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ANALGESIC ACTIVITY OF LEAF LATEX OF *ALOE PERCRASSA* TODARO AND *ALOE CAMPERI* SCHWEINFURTH IN MICE

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ABSTRACT

Aloe *Aloe percrassa* and *Aloe camperi* are among the indigenous aloe species growing in Tigray region, Northern Ethiopia. They are traditionally used for the management of pain, malaria, wounds, gastro Intestinal and dermatological problems. Leaf latex of *Aloe percrassa* and *Aloe camperi* were collected by putting the leaves concentrically around a plate. Acute toxicity study of the latex of both plants was also determined. Tail immersion method was used to evaluate *invivo* analgesic potential of the leaf latex in Swiss albino mice model. The results showed that the leaf latexes of both plants were found to have significant analgesic activity at oral dose of 200 & 400 mg/kg when compared to latency period of negative control group. The results obtained from the present study support the traditional use of the leaf latex of *Aloe percrassa* and *Aloe camperi* in painful conditions.

KEYWORDS: *Aloe percrassa*, *Aloe camperi*, Analgesic activity, *Invivo*, Latex.

INTRODUCTION

Despite the known adverse effects such as gastrointestinal erosions and ulcerations, disturbances of platelet activation, and changes in renal function of NSAIDs and tolerance and dependence induced by opiates they are widely used in patients for the treatment of pain. The use of these drugs as analgesic agents has not been successful in all the cases. Therefore, analgesic drugs lacking those effects are being searched all over the world as alternatives to NSAIDs and opiates.[1] More over analgesic drugs are usually effective against pain of low-to-moderate intensity.[2] Many medicines of plant origin had been used since antiquity. It is

therefore imperative investigation of the efficacy of plant-based drugs used in traditional medicine as they are cheap, and have little side effects.[3]

Aloe percrassa (Aloeceae) has also been known as *A. abyssinica* var. *percrassa* Baker is in a group of aloes (*A. debrana*, *A. rivae* and *A. trigonantha*, which is stemless (but some old plants developing thick, prostrate stems). *A. percrassa* is distinguished from the rest of the group by the large bracts, which are 10–16(– 20) mm long while *Aloe camperi* belongs to a group of calescent aloes species of the first subgroup (*A. adigratana*, *A. cam peri*, *A. schelpei*, and *A. sinana*) mainly characterized by erect, ascending or sprawling stems that are more than 5 cm in diameter.[4] These medicinal plants are traditionally used to treat malaria, wound healing, eye inflammation, to relief pain, to treat dermatological and gastro intestinal problems.[5, 6] There is, however, very little scientific evidence to support these claims. Hence the present study was aimed to investigate the analgesic activity of leaf latex of *A. camperi* and *Aloe percrassa* in mice using tail immersion model.

MATERIALS AND METHODS

MATERIALS

Plant material

Leaf latex of *Ale percrassa* was collected from and around a town called Edagahamus which is around 100 Km north-east, while leaf latex of *Aloe camperi* was collected from Ashegoda, around 20Km south of the regional capital city Mekelle ,Northern Ethiopia. The authenticity of the plant materials was confirmed by Professor Sebsibe Demissew, at the National Herbarium, Department of Biology, Addis Ababa University where voucher specimens collection number GG 001 and GG 002 for *Ale percrassa* Todaro and *Aloe camperi* Schweinfurth respectively were deposited.

Instruments, apparatus equipments and drugs

The following instruments and chemicals were used to conduct the experiment: Waterbath (STUART® RE300B), thermometer, Diclofenac sodium (ASTRA LIFECARE, India), distilled water, beakers, measuring cylinder, ruler, markers, oral gavages, stop watch, and beam balance.

Experimental animals

Healthy adult Swiss albino mice of both sexes (30-40 g) obtained from the animal house of pharmacy department, Mekelle University and acclimatize for one week in polypropylene

cages at room temperature and were fed on standard laboratory diet and water before commencement of the activity. The study animals were treated and the experiment was conducted in compliance with NIH Guide for Care and Use of Laboratory Animals.[7]

METHODS

PREPARATION OF LEAF LATEX

The leaf latex of the plants was collected by putting the leaves concentrically around a plate and left in open air for 3 days to allow evaporation of water. The dried dark brown powder was scraped off from the plate, collected and stored in a tightly sealed umber colored bottle.

ORAL ACUTE TOXICITY TEST FOR THE LATEX

Acute oral toxicity study of the latex was conducted as per the internationally accepted protocol drawn under OECD guidelines 425.[8] The leaf latex was dissolved in distilled water and administered by standard oral gavages at dose of 2000 mg/kg to the study animals.

ANALGESIC ACTIVITY

Tail immersion test

Tail immersion method was used as described by Adeyemi *et al.* (2011)[9] and Ghosh *et al.* (2011).[2] The animals were fasted over night with free access to water prior to experiment, then weighed and coded. Preliminary screening on study animals was done by immersing the lower portion of the tail in a water bath maintained at 50 ± 5^{o}C and mice showing tail-flick response in 10 seconds were selected to avoid any thermal injury and randomly grouped in to six groups of five animals each. The first group served as a control group which received distilled water (10ml/Kg).The second group received the reference standard drug Diclofenac sodium 50mg/kg (Astra life care, India). The third and fourth, groups were given leaf latex of *Aloe percrassa* (LLAP) at the dose level of 200 and 400 mg/kg and the fifth and sixth groups were given leaf latex of *Aloe camperi* (LLAC) at the dose level of 200 and 400 mg/kg orally respectively. The time in seconds taken to withdraw (flick) the tail from the water was taken as reaction time (latency period). The reaction time was measured 30minutes before administration of the leaf latex and the standard drug. The animals are submitted to the same testing procedure after 30, 60, 90, 120 and eventually 150 minutes after oral administration of the drug and the latex. The reaction time of individual animal was noted at every 30min interval. Finally percent protection was calculated using the following formula.

$$Percentage\ protection = \frac{Latency\ (test) - Latency(control) \times 100}{latency\ (Control)}$$

DATA ANALYSIS: Data obtained were expressed as mean plus standard error of mean (M± SEM) and results were analyzed using SPSS version 16 and Demo Graph pad Intat windows software using one-way analysis of variance (ANOVA) and student t-test at a 95% confidence interval ($\alpha = 0.05$) to compare results between groups. The results were considered significant when $P<0.05$.

RESULT AND DISCUSSION

ACUTE TOXICITY

Acute toxicity is a toxicity produced by a pharmaceutical when administered in one or more doses within a period not exceeding 24 h. Changes in general behaviors, variations in body weight and mortality are critical for the evaluation of the effect of a compound on test animals, since such changes are often the first signs of toxicity.[10]

Accordingly, the acute toxicity study of the present study indicated that no mortality in mice was caused within 24 h after oral administration of the leaf latex of *A. percrassa*, and *A. camperi* at a dose of 2000 mg/kg.

Gross physical and behavioral observations of the experimental mice also revealed that there were no visible signs of toxicity like lacrimation, hair erection, diarrhea, comma and feeding activities.

The results of the present study showed that the leaf latex of *A. percrassa* and *A. camperi* possesses analgesic activity on tail immersion in 50 ± 5^{o}C hot water. As can be seen from table 1, significant percent protection was observed on the leaf latex of *Aloe camperi* at 200mg/kg and 400mg/kg at 60, 90 120 and 150 minutes where as *Aloe percrassa* was found to posses analgesic activity at 90 and 120 minutes compared to distilled water treated control groups.

The bitter yellow leaf latex found in the outer layer of the leaves of aloe predominantly contains active anthraquinones and their derivatives. Anthraquinones glycosides like aloin A and B, hydroxyanthrone and chromones are among others.[11] Anthraquinones have been reported to have analgesic activity. Alion and aloe-emodin are major anthraquinones acts as analgesic.[12]

The analgesic activity of *aloe percrasssa* and *aloe camperi* observed in the present study could be due to the presence of anthraquinones and their derivateves. Different studies

reported that anthraquinones have shown analgesic activities for painful conditions.[13]The roots of *Morinda citrifolia* L. plant known to contain medicinally active anthraquinones, having analgesic effects.[14]

It was also reported that Anthraquinones from ethanol extract *Cassia occidentalis* leaves possess antinociceptive and antipyretic properties.[15] More over anthraquinones isolated from stem bark *Stapelia gigantean* (Asclepiadaceae)[16] and anthraquinones isolated from Bark/root of *Bombax buonopozense* (Malvaceae) was indicated for painful body, limbs and chest pain.[17] This supports the analgesic activity of anthraquinone and their derivatives seen in the present study.

Table1: Analgesic effect of leaf latex of *Aloe percrassa* and *Aloe camperi* on tail immersion in 50 ± 5°C hot water.

Drug/Latex	Tolerance	Pre-treatment	Post-treatment				
		0min	30min	60min	90min	120min	150min
Vehicle (10 ml/Kg)	Latency(Sec)	1.4±0.24	1.6±0.40	1.5±0.20	1.5±0.22	1.7±0.20	1.6±0.24
	%Protection		-	-	-	-	-
Diclofenac (50mg/Kg)	Latency(Sec)	1.6±0.24	3.2±0.2**	3.6±0.24***	4.0±0.16***	5.6±0.29***	7.4±0.37***
	%Protection		(100.0)	(140.0)	(166.7)	(229.4)	(362.5)
LLAP (200mg/Kg)	Latency(Sec)	1±0.0	2.0±0.32	3.6±0.40	3.7±0.99	4.2±0.80*	3.6±0.81
	% Protection		(25.0)	(140.0)	(146.7)	(147.1)	(125.0)
LLAP (400mg/Kg)	Latency(Sec)	1.4±0.4	1.7±0.2	2.2±0.2	3.2±0.32*	3.3±0.58*	2.8±0.58
	% Protection		(6.25)	(46.7)	(133.3)	(94.2)	(75.0)
LLAC (200mg/Kg)	Latency(Sec)	1±0.0	1.8±0.20	3.1±0.40*	3.4±0.24**	3.9±0.10***	3.2±0.58*
	% Protection		(12.5)	(106.7)	(126.7)	(129.4)	(100.0)
LLAC (400mg/Kg)	Latency(Sec)	1.2±0.20	2±0.32	2.2±0.20	3.4±0.51*	4.2±0.26***	3.8±0.66**
	% Protection		(25.0)	(46.7)	(126.7)	(147.1)	(137.5)

*Values are presented as M ± SEM; n =5; * P < 0.05;** P < 0.01;***P < 0.001; values in parenthesis indicate percentage inhibition*

CONCLUSIONS

From the present study, it can be concluded that analgesic activity of leaf latex of *Aloe percrassa* and *Aloe camperi* justifies their traditional use for painful conditions.

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