
IN-VITRO EVIDENCE OF ANTIFUNGAL ACTIVITY OF HOMOEOPATHIC PREPARATIONS AGAINST CANDIDA SPECIES: A NARRATIVE REVIEW

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ABSTRACT

Background: Candida species are important fungal organisms associated with superficial, mucosal and invasive candidiasis. Laboratory investigations have examined whether selected homoeopathic preparations show measurable antifungal activity against Candida.

Objective: To summarize and compare, in narrative form, the reported in-vitro evidence concerning homoeopathic medicines investigated against Candida species, with particular attention to author, year, organism, medicine, potency or preparation, laboratory method, comparator and reported outcome.

Selection criteria:

- Studies investigating Candida species as the test organism.
- Studies evaluating a homoeopathic medicine, mother tincture, combination, or potency.
- Studies using an in-vitro experimental design or summarizing in-vitro evidence.
- Studies reporting identifiable laboratory methodology and antifungal findings.

Studies reviewed (nine primary studies plus one contextual review):

- Prajapati et al. (2017),
- Gupta et al. (2015),
- Shinde et al. (2018),
- De Klerk (1998),

- Subramanian (2020),
- Ismail (2022),
- Sukraj (2022),
- Aparna et al. (2023),
- Anandu et al. (2023),
- Chandini and Saranya (2022) (a previously published systematic review of *Ocimum sanctum* preparations, included as contextual evidence only).

Methods: This is a narrative review. The studies were drawn from literature compiled by the authors; no systematic database search, duplicate screening or formal study-selection process was carried out. Study characteristics and reported findings were extracted and presented in comparative tables, and each result was compared descriptively with the control used in the same study where numerical control values were available. Because the studies differed substantially in medicines, preparations, *Candida* strains, assay systems and outcome measures, findings are presented narratively rather than pooled statistically.

Methodological appraisal: No formal risk-of-bias tool was applied. Reporting of key methodological features (randomization, blinding, controls, sample size/replication, standardization of preparation) was instead checked descriptively and was often incomplete, and controls, strains and laboratory methods varied between studies. The Shinde et al. article also uses different units in its text (mm) and table (cm). The findings should therefore be interpreted cautiously.

Results: The reviewed evidence includes mother tinctures, decimal preparations and centesimal potencies. Each result was read against its own control where one was reported. In Prajapati et al. (2017), *Syzygium jambolanum* Ø/Q gave the largest mean inhibition zone among seven mother tinctures (27.0 ± 3.81 mm); it and *Thuja occidentalis* Ø/Q (21.4 ± 1.52 mm) exceeded ketoconazole (20.0 ± 1.87 mm), whereas *Holarrhena antidysenterica* (7.0 $\pm$ 1.00 mm) was no larger than the 90% alcohol vehicle control (7.2 ± 0.84 mm). In Shinde et al. (2018), all ten medicines produced zones (5.5–9.0 mm) larger than the vehicle control (3.5 mm), and ten medicine-potency combinations were reported as MICs with 100% germ-tube inhibition. In Gupta et al. (2015), the rectified-spirit control gave 14 mm, and 7 of 12 medicines at 30C and 5 of 12 at 200C gave 14 mm or less, so an effect of the alcohol vehicle cannot be excluded for these; *Mezereum* (27 mm at 30C, 37 mm at 200C) was clearly above control but below ketoconazole (40 mm). De Klerk (1998) found *Calendula officinalis* D1 and D3 more inhibitory than D2 and D4, with nystatin more marked. *Kreosotum* and *Sepia*

exceeded placebo (0 mm); Sepia 200C exceeded Eucanazole, whereas Kreosotum and Sepia 30C did not. Activity was also reported for Hydrastis canadensis, Echinacea combinations and Punica granatum (for which tincture growth inhibition was reported to exceed that of the ethanol solvent and of the control antibiotic). The previously published Ocimum sanctum review (Chandini and Saranya) is presented as contextual evidence only.

Limitations:

- Studies were not identified through a systematic database search, and only a limited number were reviewed.
- The included studies differed in study design, methodology, homoeopathic medicines, potencies and outcome measures.
- All primary studies were in-vitro laboratory studies, so the findings cannot be directly generalized to clinical treatment in patients. Several sources were university dissertations or reports whose peer-review status could not be confirmed.
- The small number of available studies limited the possibility of performing a meta-analysis.
- Variations in experimental conditions may have affected the comparability of the results.
- Publication and reporting bias cannot be completely excluded.
- Several results were not clearly different from their own vehicle controls, so an effect of the alcohol vehicle cannot be excluded.
- Long-term clinical effectiveness and safety could not be assessed from in-vitro evidence.

Conclusion: The reviewed studies report measurable in-vitro antifungal activity for some homoeopathic preparations under their respective experimental conditions. However, several results were no larger than their vehicle controls, and heterogeneity and the exclusively laboratory-based nature of the evidence prevent direct quantitative comparison and do not establish clinical effectiveness in patients with candidiasis.

KEYWORDS: Candida; Candida albicans; antifungal activity; homoeopathy; mother tincture; potency; in-vitro study; MIC; inhibition zone; narrative review.

Abbreviations: Ø/Q, mother tincture; D, decimal potency; C, centesimal potency; M, millesimal potency; MIC, minimum inhibitory concentration; MFC, minimum fungicidal concentration.

INTRODUCTION

Candida is a genus of yeast associated with mucosal and systemic fungal infections. *Candida albicans* is frequently investigated in laboratory antifungal studies, while non-*albicans* species such as *C. auris*, *C. glabrata*, *C. tropicalis*, *C. parapsilosis*, *C. lusitanae* and *C. rugosa* are also represented in the reviewed studies.

The reviewed studies describe laboratory investigations using mother tinctures, combinations of mother tinctures, decimal potencies and centesimal potencies. Experimental approaches include disc or paper-disc diffusion, agar-well diffusion, microdilution, minimum inhibitory concentration (MIC), minimum fungicidal concentration (MFC), germ-tube inhibition and modified broth dilution.

The studies differ in intervention, preparation, strain, concentration or potency, comparator, assay conditions and outcome measures. Accordingly, inhibition zones or MIC-related observations from different studies should not be treated as equivalent effect measures.

AIM

To summarize and compare, in narrative form, the reported in-vitro antifungal activity of homoeopathic medicines against *Candida* species, interpreting each result against its own control where one was reported.

OBJECTIVES

- To identify the author and year of each included study or study group.
- To identify the *Candida* species or strains investigated.
- To document the homoeopathic medicine and potency or preparation used.
- To describe the experimental methods and comparator groups.
- To summarize the reported antifungal outcomes.
- To compare findings descriptively across studies, interpreting each result against its own control where one was reported.
- To identify methodological limitations and research gaps.

PICO FRAMEWORK

Component	Description
Population / Problem	<i>Candida albicans</i> or <i>Candida</i> species examined in laboratory experiments.
Intervention	Homoeopathic medicines in mother tincture, decimal or centesimal preparations, including selected combinations.
Comparator	Vehicle controls and conventional antifungal controls where reported, including ketoconazole, fluconazole, clotrimazole, Eucanazole, nystatin and a control antibiotic (Sukraj), as well as placebo where used.
Outcomes	Inhibition-zone diameter, MIC, MFC, germ-tube inhibition, growth inhibition and broth-dilution findings.

METHODS

Review design

This is a narrative review of in-vitro studies investigating the antifungal activity of homoeopathic medicines against *Candida* species. For each study, the medicine or preparation, *Candida* organism, laboratory method, comparator and antifungal outcome were recorded, and findings were synthesized qualitatively.

Source selection

Studies were drawn from literature compiled by the authors. No systematic database search, independent study-selection process or duplicate screening was conducted, so the review is not exhaustive and relevant studies may have been missed. One previously published systematic review (Chandini and Saranya, 2022) is summarized separately as contextual evidence; because it concerns *Ocimum sanctum* extracts and essential oils rather than specifically homoeopathic preparations, it is not counted among the primary studies.

Selection criteria

- Investigated *Candida* species as the test organism.
- Evaluated a homoeopathic medicine, mother tincture, combination or potency.
- Used an in-vitro experimental design or summarized in-vitro evidence.
- Reported identifiable laboratory methodology and antifungal findings.

Data extraction

Author/year, study design, *Candida* species or strain, medicine/intervention, potency or preparation, experimental method, comparator and reported antifungal outcome were extracted and organized into tables.

Data synthesis

Results were synthesized narratively. Meta-analysis was not attempted because the interventions, preparations, *Candida* strains, assay systems, controls and outcome measures were heterogeneous. Each result was compared descriptively with the control used in the same study where numerical control values were available (vehicle, placebo or conventional antifungal).

Appraisal approach

No formal risk-of-bias tool was applied. Each study was instead checked descriptively for reporting of:

- Randomization and allocation
- Blinding
- Use of appropriate controls/comparators
- Standardization of medicine preparation and experimental conditions
- Outcome measurement
- Sample size and replication
- Completeness of methodological reporting

Characteristics of Included Studies (Chandini and Saranya, 2022 is a contextual review, not a primary study)

Author / Year	Condition / Organism	Medicine / Intervention	Method	Main reported outcome	Replicates / n	Statistics / analysis	Blinding	Vehicle-matched (succussed) control
Prajapati et al., 2017	Candida albicans (MTC C 3017)	7 mother tinctures: Syzygium jambolanum, Ficus religiosa, Ocimum sanctum, Allium cepa, Thuja occidentalis, Holarrhena antidysenterica, Eucalyptus globulus	Paper-disc agar diffusion	Largest mean inhibition zone with Syzygium jambolanum: 27.0 $\pm$ 3.81 mm	NR	Mean $\pm$ SD reported; no statistical test reported	Not reported	Vehicle control reported; succussed status not reported
Shinde et al., 2018	C. albicans (NCI M-3557)	Azadirachta indica; Acidum Benzoicum; Acidum	Agar-well diffusion, MIC, germ-tube inhibition	Ten medicine-potency combinations reported as MICs;	MIC assay repeated 3 times; n for zones	Mean $\pm$ SD reported; no statistical test reported	Not reported	90% dispensing-alcohol vehicle and clotrimazole controls reported;

		Sulphuricum; Cinchona officinalis; Iodium; Phosphorus; Selenium; Sulphur; Zincum metallicum; Zingiber officinale	on and lysis study	100% germ-tube inhibition at the reported MIC; zones 5.5–9.0 mm (vehicle control 3.5 mm)	NR			succussed status not reported
De Klerk, 1998	C. albicans	Calendula officinalis D1-D4 in 20% ethanol	Disc diffusion and modified broth dilution	D1 and D3 more inhibitory than D2 and D4; Nystatin more marked	NR	D1/D3 more inhibitory; difference reported as not statistically significant	Not reported	20% ethanol vehicle described; succussed status not reported
Gupta et al., 2015	C. albicans	12 homeopathic medicines at 30C and 200C	Disc diffusion / inhibition-zone method	Mezereum: 27 mm at 30C and 37 mm at 200C; ketoconazole: 40 mm	NR	Inhibition-zone values reported; no statistical test reported	Not reported	Rectified spirit/distilled water controls; succussed status not reported
Subramanian, 2020	C. albicans and non-albicans Candida spp.	Hydrastis canadensis Ø/Q; Calendula officinalis Ø/Q; combination	Disc diffusion, microdilution and MFC	Inhibition reported with individual preparations and combination; fluconazole generally greater	NR	Inhibition/MFC reported; statistical analysis not reported	Not reported	Controls reported; vehicle-matching/succussion not specified
Ismail, 2022	Clinically	Echinacea	96-well microdilution	Most tested	NR	MIC/growth	Not	Controls reported;

	relevant Candida strains	purpurea Ø/Q + Echinacea angustifolia Ø/Q	lution / MIC	strains showed inhibition at 24 h; generally reduced at 48 h		inhibition reported; statistical analysis not reported	reported	vehicle- matching/s succussion not specified
Sukraj, 2022	25 clinical strains representing six Candida species	Punica granatum Ø/Q	96-well MIC method	Antifungal activity reported across tested Candida groups; growth inhibition higher than ethanol solvent alone and than the control antibiotic ; variation with time and dilution	NR	MIC/growth inhibition reported; statistical analysis not reported	Not reported	Ethanol solvent and control antibiotic reported; succussion not specified
Aparna et al., 2023	C. albicans / candidal infection	Kreosotum 30C and 200C	In-vitro antifungal assay	30C: 9 mm at 24 h and 10 mm at 48 h; 200C: 3 mm at both time points	NR	Inhibition-zone values at 24/48 h; statistical analysis not reported	Not reported	Placebo reported; vehicle- matching/s uccussion not specified
Anandu et al., 2023	C. albicans / candidal infection	Sepia 30C and 200C	In-vitro antifungal assay	30C: 6 mm at 24 h and 7 mm at 48 h; 200C: 9 mm at 24 h and 10 mm at 48 h	NR	Inhibition-zone values at 24/48 h; statistical analysis not reported	Not reported	Placebo reported; vehicle- matching/s uccussion not specified
Chandini and Saranya,	Candida species /	Ocimum sanctum extracts, essential	Systematic review of 8 in-	Anti- candidal activity reported	NR	Narrative synthesis of 8 studies;	Not reported	Varied by included study; vehicle-

2022	candidal infections	oils and combinations (herbal; not specifically homoeopathic; contextual only)	vitro studies	across preparations and species; some reported additive/synergistic effects		no pooled statistics	ed	matched/succussed control status not reported
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“NR” indicates not reported. Blinding of laboratory personnel and succession of vehicle controls were not stated in these studies and should not be inferred.

RESULTS

Prajapati et al. (2017): Mother Tinctures

Medicine	Preparation	Mean inhibition zone (mm)	Difference from vehicle control (mm)	Increase in zone diameter over 7 mm disc (%)*
Syzygium jambolanum	Ø/Q	27.0 ± 3.81	+19.8	285.7%
Thuja occidentalis	Ø/Q	21.4 ± 1.52	+14.2	205.7%
Allium cepa	Ø/Q	16.6 ± 2.41	+9.4	137.1%
Ficus religiosa	Ø/Q	13.8 ± 0.84	+6.6	97.1%
Eucalyptus globulus	Ø/Q	13.2 ± 1.30	+6.0	88.6%
Ocimum sanctum	Ø/Q	11.2 ± 1.48	+4.0	60.0%
Holarrhena antidysenterica	Ø/Q	7.0 ± 1.00	-0.2	0.0%
Ketoconazole	10 µg/ml	20.0 ± 1.87	+12.8	185.7%
Vehicle control	90% alcohol	7.2 ± 0.84	—	—

*Relative increase in zone diameter over the 7 mm disc: $(\text{zone} - 7 \text{ mm}) / 7 \text{ mm} \times 100$. This is not an inhibition percentage and is not calculated against the vehicle-control zone (7.2 ± 0.84 mm). The source table reports rounded values (e.g., 285%, 205%, 137%, 97%, 89%, 60% and 0%).

Syzygium jambolanum Ø/Q gave the largest mean inhibition zone among the tested mother tinctures. Syzygium and Thuja occidentalis exceeded the ketoconazole control (20.0 mm), whereas Holarrhena antidysenterica (7.0 mm, equal to the disc diameter) was no larger than the vehicle control (7.2 mm). Differences are descriptive; no statistical test was reported.

Shinde et al. (2018): Potency Screening, MIC and Germ-Tube Findings

Medicine	Reported potency	MIC	Germ-tube inhibition at MIC
Azadirachta indica	6C		100%
Acidum Benzoicum	12C		100%
Acidum Sulphuricum	6C		100%
Cinchona officinalis	12C		100%
Iodium	6C		100%
Phosphorus	6C		100%
Selenium	6C		100%
Sulphur	6C		100%
Zincum metallicum	30C		100%
Zingiber officinale	6C		100%
Clotrimazole (positive control)	—		23%
Dispensing alcohol 90% (vehicle control)	—		0%

Each medicine at its reported MIC inhibited germ-tube formation by 100%, compared with 23% for clotrimazole and 0% for the dispensing-alcohol vehicle. Zone-of-inhibition values for all potencies are given below. The article's text gives the zone range as 0.3–0.9 mm, whereas its table reports values in cm (the text's lower bound of 0.3 does not match the lowest tabulated value of 0.55 cm and could not be reconciled); because the wells were 3 mm in diameter, the table values are interpreted as cm and are shown here in mm.

Shinde et al. (2018): mean zone of inhibition by potency (mm)

Medicine	6C	12C	30C	200C	1M
Azadirachta indica	9.0	6.5	9.0	7.0	5.5
Acidum Benzoicum	6.0	6.0	6.0	8.0	5.5
Acidum Sulphuricum	8.5	7.5	7.0	6.5	7.0
Cinchona officinalis	8.5	9.0	7.5	7.5	6.5
Iodium	6.5	7.5	6.0	7.0	6.0
Phosphorus	6.0	8.0	7.0	9.0	6.5
Selenium	6.5	6.0	7.0	8.0	5.5
Sulphur	7.5	6.5	7.0	9.0	7.0
Zincum metallicum	6.0	7.5	6.0	8.5	7.0
Zingiber officinale	8.0	6.0	5.5	5.5	8.0

In the same assay the vehicle control (90% dispensing alcohol) gave 3.5 mm and clotrimazole (100 µg/ml) gave no zone. All medicine-potency values (5.5–9.0 mm) were larger than the vehicle control; no statistical test was reported.

De Klerk (1998): *Calendula officinalis*

Preparation	Reported finding
Calendula officinalis D1	More inhibitory than D2 and D4; among the more inhibitory preparations.
Calendula officinalis D2	Among the less inhibitory preparations.
Calendula officinalis D3	More inhibitory than D2 and D4; among the more inhibitory preparations.
Calendula officinalis D4	Among the less inhibitory preparations.
Nystatin	Produced a more marked effect than the Calendula preparations.

Gupta et al. (2015): 30C and 200C Medicines.

Medicine	30C (mm)	200C (mm)	30C: difference from rectified spirit (mm)	200C: difference from rectified spirit (mm)
Acidum Benzoicum	16	14	+2	0
Apis mellifica	14	14	0	0
Graphites	15	14	+1	0
Kali iodatum	13	25	−1	+11
Mezereum	27	37	+13	+23
Petroleum	13	14	−1	0
Sepia	14	16	0	+2
Silicea	14	16	0	+2
Sulphur	19	16	+5	+2
Sulphur iodatum	14	14	0	0
Tellurium	18	17	+4	+3
Thuja occidentalis	14	16	0	+2
Rectified spirit	14	14	—	—
Distilled water	12	12	−2	−2
Ketoconazole	40	40	+26	+26

Taking the rectified-spirit control (14 mm) as the comparator, Mezereum gave the largest zones (27 mm at 30C and 37 mm at 200C), followed by Kali iodatum 200C (25 mm); ketoconazole gave 40 mm. However, 7 of 12 medicines at 30C and 5 of 12 at 200C gave 14

mm or less, i.e. no larger than the spirit control (distilled water gave 12 mm), so for these preparations an effect of the alcohol vehicle cannot be separated from an effect of the medicine. No statistical test was reported.

Subramanian (2020)

Hydrastis canadensis Ø/Q, *Calendula officinalis* Ø/Q and their combination were investigated against *C. albicans* and several non-*albicans* *Candida* species using Kirby-Bauer disc diffusion, microdilution and MFC methods. Inhibition was reported with the individual preparations. The *Hydrastis* + *Calendula* complex showed notable reported zones against several non-*albicans* strains, including 19 mm for *C. lusitaniae*, 35 mm for *C. parapsilosis* and 17 mm for *C. rugosa*. In this study, fluconazole generally produced greater inhibition.

Ismail (2022)

A combination of *Echinacea purpurea* Ø/Q and *Echinacea angustifolia* Ø/Q was evaluated against clinically relevant *Candida* strains using 96-well microdilution. Most tested yeast strains showed inhibition at 24 hours, while inhibition generally decreased at 48 hours. One *C. auris* repeat did not show inhibition at 24 hours, illustrating variation between strains.

Sukraj (2022)

Punica granatum Ø/Q was investigated against 25 clinical *Candida* strains representing *C. albicans*, *C. auris*, *C. glabrata*, *C. lusitaniae*, *C. tropicalis* and *C. parapsilosis*. Using a 96-well MIC method with optical-density measurement, antifungal activity was reported across the tested *Candida* groups, with activity declining over time and with dilution. Growth inhibition with the tincture was reported to exceed that of the ethanol solvent alone and that of the control antibiotic.

Kreosotum and Sepia Studies (2023)

Study / Test substance	24 h inhibition zone	48 h inhibition zone
Aparna et al., 2023 – Kreosotum 30C	9 mm	10 mm
Aparna et al., 2023 – Kreosotum 200C	3 mm	3 mm
Aparna et al., 2023 – Eucanazole	10 mm	11 mm
Aparna et al., 2023 – Placebo	0 mm	0 mm
Anandu et al., 2023 – Sepia 30C	6 mm	7 mm
Anandu et al., 2023 – Sepia 200C	9 mm	10 mm
Anandu et al., 2023 – Eucanazole	8 mm	9 mm
Anandu et al., 2023 – Placebo	0 mm	0 mm

Placebo gave 0 mm in both studies, so every Kreosotum and Sepia value exceeded placebo. Against Eucanazole, Sepia 200C was larger (9 vs 8 mm at 24 h; 10 vs 9 mm at 48 h), whereas Kreosotum 30C and 200C and Sepia 30C were smaller.

Ocimum sanctum: Previously Published Systematic Review (2022)

Chandini and Saranya (2022) summarized eight in-vitro studies of *Ocimum sanctum* preparations. The review reports anti-candidal activity across multiple preparations and *Candida* species, with some studies reporting additive or synergistic effects with conventional antifungals. This is a secondary source, and its *Ocimum sanctum* extracts and essential oils are not specifically homoeopathic preparations; it is therefore presented for context and not counted among the primary studies.

Medicine-Wise Summary

Medicine Preparation /	Study	Candida tested	Reported outcome
Syzygium jambolanum Ø/Q	Prajapati et al., 2017	<i>C. albicans</i>	27.0 ± 3.81 mm mean inhibition zone (vehicle control 7.2 mm; ketoconazole 20.0 mm)
Thuja occidentalis Ø/Q	Prajapati et al., 2017	<i>C. albicans</i>	21.4 ± 1.52 mm (vehicle control 7.2 mm; ketoconazole 20.0 mm)
Allium cepa Ø/Q	Prajapati et al., 2017	<i>C. albicans</i>	16.6 ± 2.41 mm (vehicle control 7.2 mm; ketoconazole 20.0 mm)
Ten medicines, 6C–1M (Shinde et al.)	Shinde et al., 2018	<i>C. albicans</i>	Zones 5.5–9.0 mm (vehicle control 3.5 mm; clotrimazole no zone); MIC at 6C–30C with 100% germ-tube inhibition
Hydrastis canadensis Ø/Q	Subramanian, 2020	<i>C. albicans</i> + other <i>Candida</i> spp.	Inhibitory activity reported
Calendula officinalis Ø/Q	Subramanian, 2020	<i>C. albicans</i> + other <i>Candida</i> spp.	Inhibitory activity reported
Hydrastis + Calendula Ø/Q	Subramanian, 2020	<i>C. albicans</i> + non- <i>albicans</i> <i>Candida</i>	Notable inhibition against several strains
Echinacea purpurea Ø/Q + E. angustifolia Ø/Q	Ismail, 2022	<i>C. albicans</i> + other strains	Most tested strains inhibited at 24 h
Punica granatum Ø/Q	Sukraj, 2022	Six <i>Candida</i> species	Activity reported across tested strains; growth inhibition higher than ethanol solvent alone and than the control antibiotic

Calendula officinalis D1-D4	De Klerk, 1998	C. albicans	D1 and D3 more inhibitory than D2 and D4
Mezereum 30C/200C	Gupta et al., 2015	C. albicans	27 mm at 30C; 37 mm at 200C (rectified spirit 14 mm; ketoconazole 40 mm)
Kreosotum 30C/200C	Aparna et al., 2023	C. albicans	9/10 mm for 30C; 3/3 mm for 200C at 24/48 h (placebo 0 mm; Eucanazole 10/11 mm)
Sepia 30C/200C	Anandu et al., 2023	C. albicans	6/7 mm for 30C; 9/10 mm for 200C at 24/48 h (placebo 0 mm; Eucanazole 8/9 mm)
Ocimum sanctum preparations	Chandini and Saranya, 2022	Candida species	Activity reported across eight in-vitro studies

Comparison of Experimental Methods

Study	Laboratory method	Outcome measure	Comparator / control	Replicates / n	Statistics / analysis	Blinding	Vehicle-matched (succussed) control
Prajapati et al., 2017	Paper-disc agar diffusion	Inhibition-zone diameter	Ketoconazole; vehicle	NR	Not reported	Not reported	Vehicle reported; succussed status not reported
Shinde et al., 2018	Agar-well diffusion, MIC, germ-tube inhibition, lysis	Zone of inhibition; MIC; germ-tube inhibition	Clotrimazole; 90% dispensing-alcohol vehicle	MIC assay: 3 repeats	Mean $\pm$ SD; no statistical test reported	Not reported	Dispensing alcohol; succussed status not reported
De Klerk, 1998	Disc diffusion + modified broth dilution	Antifungal inhibition	Nystatin	NR	D1/D3 vs D2/D4 difference reported as not statistically significant	Not reported	20% ethanol vehicle; succussed status not reported
Gupta et al., 2015	Disc diffusion	Inhibition-zone diameter	Ketoconazole, rectified spirit, distilled water	NR	Not reported	Not reported	Rectified spirit and distilled water; succussed status not reported
Subramanian, 2020	Disc diffusion + microdilution	Inhibition / MFC	Fluconazole and controls	NR	Not reported	Not reported	Controls reported; succussed

	+ MFC						status not specified
Ismail, 2022	96-well microdilution	MIC / growth inhibition	Fluconazole and controls	NR	Not reported	Not reported	Controls reported; succussed status not specified
Sukraj, 2022	96-well MIC	Growth inhibition / MIC	Control antibiotic; ethanol solvent	NR	Not reported	Not reported	Ethanol solvent reported; succussed status not specified
Aparna et al., 2023	In-vitro antifungal assay	Inhibition-zone diameter	Eucanazole; placebo	NR	Not reported	Not reported	Placebo reported; succussed status not specified
Anandu et al., 2023	In-vitro antifungal assay	Inhibition-zone diameter	Eucanazole; placebo	NR	Not reported	Not reported	Placebo reported; succussed status not specified
Chandini and Saranya, 2022	Systematic review of in-vitro studies	Reported anti-candidal outcomes	Varied by included study	NR	Not applicable to review-level row	Not applicable	Varied by included study

METHODOLOGICAL APPRAISAL: FINDINGS

No formal risk-of-bias tool was applied. Descriptively, randomization, blinding, sample-size justification and replication were not consistently reported. Candida strains, preparations, experimental methods and controls also differed between studies. Shinde et al. (2018) described zone values in mm in the text but reported them in cm in the table. These features limit confidence in the findings, which should be interpreted cautiously.

QUALITATIVE SYNTHESIS

Across the reviewed studies, all study groups reported laboratory antifungal activity for at least some tested preparations. Activity must be judged against each study's own control, however. Some results were no larger than the vehicle control (*Holarrhena antidysenterica* in Prajapati et al.; 7 of 12 medicines at 30C and 5 of 12 at 200C in Gupta et al.), whereas others clearly exceeded it (*Syzygium* and *Thuja* in Prajapati et al.; *Mezereum* in Gupta et al.; all ten medicines in Shinde et al.). For the weaker results, an effect of the alcohol vehicle cannot be excluded. The magnitude of activity also cannot be compared directly across studies because

interventions, concentrations or potencies, *Candida* strains, culture conditions, controls and assay methods differed.

The findings do not demonstrate a consistent general relationship between homoeopathic potency and antifungal activity. For example, the *Kreosotum* study reported greater inhibition with 30C than 200C, whereas the *Sepia* study reported greater inhibition with 200C than 30C under its respective experimental conditions. The *Calendula* study reported D1 and D3 as more inhibitory than D2 and D4, although the difference between potencies was not statistically significant.

Similarly, inhibition-zone measurements from mother-tincture studies and MIC or germ-tube findings from other experiments represent different laboratory endpoints. They should therefore be interpreted within the experimental system in which they were obtained.

DISCUSSION

The combined evidence provides a broad laboratory overview of homoeopathic preparations investigated against *Candida*. Mother-tincture studies contribute inhibition-zone measurements across *C. albicans* and, in some cases, non-*albicans* species. Potency-screening studies contribute MIC and germ-tube observations. The *Calendula* study contributes both diffusion and broth-dilution observations, while the *Kreosotum* and *Sepia* studies provide time-specific potency comparisons.

Several studies used conventional antifungal comparators, and the picture is mixed. Nystatin (De Klerk) and fluconazole (Subramanian) were reported to produce more marked effects than the investigated preparations, and ketoconazole exceeded every preparation in Gupta et al. (40 mm against a maximum of 37 mm). In contrast, the *Syzygium jambolanum* and *Thuja occidentalis* mother tinctures (27.0 and 21.4 mm) exceeded ketoconazole (20.0 mm) in Prajapati et al.; *Sepia* 200C exceeded Eucanazole at both time points in Anandu et al., whereas Eucanazole exceeded *Kreosotum* and *Sepia* 30C; and in Shinde et al., clotrimazole produced no zone and 23% germ-tube inhibition, against 100% for the medicines at their MICs. The absence of any clotrimazole zone alongside 23% germ-tube inhibition is unusual and may reflect assay- or strain-related factors, so this comparison should be read cautiously. Sukraj reported greater growth inhibition with the tincture than with the control antibiotic. Comparator results are therefore study-specific, and no general ranking of homoeopathic preparations against conventional antifungals can be drawn.

Vehicle controls matter for interpretation because most of the preparations are alcohol-based. Where control values were available, several results were no larger than the vehicle

(Holarrhena in Prajapati et al.; 7 of 12 medicines at 30C and 5 of 12 at 200C in Gupta et al.), whereas others clearly exceeded it (Syzygium and Thuja in Prajapati et al.; Mezereum in Gupta et al.; all ten medicines in Shinde et al.). Sukraj reported greater growth inhibition with the tincture than with the ethanol solvent alone. None of the studies reported succussed vehicle controls, so an effect of the solvent cannot be fully separated from an effect of the medicine.

The evidence is also strain-dependent and method-dependent. Different *Candida* species or clinical isolates may respond differently, and experimental factors such as dilution, exposure time, vehicle, starting inoculum and assay technique may influence measured outcomes.

For applications concerning vulvovaginal, oral or invasive candidiasis, the laboratory findings should be distinguished from clinical treatment outcomes. The reviewed studies do not establish effectiveness, safety, optimal dose or treatment duration in human patients.

LIMITATIONS

- Studies were drawn from literature compiled by the authors, without a systematic database search, so relevant studies may have been missed.
- No PRISMA-style screening, independent study selection or duplicate review was performed; this is a narrative review, not a systematic review.
- All individual experimental evidence was laboratory-based; clinical effectiveness was not evaluated.
- The medicines, potencies or preparations, *Candida* strains, laboratory methods and outcome measures were heterogeneous.
- Different conventional antifungal comparators were used.
- Results cannot be pooled into a reliable single quantitative effect estimate.
- No formal risk-of-bias tool was applied; methodological reporting was appraised descriptively only.
- The findings do not establish clinical efficacy, safety, optimal dosage or treatment duration in humans.
- In Shinde et al., the units in the article's text (mm) and table (cm) disagree; the table values were interpreted as cm and are shown in mm; the lower bound of the range quoted in the text could not be reconciled with the table.
- Numerical control values were not extracted for all studies (De Klerk, Subramanian, Ismail, Sukraj, Chandini), so comparison with each study's own control could not be completed for these.

- Several sources (De Klerk, Subramanian, Ismail, Sukraj) are university dissertations, and the Aparna and Anandu reports could not be identified as peer-reviewed journal articles; peer-review status was not assessed, so results from these sources should be interpreted cautiously.
- Several results were not clearly different from their own vehicle controls (for example in Gupta et al.), and no study reported succussed vehicle controls.

RESEARCH GAPS

- Replication using standardized antifungal susceptibility methods.
- Consistent reporting of MIC, MFC and inhibition-zone outcomes.
- Use of larger numbers of clinically characterized *Candida* isolates.
- Species-specific investigations, particularly for non-albicans *Candida*.
- Standardization of medicine preparation, dilution and vehicle controls.
- Independent replication and reproducibility of laboratory findings.
- Mechanistic laboratory studies.
- Well-designed in-vivo studies where justified.
- Appropriately designed clinical studies before conclusions regarding therapeutic effectiveness are made.

CONCLUSION

The reviewed studies report measurable in-vitro antifungal activity of some homoeopathic preparations against *Candida albicans* or other *Candida* species. The evidence includes mother tinctures, decimal preparations and centesimal potencies and uses laboratory outcomes such as inhibition zones, MIC, MFC and germ-tube inhibition. Some preparations clearly exceeded their own controls (for example *Syzygium jambolanum* and *Thuja occidentalis* mother tinctures, *Mezereum*, and the medicines in Shinde et al.), but others were no larger than their vehicle controls (*Holarrhena antidysenterica*; many 30C and 200C medicines in Gupta et al.), and comparisons with conventional antifungals were mixed.

The reported activity varies according to the medicine, preparation or potency, *Candida* strain, exposure time and experimental method. The heterogeneity of the studies prevents direct quantitative comparison or reliable meta-analysis. Because the evidence is entirely laboratory-based, the findings cannot establish clinical effectiveness for candidiasis, including vulvovaginal candidiasis.

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