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Proceedings

Comparative cytotoxic and growth inhibitory effects of the volatile oils of *Hyptis suaveolens*, *Ocimum basilicum* and *Ocimum gratissimum* leaves

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Abstract

Purpose: To determine the growth inhibitory and cytotoxic effect of volatile oils obtained from *Hyptis suaveolens*, *Ocimum basilicum* and *Ocimum gratissimum* leaves.
Methods: The VOs obtained from the three plants were examined for cytotoxicity (10 - 40 µg/mL) on tadpoles of *Ranniceps ranninus* and antiproliferative effects (1 – 30 mg/mL) using *Sorghum bicolor* seeds.
Results: All the VOs produced 100 % mortality on the tadpoles at 40 µg/mL. Concentration-dependent growth inhibition was observed with all the oils.
Conclusion: VOs of *Hyptis suaveolens*, *Ocimum. basilicum* and *Ocimum gratissimum* have cytotoxic and antiproliferative effects on rapidly growing cells as found in tumour-related ailments.

Keywords: Cytotoxicity, growth inhibitory, *Hyptis suaveolens*, *Ocimum basilicum* and *Ocimum gratissimum*

Indexing: Index Copernicus, African Index Medicus

Background

Search for medicinal plants having anti-tumor activity has become imperative due to the prevalence and poor prognosis of various types of cancer. Essential oils from some herbs and spices are said to possess cancer chemo-preventive activities [1] and are indicated in ethnomedicine as aiding in the treatment of tumor-related ailments.

Aim/Objectives

To determine the growth inhibitory and cytotoxic effect of volatile oils obtained from *Hyptis suaveolens*, *Ocimum basilicum* and *Ocimum gratissimum* leaves.

Materials and Methods

Volatile oils obtained separately from the three plant leaves using Clavenger-type apparatus were examined for cytotoxicity on tadpoles of *Ranniceps ranninu*s at 10 - 40 µg/mL and antiproliferative effects using guinea corn (*Sorghum bicolor*) seeds [2] at 1.0 - 30 mg/mL. All data were expressed as mean ± SEM and analysed with one way Analysis of Variance (ANOVA) using SPSS 21. $P< 0.05$ was regarded as significant

Results

All the oils produced 100 % mortality at 40 µg/mL in less than 24 h. *H. suaveolens* oil showed the highest cytotoxic activity with an LC50 of 8 µg/mL. LC50 of 15.8 and 25.2 µg/mL were obtained for *O. gratissimum* and *O. basilicum* oils respectively [Figure 1]. The oils

were observed to elicit concentration-dependent reductions in the length of the radicles that emerged from the guinea corn seeds treated with them.

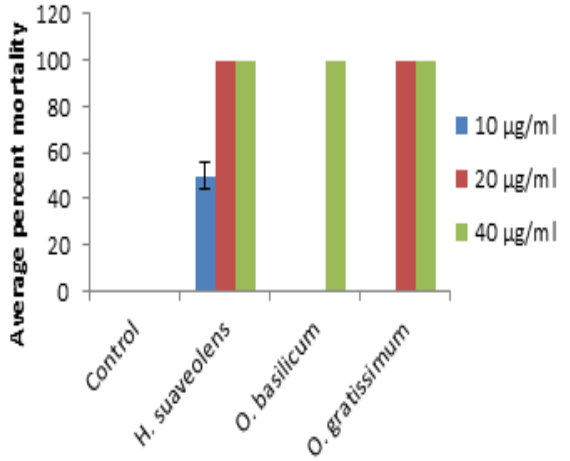

Figure 1: Cytotoxic effects of the essential oils of *Hyptis suaveolens*, *Ocimum gratissimum* and *Ocimum basilicum* leaves on tadpoles

At 96 h, 100 % growth inhibition was observed with *O. gratissimum* oil at 10 mg/mL [Figure 2] while 91.96 % and 52.98 % reductions were produced by *O. basilicum* [Figure 3] and *H. suaveolens* oils [Figure 4] respectively. The effects of the oils were observed to be significantly different from the controls ($P < 0.05$).

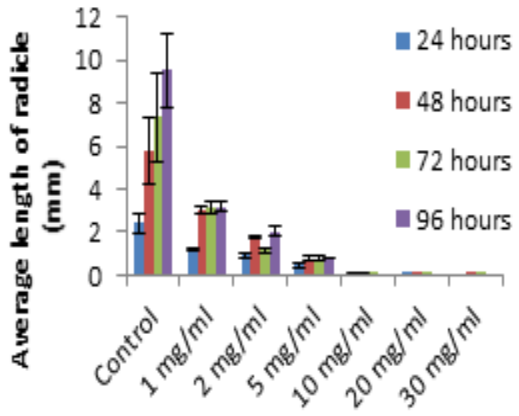

Figure 2: Inhibitory effects of the essential oil of *Ocimum gratissimum* leaves on length of *Sorghum bicolor* radicle

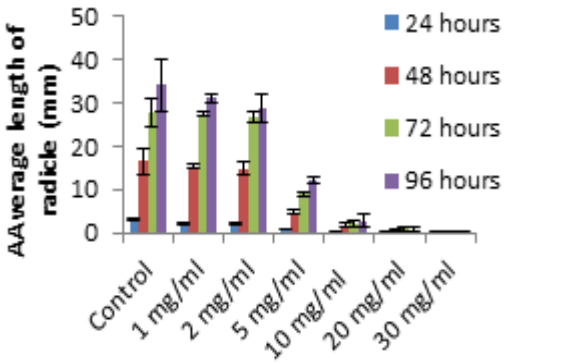

Figure 3: Inhibitory effects of the essential oil of *O. basilicum* leaves on length of *Sorghum bicolor* radicle

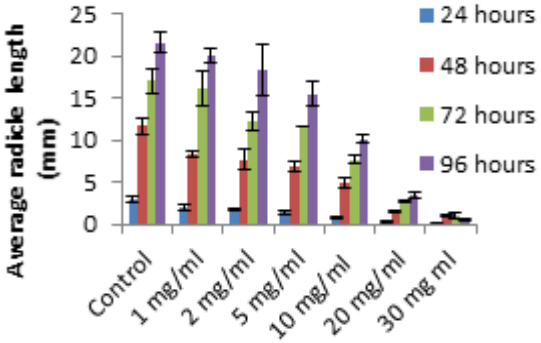

Figure 4: Inhibitory effects of the essential oil of *H. suaveolens* leaves on length of *Sorghum bicolor* radicle

Discussion

Various bench-top assays are used as indicators of potentially promising antitumor agents. These include radicles of germinating seeds, mortality of tadpoles, and lethality of extracts on Brine shrimp (*Artemia salina*) [3,4]. These methods are highly valued because they are simple, rapid, reproducible, and material and time saving. They can also be carried out in labs were appropriate human cell lines are not readily available.

Cancer cells are known to have highly proliferative capacities which explain the use of S. bicolor seeds whose meristematic cells are prone to proliferation under favourable conditions. The concentration dependent reduction in lengths of the treated radicles could have been due to an interference of some biochemical processes which could have affected the mitotic process in the developing radicle [2].

There are more than 100 distinct types and subtypes of cancer which can be found within specific organs [5]. These oils may be a potential source of natural anti-cancer compounds and

therefore play an important role in human health. More studies are currently in progress using cancer cell lines to further validate the findings of this work.

Conclusion

The results demonstrate that volatile oils from *H. suaveolens, O. basilicum* and *O. gratissimum* possess cytotoxic and antiproliferative activities and may have therapeutic value in the management of tumor-related ailments.

References

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