IOSR Journal of Pharmacy and Biological Sciences (IOSR-JPBS)
e-ISSN:2278-3008, p-ISSN:2319-7676. Volume 13, Issue 3 Ver. IV (May. – June. 2018), PP 60-63
www.iosrjournals.org

The Anti-Inflammatory and Analgesic Effects Of the Aqueous Leaves Extract of *Carica Papaya*

A.M Danborno[1,2], S.H. Ibrahim[2] And M. J. Mallo[1]
1. *Bingham University, Karu*
2. Ahmadu Bello University, Zaria
Corresponding Author: A.M Danborno PhD

Abstract : *In this study, the anti-inflammatory and analgesic properties of aqueous leaves extract of Carica papaya using formalin induced hind paw edema in rats, and acetic acid induced abdominal writhing in mice was investigated. A total of 25Albino Wistar rats were used for the anti-inflammatory studies and 25 mice where used for the analgesic study. In the anti-inflammatory studies, 25 rats were divided into 5groups of 5rats each. Group I serve as control group and received normal saline, group II, III and IV were administered 25, 50 and 100mg/Kg body weight of the carica papaya leaves extract while group V serves as the positive control group which was administered piroxicam 20mg/kg body weight. For the analgesic study, 25 mice were divided into 5groups of 5mice each. Group I serve as control group and receive normal saline while groups II, III, and IV were administered 25, 50 and 100mg/kg body weight of the carica papaya leaves extract respectively. Group V was administered piroxicam 20mg/kg body weight it serves as the positive control. The results obtained showed a significant reduction in the formalin induced edema in rats administered at the 1st, 2nd, 3rd and 4th hours respectively e.g at the first hour 25mg/kg of the extract 0.59±0.03[a] as compared to 0.64±0.01,(control), 50mg/kg 0.59±0.02[a] as compared to 0.64±0.01, 100mg/kg 0.60±0.01[a] as compared to 0.64±01 and piroxicam 20mg/kg 0.62±0.02[a]. The extract produced more anti-inflammatory effect than piroxicam 20mg/kg a standard anti-inflammatory drug. The analgesic study of the plant extract revealed that the plant extract of carica papaya significantly reduced the writhing reflex in mice which is an indication of analgesic property and it is dose dependent as seen from the result. 25mg/kg 7.20±1.65, 50mg/kg 5.50±2.39, 100mg/kg 4.33±2.84, piroxicam 20mg/kg 5.00±2.44 as compared to the control 17.00±2.09, at 100mg/kg, carica papaya leaves extract have stronger analgesic property than piroxicam 20mg/kg. Therefore, the leaves extract of carica papaya has a strong anti-inflammatory and analgesic property and its analgesic property is dose dependent.*

Key words: *Carica papaya, anti-inflammatory, analgesic effect, piroxicam, abdominal writhing reflex, edema, formalin*

Date of Submission: 16-06-2018 Date of acceptance: 02-07-2018

I. Introduction

Inflammation is a reaction of living tissues to injury. It involves a cascade of events in the cells, involving products of cells, enzymes, soluble factors and blood vessels and their contents. It is a pathophysiological response of living tissues and defense mechanism [1]. The term inflammation is usually restricted to the early vascular and cellular response which is part of the defense mechanism of the body, while the later reconstructive changes are referred to as repair or resolution [2].

Inflammation can either be acute or chronic. Acute inflammation occurs as an immediate response to trauma usually within two hours, when it is chronic, the inflammation reflects an on-going response to a long term medical condition such as arthritis [3]. Chronic inflammation is an inflammatory response of prolonged duration; weeks, months, or even indefinitely whose extended time course is provoked by persistence of the causative stimulus to inflammation in the tissue damage and is accompanied by simultaneous attempts at healing and repair. The exact nature, extent and time course of chronic inflammation is variable and depends on a balance between the causative agent and the attempts of the body to remove it [3]. Chronic inflammation arises as a result of persistent infections by certain micro organisms such as virus, fungi etc and evoke an immune response sometimes takes a specific pattern called granulomatous reaction [4].

Analgesics are a class of drugs used to relieve pain. The pain relief induced by analgesics occurs either by blocking pain signals going to the brain or by interfering with the interpretation of the signals by the brain, without producing loss of consciousness. Aspirin and other non-steroidal anti-inflammatory drugs are sometimes referred to be in the class of analgesics because they have some analgesic properties and primarily have an inflammatory effect, as opposed to being solely analgesic [5].

Carica papaya leaves are used locally as a herbal medicine, especially for the treatment of stomach troubles, relieving asthma when the dried leaves is smoked, combating ulcer, treatment of malaria and eradicating worms. Thus an investigation into its possible analgesic and anti-inflammatory effect is of paramount importance.

II. Materials and Method

Location of study

This study was conducted in the department of Human physiology, Faculty of Medicine Ahmadu Bello University, Zaria Nigeria in 2009.

Plant Material

Fresh leaves of *carica papaya* were plucked at silver Jubilee, Zaria Kaduna State Nigeria in 2009 The plants were identified at the herbarium unit of the Biological Science Department Ahmadu Bello University, Zaria. The fresh leaves of *carica papaya* was taken to the department of Pharmacognosy and drug development Ahmadu Bello University, Zaria where the extracts of the plant was prepared by grinding the air dried leaves into powder. 150g of the powder of the plant was kept inside a tumble then put inside the sox-let extractor.

This was then macerated with 1litetre of water for 48hours. The extract was concentrated and evaporated to dryness to obtain a dark brown mass of 30g with the aid of a scraper the solid residue (referred to as the aqueous extract) was scraped from the evaporating dish and stored in a beaker covered with a foil of paper (to avoid moisture absorption) until used. Appropriate concentrations of the extract was prepared by dissolving the extract in distilled water and expressed in Mg/ml

Animals

Twenty five Wistar rats (145-240g) and twenty five Swiss albino mice (15-30g) of both sexes were used for this experiment. The animals were obtained from the animal house faculty of Pharmaceutical sciences Ahmadu Bello University, Zaria and housed in the animal house, Faculty of Medicine Ahmadu Bello University Zaria. The animals were maintained under standard laboratory conditions and fed with standard feed pellets (Vital feeds) with free access to water ad libitum. All procedures were performed in the morning according to the guidelines for the care of laboratory animals [6].

III. Experimental Design

The laboratory model for evaluating the anti-inflammatory activities of drugs involves the induction of a feature of inflammation, such as edema, in rat's paw using endomatogenic compounds. The method of Winter *et al*., (1963) was used with slight modification. The level of swelling is measured by determining the thickness of the paw using vernier caliper. This method was also used to study the anti-inflammatory effects of the aqueous extracts of *carica papaya*. The laboratory method for analgesics activity of drugs involves the induction of a feature of pain in mice using acetic acid. The degree of pain is determined by a number of abdominal contractions (writhing in each mouse). The acetic acid method was used to evaluate the analgesic effect of the aqueous extract of *carica papaya*.

Animals were weighed using a weighing balance and their individual weights were noted and recorded accordingly. The drugs and the plant extract were injected intraperitoneally in kilogram per body weight of the animal.

FORMALIN-INDUCED HIND PAW EDEMA

The increase in the rat's hind paw linear diameter induced by sub-planter injection of formalin was used as the measure of acute inflammation [7]. The rats were divided into the following groups:

Group I (n=5) the control group received normal saline (i.p)
Group II (n=5) received the plant extract 25mg/kg
Group III (n=5) received plant extract 50mg/Kg
Group IV (n=5) received plant extract 100mg/kg
Group V (n=5) received Piroxicam. 20mg/kg

30 minutes later, acute inflammation was induced by subcutaneous injection of 0.1ml of 2.5% solution of formalin under the planter surface of the left hind paw of each rat. Edema was assessed in terms of the linear diameter at intervals of 1hour for 4hours using vernier caliper. Percentage inhibition of edema was determined for each group by comparing with the control group and calculated using the formula below:

$$\%\text{inhibition} = \frac{\text{mean paw diameter (control)} - \text{mean paw diameter (treated)}}{\text{Mean paw diameter (control)}} \times 100$$ [8]

ACETIC ACID-INDUCED ABNORMAL WRITHING TEST

The test was carried out accordance with the method of described by [9]. The Swiss albino mice were divided into 5 groups of 5mice each (n=5):

Group I (n=5) control
Group II (n=5) received extract 25mg/kg
Group III (n=5) received extract 50mg/Kg
Group IV(n=5) received extract 100mg/kg
Group V (n=5) received piroxicam 20mg/kg

30 minutes later, each mouse was given an intraperitoneal injection of 0.06% acetic acid (5mg/kg). The number of abdominal writhing (contractions) was counted 5 minutes after injection of acetic acid for a period of 10minutes. The percentage inhibition of the writhing was calculated using the formula.

$$\%\text{inhibition} = \frac{\text{mean paw diameter (control)} - \text{mean paw diameter (treated)}}{\text{Mean paw diameter (control)}} \times 100$$

[8].

STATISTICAL ANALYSIS

The data obtained from the study were expressed as mean ± SEM. The differences between the groups were analyzed by one-way analysis of variance (ANOVA) using SPSS statistical tool version 16. Values of $p< 0.05$ were considered statistically significant.

IV. Result

Table 1. Effects of aqueous extract of *carica papaya* on formalin-induced hind paw edema in Wistar rats

Groups	1hr	2hr	3hr	4hr
Control	0.64±0.01	0.64±0.02	0.58±0.01	0.52±0.02
Extract 25mg/kg	0.59±0.03[a]	0.58±0.04[a]	0.55±0.02[a]	0.50±0.03[a]
Extract 50mg/kg	0.59±0.02[a]	0.54±0.02[a]	0.56±0.03[a]	0.50±0.01[a]
Extract 100mg/kg	0.60±0.01[a]	0.56±0.04[a]	0.56±0.05[ns]	0.48±0.02[a]
Piroxicam 20mg/kg	0.62±0.02[a]	0.57±0.02[a]	0.56±0.02[ns]	0.50±0.01[ns]

P<0.05, a= statistical significant, ns= not statistically significant

Table 2: Effects of aqueous extract of *carica papaya* on acetic acid-induced writhing mice

Groups	No. of writhing	% inhibition
Control (normal Saline)	17.00±2.09	-
Extract 25mg/kg	7.20±1.65[a]	57.64
Extract 50mg/kg	5.50±2.39[a]	67.64
Extract 100mg/kg	4.33±2.84[a]	74.52
Piroxicam 20mg/kg	5.00±2.44[a]	70.58

P<0.05, a= statistical significant, ns= not statistically significant

V. Discussion

The result from the present study indicated that intraperitoneal administration of aqueous extract of *carica papaya* significantly reduced abdominal writhing induced by acetic acid in mice. This was evident as it reduces contractions in mice at doses of 25, 50 and 100mg/kg with an approximate percentage inhibition of 57.64%, 67.64% and 74.52% respectively in a dose dependent manner. From the result it can be clearly seen that the administration of 100mg/kg of the plant extract has more analgesic effects than the standard drug used (piroxicam). The analgesic effect of *carica papaya* leaves extract can be linked to the tannins, phenolic compounds and flavonoids which have been documented to have analgesic effects [10].

Formalin which is a potent edematous agent produced inflammation through the release of several inflammatory mediators including prostaglandins [11]. These chemical mediators of inflammation produced increased in vascular permeability, thus promoting fluid accumulation in tissues which results in edema [12][13]. The aqueous extract of *carica papaya* leaves extract administration also demonstrated a significant anti-inflammatory activity against formalin induced edema in Wistar rats. The extract of *carica papaya* leaves at doses of 50mg/kg and 100mg/kg reduce the formalin-induced edema significantly at the beginning of 2hours when compared to the control group.

VI. Conclusion

The leaves extract of *carica papaya* has a strong anti-inflammatory and analgesic effects as seen from the result of the study.

References

[1]. Sosa, S., Balick, M.J., Arvigo, R., Esposito R. G., Pizza, C. and Al-inier, G (2002). Screening of the tropical anti-inflammatory activity of some central African plants. Journal of Ethno pharmacology. 81: 211-215

[2]. Selwyn, T. and leonard, C. (2009). A Short textbook of surgery, 4th ed. ELBS and Holder and Stoughton, London. Pp 42-43

[3]. Bevan, S. (1996). Intercellular messengers and signal transduction in nociceptors. Neurobiology of nociceptors. Ed. By Belmonte, C and Cervero, F. Pp 298-324. Oxford University Press NY

[4]. Kumar, V., Contran, R.S and Collins, T. (2005). Pathological basis of disease. 7th ed., W. B. Saunders Company. Philadelphia, London, Toronto Montreal, Sydney, Tokyo. Pp52-80

[5]. Todd, K.H., Funk, K.G., Funk, J.P. and Bonacci, R. (1996): Clinical significance of reported changes in pain severity. Annual emergency Medicine, 27. 485-489

[6]. Zimmermann, M. (1983): Ethical guidelines for investigation of experimental pain in conscious animals. Pain 16. 109-110

[7]. Winter, C.A., Riley, E.A. and Nuss, G.W. (1963): Journal of Pharmacology and Experimental Therapy. 141:389.

[8]. Kouadio, F., Kanko, C. and Juge, M. (2000). Analgesic and anti-inflammatory activities of an extract from parkia bigblobosa used in traditional medicine in the Ivory Coast. Pytother Res; 14:635-7.

[9]. Koster, R., Auderson, N., and De Beer, J.M. (1959). Acetic acid used for analgesic screening. Federation proceedings; 18: 412-9

[10]. Leung, A. Y. and Foster, S. (1996). Encyclopedia of common Natural ingredients used in food, drugs and cosmetics. 2nd ed. Willy and Sons, New York

[11]. Tyolsen, A., Berge, O., Hunskaar, S., Rosland, H.J. and Hole, H. (1992)The formalin test: An evaluation of the method. Pain, 51: 5-14

[12]. Williams, T.J. and Morley, J. (1993): Prostaglandins as potentiators of increased vascular permeability in inflammation. Nature, 246: 215-217

[13]. White, M. (1992): Mediators of inflammation and inflammatory process. Journal of allergy and Clinical Immunology, 103. 5378-5381

A.M Danborno "The Anti-Inflammatory and Analgesic Effects Of the Aqueous Leaves Extract of Carioca Papaya"IOSR Journal of Pharmacy and Biological Sciences (IOSR-JPBS) 13.3 (2018): 60-63.