Anti-oxidant, Anti-bacterial and Anti-fungal properties of gelatin derived from earthworm, *Eudrilus eugeniae*

A.Sujithra Devi*, Nor Azwady Abd. Aziz*, Dr. Shuhaimi Mustafa #, Muskhazli Mustafa*
*Department of Biology; # Halal Product Research Institute
UNIVERSITI PUTRA MALAYSIA

INTRODUCTION

Earthworms are rich with high protein content. The crude protein in earthworms reaches about 70% of its total dry weight. The interest of culturing earthworms for its highly beneficial protein has found to be economically viable. Gelatin are known to be an expensive form of protein which is widely used in cosmeceutical industry. Earthworm body contains high amount of proteins with high content of fibrinolytic, anti-coagulative, anti-oxidant and anti-microbial peptides. The latest breakthrough in medical industry might come from earthworms due to the beneficial earthworm bioactive peptides with no previous study on earthworm collagen and gelatin. With the great demand of Halal and kosher market, an alternative high value gelatin can be derived from earthworms and its bioactivity characters poses as a significant precursor for earthworm gelatin to be used in cosmeceuticals.

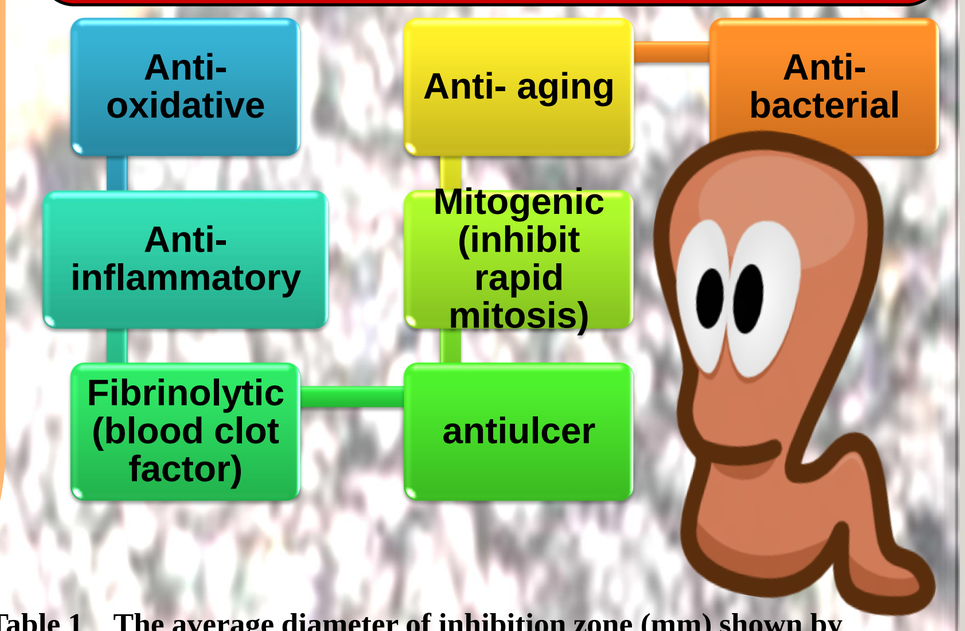
The finding suggests that earthworm gelatin extract shows antibacterial, antifungal and antioxidant activity. Earthworm, *Eudrilus eugeniae* gelatin extract generally possess almost similar activity as of its control showing anti-oxidant, anti-bacterial and anti-fungal inhibition rate of more than 50%. This suggests that the active biomolecule of *Eudrilus eugeniae* is soluble in aqueous solvents and has a different affinity to the solvents assayed. This opens up the efficacy of the gelatin extracts in dissolving cellular components. It can also be stated that in the production of water-soluble bioactive peptides, acid-alkaline processing of earthworm gelatin was more effective, thus releasing the peptides readily in the gelatin.

The antibiotic properties contained in the earthworm gelatin serves as a double action mechanism together with high anti-oxidant properties, making it more beneficial to be exploited as skin care medication. The package of gelatin quality obtained with the gel characters that was discussed previously is found to be therapeutically active, making it a good alternative to be explored in the field of medication especially in making of skin creams with its highly healing property, having antibiotic character and also found to be precursor for heart ailments and blood related diseases (Mihara et al., 1996).

Vermiculture is a unique technique of raising earthworms which is economically viable, environmentally sustainable and socially acceptable

Earthworms contain high amount of protein up to 70% of its dry weight which is commercially used as fish bait, animal feed and in vermicomposting

Earthworms proteins and enzymes can be used as treatments for various diseases and as cosmetic ingredients



OBJECTIVE

➢To test for anti-oxidant, anti-bacteria and anti-fungal properties of the earthworm gelatin to propose for use in cosmeceuticals.

RESULTS & DISCUSSIONS

➢Gelatin extracted from *Eudrilus eugeniae* showed more than 50% of inhibition towards DPPH
➢Average anti-oxidant property in gelatin of *Eudrilus eugeniae* was found to have an inhibition rate of 51.14±0.89% in comparison to the control used; Vitamin C.
➢IC_{50} value calculated for earthworm gelatine was found to be 0.46mg/ml.
➢The percentage of inhibition of earthworm gelatin towards bacteria was 75%
➢The fungicidal properties of earthworm gelatin towards fungal infection were 67%.

Table 1 The average diameter of inhibition zone (mm) shown by earthworm gelatine sample in comparison to antibiotics (mean ± SE)

Test	Sample	Average diameter of inhibition zone (mm)
Anti-bacterial	Eudrilus eugeniae gelatine	**18±0.97[a]**
	Ciproflaxin antibiotic	**22±0.02[a]**
Anti-fungal	Eudrilus eugeniae gelatine	**16±1.03[a]**
	Nystatin antibiotic	**24±0.01[b]**

➢Earthworm gelatine having more than 50% anti-oxidant level is indeed a good precursor for anti- oxidant compound that can be used to make wound healing medicines and skin creams.
➢Earthworm with antioxidant properties may be useful in encouraging its use as a free-radical scavenger, particularly when using as ingredient in cosmetic cream.
➢Bactericidal and fungicidal properties has been long used as precursors as a coating to wool-based materials especially in the making of wound healing biomaterials and in the drug delivery system.
➢The existence of unique enzymes gives an advantage to earthworm gelatin characters comparison with the widely used gelatins from bovine, porcine or even fish although they may possess larger quantities of gelatin.
➢The present results will form the basis for selection of earthworm species for further investigation in the potential discovery of new natural bioactive compounds for the commercial use in cosmetics and pharmaceutical industry.

Dr. SUJITHRA DEVI A/P ARUNAGIRI THEVA
Department of Biology
Faculty of Science,
Universiti Putra Malaysia,Malaysia

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