

A Comparative Study on the Curative and Regenerative Response of *Megascolex konkanensis* Towards Three Traditionally used Herbal Remedies

Roslin Varghese, Kumar Sai Sailesh, Ayana Joy, Mukkadan J K*

ABSTRACT

Background: To evaluate the wound healing efficacy of some plants in the regeneration of earthworms. The present study was taken up to compare the curative and regenerative responses of *Megascolex konkanensis* towards the phyto extracts prepared from *Ocimum sanctum*, *Curcuma longa* and *Scoparia dulcis*. **Objective:** To assess the wound healing property of three plant extract at different concentrations. **Materials and method:** During the period of study the collected earthworms were separated into 4 groups of 2 organisms each in the paper cups, labeled and kept safely. In the time of experiment the 55th segment of posterior clitellum of each earthworm was cut carefully with the help of scissors. **Result:** The day 9, the earthworms treated with *Scoparia dulcis* extracts started showing faster growth compared with *Ocimum sanctum*, *Curcuma longa*, and control. *Scoparia dulcis* extract caused significant greater wound healing property than other two phyto extracts. The overall observation depicts that the extracts significantly promoted the healing process, as evident by an increased rate of regeneration in worms treated with herbal extract, suggesting the possible utilization of this plant to enhance wound healing.

Key words: Wound healing, Earthworms, Plant extract, *Ocimum sanctum*, *Curcuma longa* and *Scoparia dulcis*.

INTRODUCTION

Regeneration is a process that occurs in every living organism in various extends, and it is required for growth, repair and maintenance of their regular functions. It is the process of renewal, restoration and growth. In animals, such as the planarian flat worms, the cells are sensitive and when they are wounded, they are activated and the cell regeneration process starts.

The Oligocheatan members are well known for tissue regeneration and extensively used for stem cell studies due to their extensive capacity for regeneration.¹ Regeneration was controlled by nervous system.² From the point of evolution earthworm is the highest evolutionary species and is capable of regeneration. They come under the phylum annelid and show the ability to regenerate posteriorly appears to be nearly universal in Annelids. The ability to regenerate anteriorly is common but less wide spread.¹

The ability of regeneration varies among earthworms. Some of them have the capacity to regenerate both anterior and posterior segments.³ Some species regenerate only in the posterior segments. In addition to their ability to regenerate body segments, have a marked capacity of wound healing.⁴

Several medicinal plants can play significant role in healing of wounds.⁵ Plant products are potential

agents for wound healing. Large number of plant extracts and their pastes are equally used in India for treatment of cuts, wounds and burns.⁶

Many herbal plants have a very important role in wound healing process because they promote their repair mechanism in the natural way; the healing process is measured by the assessment of wound contraction.⁷ The traditional Indian medicine- Ayurveda describes various herbs, fats, oils and minerals with anti -aging as well as wound healing properties.⁸

Taking all these factors into account the present study aims to compare the curative and regenerative responses of *Megascolex konkanensis* towards the three phyto extracts prepared from *Ocimum sanctum* (Tulsi), *Curcuma longa* (Turmeric) and *Scoparia dulcis* (Sweet Broom).

MATERIALS AND METHODS

Earthworms used for the present study was collected from Changanacherry, Kottayam District, Kerala during the month of August 2015. It was collected from a patch of uncultivated land. Care was taken to collect earthworms from uncontaminated soil. All the collections were made from 'Chass' Changnacherry. They were immediately transferred to a tray containing moist soil from the original site. From the

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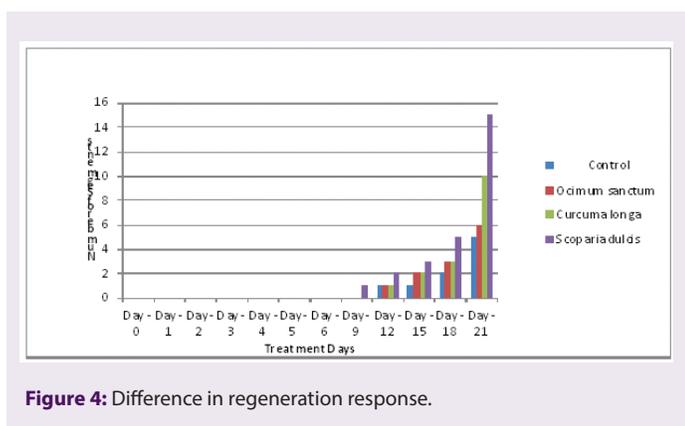
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Table 1: The difference in the regeneration response of earthworms during the period of study

Treatment Days	Control Distilled (Water)	<i>Ocimum sanctum</i> (Tulsi)	<i>Curcuma longa</i> (Turmeric)	<i>Scoparia dulcis</i> (Sweet Broom)
Day -0	Amputated	Amputated	Amputated	Amputated
Day -1	Inflammation	Inflammation	Inflammation	Inflammation
Day -2	Inflammation Subsides	Inflammation Subsides	Inflammation Subsides	Inflammation Subsides
Day -3	Remodeling Begin	Remodeling Begin	Remodeling Begin	Remodeling Begin
Day -4	Blastema Initiation	Blastema Initiation	Blastema Initiation	Blastema Initiation
Day -5	Blastema Initiation	Blastema Initiation	Blastema Initiation	Blastema Established
Day -6	Blastema Established	Blastema Established	Blastema Established	Blastema Established
Day -9	Blastema Established	Blastema Established	Blastema Established	1 st Segment
Day -12	1 st Segment	1 st Segment	1 st Segment	2 nd Segment
Day -15	1 st Segment	2 nd Segment	2 nd Segment	3 rd Segment
Day -18	2 nd Segment	3 rd Segment	3 rd Segment	5 th Segment
Day -21	5 th Segment	6 th Segment	10 th Segment	15 th Segment

**Figure 4:** Difference in regeneration response.

preliminary collection, the predominant species of earthworm was identified as *Megascolex konkanensis*.

For the present study three plants, traditionally used for wound healing in different communities were selected after a pilot survey conducted among local people. The three selected plants are *Ocimum sanctum* (Tulsi), *Curcuma longa* (Turmeric) and *Scoparia dulcis* (Sweet Broom) were also collected in the month of August. The leaves of Tulsi and Sweet Broom and rhizome of Turmeric were washed with distilled water; extracts were prepared and kept in an air tight bottle and refrigerated till use.

The earthworm were divided into 4 groups

1. Control
2. *Ocimum sanctum* extract
3. *Curcuma longa* extract
4. *Scoparia dulcis* extract

The posterior part of the earthworm on the 55th posterior clitella was cut. Cut end of earthworm was treated with each of plant extract by using filler every day morning. Observation was done in each three days interval. Appropriate aeration, water, atmosphere and humidity were provided for the regeneration of earthworm. The procedure was repeated and treated the worms with phyto extracts for obtaining expected result.

OBSERVATIONS

The changes observed during the study is given as follows.

RESULT

The study proves that the selected plant extracts plays a vital role in the process of regeneration as they showed marked difference in stimulating regeneration compared to the earthworms kept as control by treatment with distilled water.

DISCUSSION

Plant products promotes the repair mechanism in the natural way. Wound healing property of different plants were studied and reported by Jaiswal and Rajinder Raina conducted a study on the effects of phyto extracts on wound healing and reported that the plant extracts have immense potential for the management and treatment of wounds and are capable of inducing the regeneration of the lost tissue by multiple mechanisms.^{9,10}

Research has been shown that different plant extracts does possess anti microbial properties, and a study have shown that there is a co relation of the rate of wound healing and anti microbial properties have proven positive, and showed that prevention of entry of microbes into the wound does help to speed up the rate of natural wound healing. Plant extracts with anti microbial properties were used in this experiments, and hence the extracts used in this study would most likely yield similar results.

An experiment was conducted by Shetty to evaluate the wound healing effect of aqueous extract of *Ocimum sanctum* observed an increased percent of wound contraction.¹¹ A study conducted by Udupa on extract of leaves of *Ocimum sanctum* to test the property for normal wound healing and found that the extract increases the wound epithelializes fast and increase the wound breaking strength.¹²

A study conducted by Suman on Turmeric and reveals that the Turmeric can be administered to mammals, including humans, to promote wound healing and any type of wound on the outside surface of the body can be treated by it. Turmeric Curcumin may be good potential agents for wound healing in hunman.¹³ Studies conducted by Ediriweera shows that the decoction of *Scoparia dulcis* leaf is used as anti septic for washing wounds in wound healing *Scoparia dulcis* leaf is ground into a paste and applied on affected places to heal wounds.¹⁴

Ocimum sanctum commonly known as ‘Tulsi’ belongs to the family Labiatae is a well-known herb in Indian medicine possesses various therapeutic properties including healing properties including healing properties and Cytokine induction. Leaves, stem, flower, root, seeds and even whole plant used for skin diseases, wounds, arthritis, chronic fever, insect bite etc.¹⁵ It also has ulcer healing capacity.

Curcuma longa belonging to the family Zingiberaceae, commonly known as Turmeric. The parts used are rhizome and it contains curcumin, turmeric oil or turmerol and 1,7-bis,6-hepta-diene 3,5-dione possess anti – bacterial, anti-fungal and anti-inflammatory activities. It also contains protein, fat, vitamin A, B, C eta and all of which have an important role in wound healing and regeneration.⁸

Scoparia dulcis commonly known as Sweet Broom belongs to family Scropulariaceae. The whole plant in fusion is used as analgesic, anti-inflammatory. The decoction of the leaf is used as anti septic for washing wounds in wound healing.¹⁵

Although the wound treated with Tulsi, Turmeric and Sweet Broom did not differ from that of the control on first 6 days, the average regeneration rate was still superior to that of the control from day 21 onwards.

On days 1-6 of the experiment, no significant differences were observed on the visual evaluation of the wounds treated with Turmeric and Tulsi, relative to the control treatment. However, Sweet Broom extract treatment showed considerable difference in promoting the regeneration of segments from day 9 onwards, possibly because of its high anti-inflammatory and anti-bacterial activities. There are previous studies which proved that the whole plant in fusion is useful as analgesic and anti-inflammatory agent.

It is also noted that wounds treated with Sweet Broom did not significantly differ from those treated with Turmeric and Tulsi during the first 9 days and it shows that all the three traditionally used plants have similar wound healing properties during the initial wound healing stages like remodeling and blastema initiation, But on a later stage of regeneration, it was observed that sweet broom extract stimulated the segment formation and yielded significantly better results than those treated with Tulsi and Turmeric at the end of the treatment. It is to be inferred that the phyto extract of *Scoparia dulcis* (Sweet Broom) has more tissue restoration property as compared to the extracts *Ocimum sanctum* (Tulsi) and *Curcuma longa* (Turmeric). The final result obtained from the experiment show 5 that all the three traditionally used plants *Scoparia dulcis* (Sweet Broom), *Ocimum sanctum* (Tulsi) and *Curcuma longa* (Turmeric) has considerable benefits in wound healing and associated responses. Though Tulsi and Turmeric shows proven anti – bacterial and anti – inflammatory properties, a less studied plant *Scoparia dulcis* (Sweet Broom) which is better known in the traditional medicine for the treatment of kidney stones has significant regeneration and tissue restoration properties and deserve serious attention of researchers from related areas. In addition the study signifies the need of conservation of *Scoparia dulcis*, as this plant is disappearing from our localities in a faster rate. The finding of this study experimentally proved and justifies the use of this plant in traditional medicine for treatment of wounds.

CONCLUSION

The findings from the present work justify the wound healing activity of three phyto- extracts. Compared with the results obtained for Turmeric

and Tulsi, the extract of Sweet Broom showed superior regeneration properties. Effect of Sweet Broom is more apparent in the tissue restoration stages of wound healing. However, it is difficult to say which component of the extract is responsible for the wound healing activity and further phytochemical studies are required to isolate the active compound responsible for the activity.

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CONFLICT OF INTEREST

None

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PICTORIAL ABSTRACT

A comparative study on *Megascolex konkanensis*.



Megascolex konkanensis were divided into 4 groups and treated with distilled water, *Ocimum sanctum* extract, *Curcuma longa* extract, *Scoparia dulcis* extract.



To assess the curative and regenerative response of *Megascolex konkanensis* towards three traditionally used herbal remedies.



Scoparia dulcis showed superior regeneration properties.

SUMMARY

- 1. Curative and regenerative response of *Megascolex konkanensis* towards the phyto extracts.
- 2. Phyto extracts used are *Ocimum sanctum*, *Curcuma longa* and *Scoparia dulcis*.
- 3. *Megascolex konkanensis* separated into 4 groups of 2 organisms each in the paper cups.
- 4. Cut 55th segment of posterior clitellum of each *Megascolex konkanensis* and treated with phyto extracts.
- 5. 9th day onwards *Megascolex konkanensis* treated with *Scoparia dulcis* started showing faster curative and regenerative response.

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