

150mg/kg, 300mg/kg, and 600mg/kg were among the average reaction times (seconds the animal spent licking the paw) of both Cinnamomum verum phases. When compared to Cinnamomum verum 150mg/kg, Cinnamomum verum 300mg/kg and 600mg/kg significantly reduced pain (P 0.05), with mean differences of 9.33 seconds and 10.50 seconds, respectively, for Phase 1 and 24.00 seconds and 22.66 seconds, respectively, for Phase 2.

Table 2: Significance and Mean Difference (Reaction time in seconds) of Phase 1 and Phase 2 in the formalin test after intraperitoneally administered Cinnamomum verum l 50mg/kg, 300mg/kg, 600mg/kg and control group.

		Phase I		Phase 2	
DRUG (I)	DRUG (J)	Mean Difference	· Sig.	Mean Difference	Sig .
Cont rol	*Cinnamomum* I 50mg /kg	41.33*	.000	82.83*	.000
	Cinnamomum 300 mg/kg	50.66*	.000	1 06.83*	.000
	Cinnalll0lllulll 600mg/kg	51.83*	.000	105.50*	.000
Cilllamolllulll I 50mg/kg	Cont rol	41.33*	.000	82.83*	.000
	Cinnalllomulll 300mg/kg	9.33*	.041	24.00•	.035
	Cinnalll0llllum 600 mg/kg	10.50*	.023	22.66•	.045
Cinnamomum 300mg/kg	Cont ro l	50.66*	.000	106.83•	.000
	Cinnamomum I 50mg/kg	9.33•	.041	24.00*	.035
	Cinnamomum 600mg/kg	1.16	.787	1.33	.901
Cinnamomwn 600mg/kg	Cont rol	51.83*	.000	105.50*	.000
	Cinnamomum I 50mg/kg	10.50*	.023	22.66•	.045
	Cinnamomwn 300mg/kg	1.16	.787	1.33	.90 1

In both phases with Cinnamomum verum 300 mg/kg and 600 mg/kg, the mean reaction time (seconds the animal spent licking the paw) demonstrated equivalent pain relief (P = 0.787), with a mean difference of only 1.16 sec in Phase 1 and (P = 0.901) with a mean difference of only 1.33 sec in Phase 2. One-way ANOV is used for all four of these groups. With three degrees of freedom, a value F and significance for Phases 1 and 2 were 65.67, 45.05, and P0.000, respectively.

4. DISCUSSION

The rat formalin test was used in this work to objectively evaluate the efficacy of Cinnamomum verum bark in treating two different forms of nociception [11]. The majority of research that was reported used biting and licking as a way to gauge nociception [12]. Phase 1 nociception has been demonstrated to develop via formalin-induced direct nerve stimulation. Opioid-type analgesics interact with opioid receptors in the central nervous system to modify the experience of painful stimuli. The latter is sometimes known as "wind up." The substances responsible for this central nervous system phenomenon are still being studied, including amino acids and N-methyl-D-aspartate antagonists. Along with their other known central nervous system modes of action, opioid analgesics may also modify this process.

5. CONCLUSION

According to the results of this investigation, the bark of Cinnamomum verum significantly reduces nociception in both phases. Additionally, compared to the common medication Pethidine, it also demonstrates a reduction of nociception in both phases.

ACKNOWLEDGEMENTS

The encouragement and support from Bharath University, Chennai is gratefully acknowledged. For provided the laboratory facilities to carry out the research work.

FUNDING

Nil

ETHICAL APPROVAL

Nil

COMPETING INTEREST

The authors declare no conflict of interest.

REFERENCES

[1] Cohen M, Quintner J, van Rysewyk S. Reconsidering the International Association for the Study of Pain definition of pain. Pain reports. 2018;3(2):e634.

[2] Anand KJ, Rovnaghi C, Walden M, Churchill J. Consciousness, behavior, and clinical impact of the definition of pain. Pain Forum 1999;8(2):64-73.

[3] Klein C. What pain asymbolia really shows. Mind. 2015;124(494):493-516.

[4] Bergman S. Management of musculoskeletal pain. Best Practice & Research Clinical Rheumatology. 2007;21(1):153-66.

[5] Kalichman L, Vulfsons S. Dry needling in the management of musculoskeletal pain. The Journal of the American Board of Family Medicine. 2010;23(5):640-6.

[6] Saravanan KM, Kannan M, Meera P, Bharathkumar N, Anand T. E3 ligases: a potential multi-drug target for different types of cancers and neurological disorders. Future Medicinal Chemistry. 2022;14(3):187-201.

[7] Riva P, Wesselmann ED, Wirth JH, Carter-Sowell AR, Williams KD. When pain does not heal: The common antecedents and consequences of chronic social and physical pain. Basic and Applied Social Psychology. 2014;36(4):329-46.

[8] Ranasinghe P, Pigera S, Premakumara GA, Galappaththy P, Constantine GR, Katulanda P. Medicinal properties of 'true'cinnamon (Cinnamomum zeylanicum): a systematic review. BMC complementary and alternative medicine. 2013;13(1):1-0.

[9] Jakhetia V, Patel R, Khatri P, Pahuja N, Garg S, Pandey A, Sharma S. Cinnamon: a pharmacological review. Journal of advanced scientific research. 2010;1(02):19-23..

[10] Rajpathak S, Ma J, Manson J, Willett WC, Hu FB. Iron intake and the risk of type 2 diabetes in women: a prospective cohort study. Diabetes care. 2006;29(6):1370-6.

[11] Błaszczyk N, Rosiak A, Kałużna-Czaplińska J. The potential role of cinnamon in human health. Forests. 2021;12(5):648.

[12] Ghasemi H, Tamaddonfard E, Soltanalinejad F. Role of thalamic ventral posterolateral nucleus histamine H2 and opiate receptors in modulation of formalin-induced muscle pain in rats. Pharmacological Reports. 2017;69(6):1393-401..