Available online at www.ujpronline.com
Universal Journal of Pharmaceutical Research
An International Peer Reviewed Journal
ISSN: 2831-5235 (Print); 2456-8058 (Electronic)

REVIEW ARTICLE

A REVIEW ON CHEMICAL COMPONENTS AND THERAPEUTIC USES OF ANT LION (*MYRMELON* SP)

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Article Info:

Article History:
Received: 6 October 2017
Reviewed: 11 November 2017
Accepted: 30 December 2017
Published: 15 January 2018

Cite this article: Sharma N. A review on chemical components and therapeutic uses of ant lion (Myrmelon sp). Universal Journal of Pharmaceutical Research 2017; 2(6): 73-75.
http://doi.org/10.22270/ujpr.v2i6.RW2

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Abstract

Antlions are a family of insects given the zoological classification Myrmeleontidae. The name is rooted in the Greek words *myrmex* (ant) and *leon* (lion). Since it preys primarily on ants, the antlion is, metaphorically speaking, a "lion" among ants. The name "antlion" best describes this insect's predacious larval form a mottled gray or brown creature with an oversized head, spiny jaws, short legs, and a soft body covered in bristles. Along with the beneficial effects of ant lion in agriculture, they have been found to be containing various bioactive components such as polypeptides and alkaloids. They have been proved to be useful as therapeutic agents in treatment of various human ailments such as diabetes, convulsion and also in back pain. This review article summarizes some chemical constituents of the insect and some pharmacological uses as reported by various studies.

Keywords: Ant lion, chemical components, therapeutic uses.

INTRODUCTION

Antlions have a worldwide distribution. The greatest diversity occurs in the tropics, but a few species are found in cold-temperate locations, one such being the European Euroleon nostras. They most commonly occur in dry and sandy habitats where the larvae can easily excavate their pits, but some larvae hide under debris or ambush their prey among leaf litter.The catalog of ant lion taxa, includes about 1500 known species[1]. The most known genus is *Myrmeleon* (ant lion). The exact meaning of the name "ant lion" is uncertain. It has been thought that it refers to the fact that ants form a large percentage of the prey of the insect, the suffix "lion" merely suggesting destroyer or eater. The term Ant lion applied to the larval form of insect as it feeds upon arthropods- mainly ants. Its adult is often called doodlebug in North America[2]. Some adults eat small pollen and nectar while others are predator of small arthropods. Ant lions are worldwide in distribution, most common in arid and sandy habitats[3]. The larvae of many antlion species construct conical pitfall traps in sand or fine soil. The larva settles down at the bottom, buried in the soil with only the jaws projecting above the surface, often in a wide-opened position on either side of the very tip of the cone[4]. Ant lion completes its life cycle in four stages- egg, larva, pupa and adult. Eggs are laid directly into soil. Larvae pass through three instars and then pupate in the soil. Adults are active, weak-flying, nocturnal predators[5].

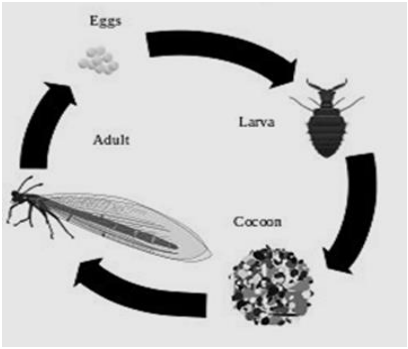

Figure 1: Antlion life cycle.

The largest forms are found in the predominately African genus *Palpares;* these have a wingspan of 16 cm (6.3 inch). A very small form in Arabia has a wingspan of only 2 cm (0.8 inch)[7,8]. The largest European species is *Acanthaclisis occitanica*, with a wingspan of 11 cm (4. inch). The other ten or so species native to central Europe are about a third smaller, and only half build sand traps[9].

There are many researches focused mainly in distribution, ecology and life cycles of ant lion but very few studies have been carried out focusing their therapeutic uses[6].

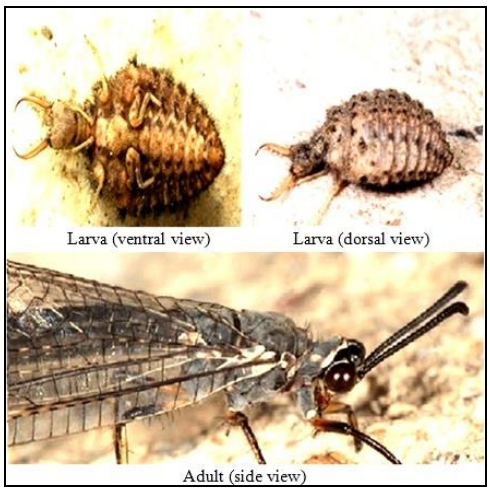

Figure 2: Antlion.

Figure 3: Sand pit trap of an antlion.

Chemical components

Nakatani *et al.*, isolated two isoindoline alkaloids namely 4-hydroxyindoline-1- one and 2-(2-hydroxyethyl)-4-hydroxyisoindoline-1-one from Ant lion larva Myrmeleontide species[2].

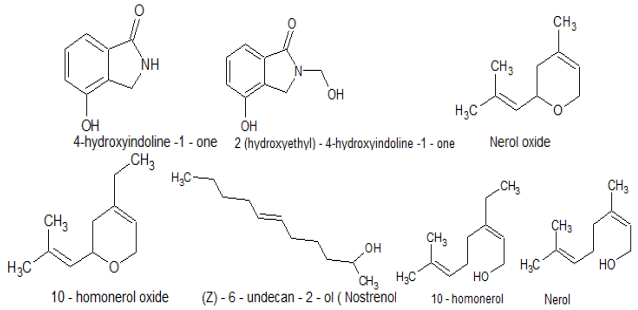

Figure 4: Chemical components obtained from antlion.

Hisashi Nishiwaki *et al.*, isolated bacteria named *Bacillus cereus* from the larvae of *Myrmeleon bore* which was found to secrete proteins that paralyze and kill German cockroaches, *Blattela germanica*, when injected. One of these active proteins was purified and identified as sphingomyelinase (molecular mass of 34 kDa) [11]. Matsuda and co workers obtained a paralytic polypeptide named AIBT-toxin from live ant lions, the larvae of Myrmeleon bore[12]. Similary the thoracic gland of the ant lion *Euroleon notras* was found to contain nerol oxide and (z)-6-undecen-2-ol (Nostrenol) while the species *grocus* bore contained 10- homonerol oxide and nostrinol. Nerol and 10-homonrol were found in third species, *Myrmeleon formicarius*. The nerol oxides of *E. nostras* and the 10-homonerol oxides of *G. bore* were found to be racemic while both species contained optically pure (R) – nostrenol[13]. In addition to this, the thoracic gland of males in two ant lion sp. *Synclysis baetica* and *Acanthaclisis occitanica* of Isreal were found to contain two component blends of nerol oxide and (R,Z)-6- tridecan-2-ol (approx 1:5) and nerol oxide and 10-homonerol oxide (approx 1:2) respectively[14].

Therapeutic uses

The dried bodies of ant lions (the larvae of Myrmeleontidae species) have been used as a traditional Chinese medicine prescribed for the treatment of malaria and childhood convulsions[15]. Endro Nugroho *et al.*, found combination of bitter guard ethanolic extract with ant lion larvae aquous extract as a blood glucose level lowering agent. In this study, human lung acting insulin was intraperitonically injected three times daily for 15 days to insulin resistance conditions in rat. In 16th day, a single dose of drug was orally given and blood glucose levels were checked before and after the administration of drug. The result was analyzed using paired t-test. The bitter gourd and ant lion larvae in ratio 75:25 (w/w percentage) were found to reduce blood glucose level by 32.20±2.57%[16]. A study in Indonesia by Tyas Kurniasih *et al.*, showed that the juice of undur-undur (ant lion) significantly (p<0.05) decreased blood glucose levels of aloxan induced hyperglycemic rats after 14 days of treatment. In this study, 30 male white Wister rats were randomly selected and divided into 6 treatment groups. First group (normal control) included aquabidest injected mice and given treatment with aquabidest at dose of 0.5 ml/200g body weight of rat per day, second group (control hyperglycemic) included alloxan induced hyperglycemic mice and given treatment with aquabidest at dose of 0.5 ml/200 g body weight of rat per day and third group (positive control) included alloxan induced hyperglycemic mice and given treatment with solution of glibenclamide dose of 0.378 mg/200 g body weight of rat per day[17]. Similarly, forth group (treatment 1) were alloxan induced hyperglycemic mice and given treatment with Undur-undur (Antlion) juice at dose of 0.01 ml/200 g body weight of rat per day, fifth group (treatment 2) were alloxan induced hyperglycemic rats and given treatment with banana amber juice at dose of 1.16 ml/200 g body weight of rat per day and finally sixth group (treatment 3) were alloxan induced hyperglycemic mice and given treatment with combination at dose 0.01 ml/200 g of ant lion juice and at dose 1.16 ml/200 g of banana juice. Blood glucose content was measured every 7 days until the 35th day. The data obtained were analyzed using ANOVA and test LSD at 95% confidence level[18].

Recently, Elza Sundhani *et al.*, also studied anti-diabetic activity of ant lion powder and ethanolic extract on white Wister male rat. Twenty seven rats were grouped randomly into nine each with 3 animals. Group I and II were given glibenclamide and group III was given glucose. Group IV, V, and VI were given ant lion powder with the dose of 5.42 mg/Kg BW, 10.84

mg/Kg BW, and 21.68 mg/Kg BW respectively while group VII, VIII, and IX were given ethanol extract of ant lion with the dose of 0.1626 mg/Kg BW, 0.3252 mg/kg BW, and 0.6054 mg/Kg BW respectively. Blood glucose level was determined and analyzed statistically. The result showed that, both powder and ethanolic extract of ant lion can prove to decrease blood glucose level[19]. Ant lion was also found to be traditionally used in back pain. Gun powder, two *Aframomum melegueta* rhizomes, two white ant, two ant lion are all grinded in a pestle and mortar and used to make nine incision marks on a man and seven on a woman on the back to treat back pain[20].

CONCLUSIONS

There are only few studies about the uses of ant lion as bioactive agents although there are number of researches focusing on distribution, ecology and life cycles of ant lion. Highlight of few researches in this article suggest that there is a need of focusing study on the pharmacological uses of ant lion.

ACKNOLEDGEMENTS

Author is thankful to management of Department of Chemistry, Nepalese Army Institute of Health Science, College of Medical Polytechnic, Kathmandu, Nepal to provide necessary facilities for this work.

AUTHOR'S CONTRIBUTION

Sharma N: Writing original draft, review, methodology, data curation, literature survey, editing.

DATA AVAILABILITY

Data will be made available on request.

CONFLICT OF INTEREST

No conflict of interest associated with this work.

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