

Antiparasitic activity of TTO and its components against medically important ectoparasites: a systematic review

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Introduction

- Ectoparasites are pathogens that can infect the skin and cause pain, discomfort, and disease.
- Essential oils (EOs) have been used for centuries for ectoparasitic infestation treatment because of their antiparasitic, antibacterial, and/or anti-inflammatory properties.
- Only a few of EOs produce broad activity against a wide range of parasites, and tea tree oil (TTO), the EO obtained from *Melaleuca alternifolia*, is one of these rare EOs with potent and broad antiparasitic properties.

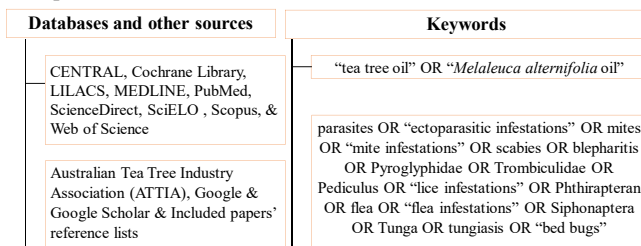
Study aim

- To assess preclinical and clinical studies investigating the antiparasitic activity of TTO and its components against *Demodex* mites, scabies mites, house dust mites, chigger mites, lice, fleas, and bed bugs.

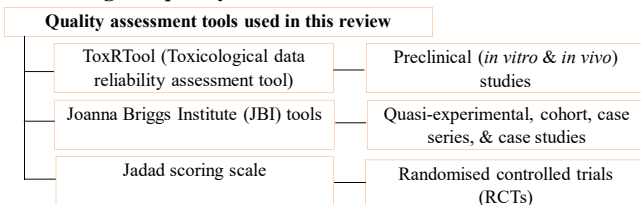
Methods

Databases and search strategy

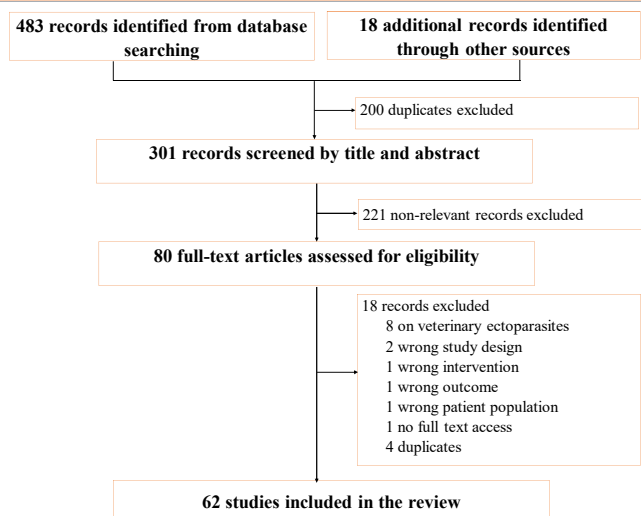
- Record searched from the following sources in any language from inception to 07 June 2021.



Methodological quality assessments



Results



Study design

In vitro (n=24)
In vitro/clinical (n=4)
In vivo (n=1)
In vivo/clinical (n=1)
Non-RCTs (n=21)
RCTs (n=12)

Publication language

English (n=61)
Mandarin (n=3)

Study setting

Europe (n=19)
Asia (n=18)
North America (n=12)
Australia & New Zealand (n=11)
Africa (n=2)

Ectoparasites studied

Demodex mites (n=35)
Scabies mites (n=5)
House dust mites (n=6)
Head lice (n=16)
Fleas (n=4)
Chigger mites, Sand fleas & Bed bugs (n=0)

Key findings

Quality assessment (Good quality)

In vitro & *In vivo* (65%)
RCTs (58%)
Non-RCTs (80%)

Adverse events (AEs, n=18)

No AEs (n=9)
Mild to Moderate skin irritation (n=9)

Treatment outcome for TTO and its components (1-100%)

Preclinical efficacy:
Lethal effect within 5 mins-3hrs
Clinical efficacy: Cure rate of 20-100%

Strength and Limitations

Strength

- To our knowledge, this is the first systematic review to comprehensively summarise all the preclinical and clinical studies exploring the antiparasitic activity of TTO and its components against mites, lice, and fleas.

Limitations

- Heterogeneity in the study designs, evaluation methods, outcome measures, and study periods precluded a meta-analysis.
- Most of the included clinical studies are non-RCTs, limiting the quality of reported findings.
- In vitro* studies, the difference in sources of TTO and the use of TTO with different contents of the main active components could have impacted the study results.

Conclusions

- The findings of this review reveal TTO and its components as the promising treatment option for ectoparasitic infestations caused by mites, lice, and fleas.
- The compelling *in vitro* activity of TTO against ectoparasites noted in this review seems to have translated well to the clinical environment.
- Still, further large-scale and high-quality RCTs can provide insight into a comparative advantage over the promising *Demodex*, head lice, and scabies interventions.
- We found no study investigating TTO and its components against bed bugs, chigger mites, and sand fleas. Given their promising activity against similar ectoparasites, this review alerts researchers to explore the potential use of TTO and its components as an alternative treatment for these parasites.

References

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