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Evaluation of the anti-inflammatory activity of extract of *Vernonia Amygdalina*

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ABSTRACT

Objective: To investigate the anti-inflammatory activity of the extract of *Vernonia amygdalina* (V.A). **Methods:** Inflammatory response was induced by topical application of croton oil dissolved in suitable vehicle on the rat ear. After 6 hrs, cutting out the ear quantitated the response. The cut ear was weighed and the increase in weight relative to control group was evaluated. **Results:** When co-applied with croton oil to the rat ear extract of V.A. produced a reduction in the inflammatory response when croton oil alone was applied to the rat ear. The extract produced $(69.1 \pm 2.0)\%$ reduction of the inflammatory response produced by croton oil alone, lower than the reduction of the inflammatory response produced by acetyl salicylic acid $[(71.1 \pm 2.0)\%]$. **Conclusions:** This finding suggests that extract of V.A. exhibits anti-inflammatory activity and may explain the usefulness of the leaves of this plant in the treatment of inflammatory disease conditions by traditional healers.

1. Introduction

Local vasodilatation and increase in capillary permeability contribute to edema. Tissue degeneration and fibrosis occur in chronic stages. Several researchers have examined the role of inflammatory cells at sites of inflammation. The recruitment of inflammatory cells to sites of injury involves the interactions of several types of soluble mediators^[1,2]. Responses induced during an inflammatory event include induction of fever, sleep and anorexia^[3]. Physical, chemical or biological assault may produce injury to the body. Prostaglandins and histamine have been implicated in these inflammatory processes^[4]. Croton oil-induced inflammatory response represents a widely used model in assessing the topical anti-inflammatory activity of various substances^[5]. The method is simple, rapid and repeatable. *Vernonia amygdalina* (bitter leaf) is a small shrub with green leaves, a characteristic odor and bitter taste. It contains alkaloids and flavonoids^[6]. The leaves soaked in water have been used to treat various diseases such as fever and to increase bowel movement. In folk medicine it has been used to

treat malaria, diabetes and inflammatory diseases^[7]. This research therefore using the croton oil-induced inflammatory model investigated these claims by traditional healers especially the anti-inflammatory activity of the extract of *Vernonia amygdalina*.

2. Materials and methods

Acetylsalicylic acid was purchased from Sigma Chemical Co., St. Louis, U.S.A. Croton oil was obtained from Serva Feibochemica, Heidelberg, Germany. Albino rats of both sexes weighing between 180–200 g were obtained from the University Animal House. The animals were kept in large plastic cages and acclimatized for at least two weeks before the commencement of the experiments. The animals were fed with a standard diet of growers mash supplied by Gee Pee Nigeria Limited and had access to clean drinking water ad libitum. The fresh leaves of the plant *Vernonia amygdalina* were dried in the open air in a shade for a period of about four weeks prior to extraction process. The water extract of the plant leaves was obtained by decoloration in accordance with the general process described in the USP^[8] to yield an extract of 4.0% w/v, which was used in the experiment. Inflammation was induced using the modified method^[8]. Croton oil vehicle containing 4

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parts pyridine, 1 part distilled water, 5 parts diethyl ether and 10 parts croton oil in diethyl ether (v/v) was selected as the inflammatory agent. The croton oil vehicle was applied to the right ear of four rats via curved felt forceps until the ear surfaces appear uniformly moist. Six hours later, each animal was lightly etherized and both ears were removed uniformly by a sharp scissors and individually weighed on a sensitive balance. The inflammatory response was quantitated by the increase in weight of the treated ear expressed as percentage to the weight of the contra-lateral ear. To determine the anti-inflammatory activity of the extract and acetylsalicylic acid (ASA), the extract and ASA were applied topically to the right ear in separate animals ($n=20$ per group), and croton oil on the contra-lateral ear in each animal as control. The anti-inflammatory response was quantitated by expressing the increase in weight of the treated ear as a percentage of the weight of the contra-lateral control ear. Results are reported as mean \pm S.E. of mean of each group of rats ($n=20$ per group). Percentage reduction was calculated as difference in weight of treated ear in the presence of the extract or ASA and the weight of the contra lateral croton oil alone treated ear. Student's t -test was applied to the data for statistical significance.

3. Results

When co applied with croton oil to the rat ear extract of *Vernonia amygdalina*. produced a reduction in the inflammatory response produced when croton oil alone was applied to the rat ear. The extract produced (69.1 \pm 2.0)% reduction of the inflammatory response produced by croton oil alone, lower than the reduction of the inflammatory response produced by acetyl salicylic acid [(71.1 \pm 2.0)%].

4. Discussion

Acetylsalicylic acid is a very effective non-steroidal anti-inflammatory agent[9]. Decreases in weight of the croton oil treated ears of the rats provided an adequate index of anti-inflammatory response and thus allows for assessment of many substances for topical anti-inflammatory activity. The results of this study show that extract of the plant *Vernonia amygdalina* possesses anti-inflammatory property and produces significant reduction in the croton oil treated

rat ear thus exhibiting potent anti-inflammatory activity though lesser than that produced by Acetylsalicylic acid. This finding therefore may justify the use of the plant in the treatment of inflammatory disease conditions by traditional healers. Further study is required to investigate the toxicity of this plant as well as possible extraction of the active ingredient for future therapeutic use.

Conflict of interest statement

We declare that we have no conflict of interest.

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