



Anti-bacterial studies on the different body parts of *Loligo duvauceli*

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ABSTRACT

Marine peptides have inherent activity, largely unexplored and ability to revolute against challenges. Molluscs, one of major group of invertebrates are not only of highly delicious seafood because of their nutritive value but also they are very good source for bio-medically important active compounds. Many bioactive compounds from gastropods, cephalopods and bivalves exhibiting antitumor, anti-leukemic, anti-bacterial and anti-viral activities have been reported worldwide. The anti-bacterial activities of tentacle, ink and shell extracts of cephalopod- *Loligo duvauceli* was studied. The anti-bacterial assay was done against *Escherichia coli* and their zones of inhibition were studied after plating and incubation. The results have led us to continue further research for isolation and purification of the compounds responsible for their activity.

Keywords: Molluscs, Cephalopod, Anti-bacterial, *Loligo duvauceli*, *Escherichia coli*

INTRODUCTION

Marine environment constitutes about 70% of the earth's total surface. The marine ecosystem includes the shorelines, with mud flats, rocky and sandy shores, tide pools, barrier islands, estuaries, salt marshes, and mangrove forests making up the shoreline segment. Marine ecosystems support a great diversity of life and variety of habitats. The ocean is a major influence on weather and climate. Marine ecosystems are home to a host of different species ranging from planktonic organisms that form the base of marine food web to large marine mammals. Many species rely on marine ecosystems for both food and shelter from predators. Marine organisms are known for their high medicinal values [13].

Antimicrobial compounds are a major component of innate immunity and can be constitutively expressed and rapidly induced to provide a prompt response to invading microorganisms [14]. Oceans supply fish and other seafood that forms a major source of protein for us. They also provide seaweed and marine plants used for the manufacturing of food, chemicals, energy and construction materials. Molluscs are invertebrates; they constitute the largest phylum of all marine organisms of about 23% of recognized marine organisms. The three most universal features defining modern molluscs are a mantle with a significant cavity used for breathing and excretion, the presence of radula, and the structure of the nervous system. Molluscs are known for their multiple functioning organs. Molluscs have, for centuries, also been the source of important luxury goods, notable pearls, mother of pearl, Tyrian purple dye, and sea silk. Their shells have also been used as money in some preindustrial societies. They are being used as an important source of food in many countries. They are classified into 9-10 taxonomic classes.

Cephalopods are characterized by bilateral body symmetry, a prominent head, and a set of arms and tentacles modified from the primitive molluscan foot. Cephalopods have an ink sac, which can be used to expel a cloud of dark ink to confuse predators. This sac is a muscular bag which originated as an extension of the hind gut. It lies beneath the gut and opens into the anus, into which its contents almost pure melanin can be squirted; its proximity to the base of the funnel means the ink can be distributed by ejected water as the cephalopod uses its jet propulsion.

The ejected cloud of melanin is usually mixed, after expulsion, with mucus, produced elsewhere in the mantle, and therefore forms a thick cloud, resulting in visual impairment of the predator, like a smokescreen. Cephalopod Ink is a dark pigment released into water by most species of cephalopod, usually as an escape mechanism. All cephalopods, with the exception of the Nautilidae and the Cirrina, are able to release ink. Squid are cephalopods of the order Teuthida, which comprises around 300 species. Squid have a distinct head, bilateral symmetry, a mantle and arms like all other cephalopod. Squid, like cuttlefish have eight arms in pairs and two, usually longer, tentacles. Squid are strong swimmers and certain species can “fly” for short distance out of the water. The main body mass is enclosed in the mantle, which has a swimming fin along each side. These fins, unlike in other marine organisms, are not the main source of locomotion in most species. Proteins, found in squids, are extremely beneficial for the healthy functioning of the human body. Squids contain sufficient copper that fulfils the 90% of the body’s requirement. Copper, being a trace mineral, is essential for absorbing, storing and metabolizing iron and stimulating the formation of red blood cells [8, 12]

EXPERIMENTAL SECTION

For the antibacterial studies, *Loligo duvauceli* were collected from the Pattinapakkam landing centre, Chennai. The animals were cleaned and stored in defreezer.

1.1 Extraction:

Loligo duvauceli was dried, the tentacles were cut into small pieces and crushed in pestle and mortar into a homogenised mass and split into three portions. One was taken as crude extract; the second portion was blended with distilled water and the other with methanol (1:3 i.e three parts of methanol for one part of the homogenised mass). The species were cut open and the ink and shell were removed from the body. Ink was taken as a separate crude extract. A small portion of ink was diluted with distilled water and was taken as another sample for testing the activity. The shell were cut, dried and ground to fine powdered mass. The powdered mass was made into two extracts, one was mixed with methanol (1:3) and the other with distilled water. A small piece of the shell was used as control disc. All the five extracts namely, crude, tentacle-methanol, tentacle -distilled Water, shell-water, and shell-methanol were centrifuged at 12000rpm for 5minutes. The eppendorf containing the methanol extracts were opened for few hours to evaporate the methanol. [7]

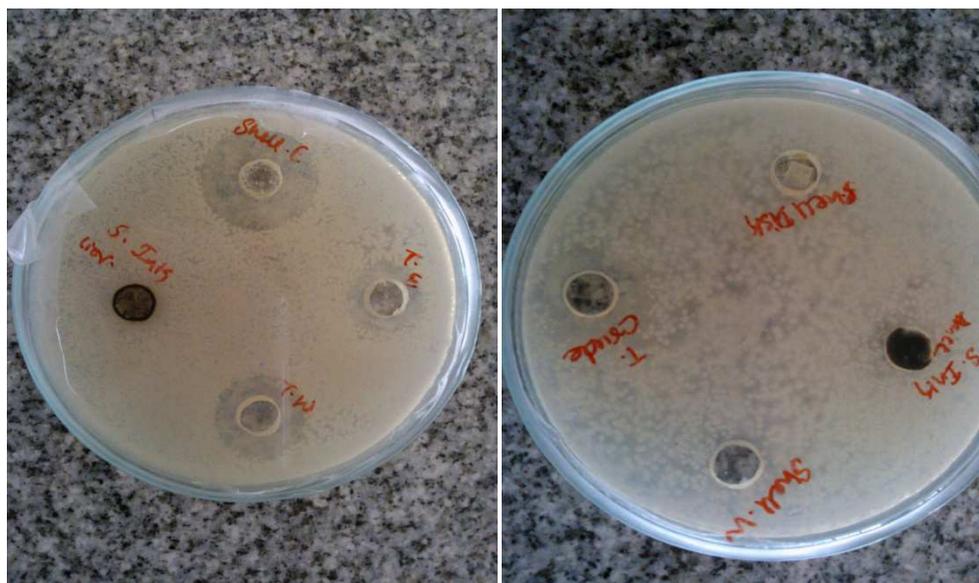
1.2 Anti-bacterial assay:

Antibacterial activity was tested for the extracts against *Escherichia coli*. A loop full of *E.coli* culture was taken and inoculated into the sterile nutrient broth and incubated at 37°C for 24hours. *E.coli* was swabbed on the surface of nutrient agar plates and the discs were impregnated with 100µl of supernatant from crude, tentacle-methanol, tentacle -distilled Water, shell-water, and shell-methanol, ink. Shell piece was used as a control disc for one plate. The plates were incubated at 37°C for 24hours and the antibacterial activity of the extracts were analysed based on the inhibition zones developed around the impregnation of extract discs. [7]

RESULTS

In the recent times, natural habitats are given a greater importance for their pharmacological potential as they do not cause any side effects. Lot of bioactive compounds have been and are being isolated from marine organisms. The anti-bacterial assay were carried out using disc diffusion method for the different body parts of *Loligo duvauceli* against bacterial pathogen *Escherichia coli* and it was seen that the crude extract of the tentacle, extracts of tentacle-water, tentacle-methanol and shell-methanol inhibited the activity of *Escherichia coli*, while the ink samples, shell disk, and shell water did not possess any activity. The zones of inhibition of the extracts are:

Crude tentacle - 0.55cm(diameter), tentacle water - 0.8cm(diameter), tentacle methanol - 0.6cm(diameter), shell methanol – 1cm(diameter)



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Shell.E- methanol extract of the shell, T.E- methanol extract of the tentacle, S. ink liq- diluted ink sample, T.W- distilled water extract of the tentacle, T.Crude- crude extract of the tentacle, S.ink thick- crude ink sample, Shell.W- distilled water extract of the shell, Shell disc- shell sample as control.

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