Fungicidal effects of homoeopathic medicines versus allopathic ketoconazole in Candida albicans

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Fungicidal effects of homoeopathic medicines versus allopathic ketoconazole in Candida albicans

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Abstract

Background: Candida albicans, accounts for more than 75% of all Candidal infections. Apart from its growing prevalence, it is also one of the most resistant strains against antifungal medication. Homoeopathy is an alternative to allopathic medication and has shown inhibiting fungal growth. Objective: This study was to determine effectiveness of homoeopathic tinctures and medications versus allopathic Ketoconazole in growth inhibition and fungicidal properties against in vitro cultures of C. albicans. Materials and Methods: Efficacy of five antifungal agents were tested for inhibiting fungal growth and their fungicidal properties on cultured C. albicans the agents tested were Eucalyptus globulus and Ocimum basilicum in essential oil form, Benzoic Acidum 30C and Kali iodatum 30C in tablet form, and compared with the effect of 100 mg Ketoconazole in powder form. Results: In the growth inhibition trial, O. basilicum had the largest zone of inhibition followed by E. globulus following. The ketoconazole group showed similar inhibition rates with Benzoic Acidum 30C, and Kali iodatum 30C showed more inhibition than Ketoconazole. The present data suggests that no individual agent had an effective fungicidal effect on C. albicans, only causing a minimal reduction on the surface in the fungal colony. Conclusion: Results indicate that essential oils O. basilicum and E. globulus were most effective in growth inhibition. However, both essential oil and homoeopathic treatment had limited fungicidal properties. This concludes that homoeopathic alternatives can be effective in preventing fungal infections but may be less effective in treatment of a fully developed C. albicans infection.

Keywords: Antifungal, Candida albicans, Essential oils, Fungicidal properties, In vitro inhibition

Introduction

Over one billion people have been impacted by fungal infections with various clinical manifestations, affecting hair, nails, and skin among other types. These infections can pose a threat by causing damage to organs. It has been reported that fungal disease mortality is similar to that of tuberculosis and is 3 times the malaria mortality. The rise of fungal infections in immunocompromised patients is a significant factor for the mortality of these cases, along with the acquired resistance of fungi to allopathic treatment. The severity of the infection varies by the fungi identified; some are mucocutaneous which target the mucosal membrane of the epidermis, and the other systemic fungi are life-threatening to immunosuppressed patients. Severe infections include invasive candidiasis, histoplasmosis, and aspergillosis which affect those with weakened immune systems by attacking blood flow and lung function. Immunocompromised patients are most susceptible, and at risk for fungal infection, these include patients suffering from AIDS, chemotherapy treatments, cystic fibrosis, and diabetes.

The number of estimated Candidal infections resulting in invasive candidiasis seems to be growing each year. Candidiasis is one of the most prominent forms of fungal disease, and also harbors a strain of the most anti-fungal resistant fungi: Candida albicans. There have been some studies conducted on Candidal infections obtained from human patients suffering from oral and vaginal candidiasis and the effects of homoeopathic treatment. Studies show that recurrent vulvovaginal candidiasis affects 75% of women...
at least once and is recurrent in 5-8% of women in prime reproductive years. [9] The most common strain responsible for vulvovaginal candidiasis is \textit{C. albicans}. [9]

A previous randomized trial of an oral regimen of fluconazole, a well-known conventional antifungal medication, showed a 50% relapse rate in patients after cessation of treatment. [9] Azole antifungals like the aforementioned Fluconazole are the primary treatment for several \textit{Candidal} infections; however, there are several studies and documentation of intrinsic and acquired resistance to azole antifungals among the \textit{Candida} genus. [7] Current antifungal drug limitations paired with the increased occurrence of systemic fungal infections and rapidly developed fungal resistance have raised awareness of the need of new drugs with novel mechanisms. [4] It has been demonstrated that although nosocomial \textit{Candidiasis} can behave such as minor epidemics with selection of virulent strains, and it is usually the commensal organisms of the body that are the initial infection source. [5] Usually, \textit{Candida} can live as a commensal organism in the body, being restricted from overgrowth by the hosts microflora, but when this microflora is disturbed such as the cases in antimicrobial or antifungal therapy there can be an increase in growth in the body. [5] This same study found that a select amount of homoeopathic drugs exhibited inhibitory properties on \textit{C. albicans} comparable to ketoconazole. [5]

This shows that although allopathic treatment still holds the maximum inhibition rate, homoeopathic drugs such as \textit{Acidum Benzoicum} and \textit{Kali Iodatum} 30C are comparable and effective in eradicating the fungal infection as well as inhibiting growth without risking development of resistance in the fungal strain.

Leading factors in raised incidences of fungal infections include excessive use of antimicrobial agents, immune system defects, and diseases that affect the human immune system. [9] Due to the recent rise in acquired drug resistance in fungal infections, researchers have been looking into alternatives for traditional allopathic -azole antifungal treatments such as peptide-based, [9] and plant-derived essential oil-based such as \textit{Eucalyptus globulus} and \textit{Ocimum basilicum}. [9,10]

The utilization of natural sources and treatments has been imperative in developing new active molecules with unique chemical skeletons and bioactivities. [4] There has been a considerable amount of success and advancement in the use of peptide-based antifungal therapy found in both plant and animal kingdoms. [3] These studies conducted on natural sources have resulted in the discovery of potent antifungals found in nature such as plants, marine products, and microorganisms. [4]

The use of plant-derived essential oils such as \textit{E. globulus} and \textit{O. basilicum} is growing in antifungal treatment. The fungicidal properties found in \textit{Basil} (\textit{O. basilicum}) oil have been studied \textit{in vitro} and showed that two chemotypes found in the essential oil link to its antifungal properties. [10] The chemotypes methyl chavicol and linalol were found to be equally effective in the same amount of quantity administered, reducing fungal growth by 78% 4 days post-inoculation. [10]

\textit{E. globulus} is a well-studied oil that shows fungicidal properties and is used in the treatment of other existing conditions such as diabetes mellitus. [11] A study on normal and diabetic rats, the antifungal properties of \textit{E. globulus} essential oil were tested using sixty normoglycemic male rats randomly divided into six groups. [11] Overall, the study found that essential oil administration accounted for a reduction of hyperglycemia, polydipsia, polyphagia, and \textit{Candidal} infection in the liver and kidneys. [11] Past research focused on a different species of \textit{Eucalyptus} but bore similar effects as the previously mentioned study. It tested the effects of \textit{Eucalyptus gomphocephala} on microbial infection, and looked at the epidemiology and toxicity. [9] The research concluded that \textit{E. gomphocephala} bore a significant amount of inhibitory properties on microbial agents. [9] Another study looked at the chemical composition of eight \textit{Eucalyptus} species harvested from various parts of Tunisia and their antimicrobial, antifungal, and antiviral activities. [12]

These studies provide precedence for a safer form of treatment than traditional oral and topical fungal treatments which can affect the liver and other organ systems. In addition, homoeopathic treatment and alternatives have been proven to be more cost-effective than traditional allopathic treatment, which is imperative with patient care to enable access to medical treatment. [13] This study expanded on previous studies of individual focus on homoeopathic alternatives and explored both the inhibitory growth rates and fungicidal effects on singular treatments between allopathic and homoeopathic medicine. It is hypothesized that essential oil and homoeopathic mother tincture treatments will exhibit measurable fungicidal effects that are equal to or greater than allopathic treatment on an existing \textit{C. albicans} infection. In addition, it is hypothesized that homoeopathic and mother tincture treatments will have a measurable growth inhibitory effect on the \textit{C. albicans} colony, aiding in preventative measures against fungal infections.

\textbf{MATERIALS AND METHODS}

\textbf{Model organism care and culturing}

\textit{C. albicans} was used as the model organism and was acquired from a commercial supplier (Carolina Biological Supply Company, Burlington, NC, # 155965). Sabouraud dextrose broth (SDB) \textit{(Sigma Aldrich, Saint Louis, MO, #S3306)} was made for culturing \textit{C. albicans} using Sigma-Aldrich protocol in a sterile hood. The fungal stock was added using an inoculating loop and swirled into the SDB Flask. The inoculated flask was incubated at 25 degrees for 7 days. Sabouraud dextrose agar (SDA) plates were prepared for running the experiments.

\textbf{Growth inhibition}

An individual analysis of each antifungal agent tested was conducted, including \textit{E. globulus} and \textit{O. basilicum} in essential oil form, \textit{Benzoic Acidum 30C} and \textit{Kali Iodatum 30C} in paste form, and 100 mg Ketoconazole in paste form.
Trial 1
The five agents were turned into an aqueous solution that was used to soak diffusion discs for 30 min. *Benzoicum Acidum 30C* and *Kali Iodatum 30C* were obtained in pellet/solid form were crushed using a mortar and pestle until completely pulverized, and then 1 mL of distilled water was added and mixed into a solution with a concentration of approximately 1 CFU/mL McFarland opacity concentration. Ketocanazole was acquired in powder form, so therefore it was measured out to 0.25 g and 300 uL of water was applied to create a solution. *E. globulus* and *O. basilicum* essential oils were acquired in aqueous form so 50 uL were simply pipetted out onto a weighing boat. One mL of the inoculated SDB broth was pipetted onto each of the prepared SDA plates and spread with an L spreader. The soaked discs were placed in the middle of the SDA plate and then the plate was turned. This was repeated for all 50 individual plates, 10 for each agent.

Fungicidal effect
All five agents were tested for their fungicidal efficacy on cultured *C. albicans*. with two different methods one with disc diffusion and another with pipetting the agent solution directly onto the cultured SDA. Concentrations of solutions were made using the same method and protocol as the agents used in the growth inhibition treatment, solutions were approximately 1 CFU/mL McFarland opacity concentration. For both protocols, 1 ml of the cultured SDB broth was added to the SDA plates. The plates were incubated at 25°C for 7 days to ensure optimal growth. This experiment was completed over approximately a month-long period.

Pipetting solution
Concentration solutions were prepared for each of the five agents. Then, 50 uL of each respective solution was pipetted onto the center of the SDA plate, and then the plate was flipped. They were then covered with parafilm to seal the plate and reduce risk of contamination. Plates were stored in a 25°C incubator for 7 days, being monitored 2 days after the start of the trial. It was noted that some diffusion discs had dislodged and were in other locations besides the initial center of the SDA plate. Concentrations of solutions were taken 2, 5, and 7 days post-treatment. Treatment was started again using the diffusion disc method being mounted on top of the already treated SDA plates, observations were taken again after 1, 2, 3, 6, and 7 days post-treatment. The plates were moved to room temperature storage from day 3 to day 7 post-treatment.

Data collection and analysis
Qualitative and quantitative data were collected. The qualitative assay of this experiment was measured by visual observation of the eradication of fungal colonies in the trials. Colonies of *C. albicans* were measured at the start of trial and then re-measured 2 days post-treatment. Quantitative data were collected by measuring size of fungal colonies using a vernier caliper and then analyzed using analysis of variance statistical analysis.

All measurements were taken in diameter × diameter, not excluding the diffusion disc which has a measurement of 5 mm × 5 mm (diameter × diameter). After the initial start of treatment when discs were applied simultaneously to the Sabaroud Dextrose Broth, measurements were taken the following day to provide details as to how the experiment was running.

Results
Growth inhibition
It was observed that *O. basilicum* showed a reaction with the fungi within 1 h and it had already begun to inhibit growth in large quantities, compared to other agents [Figure 1]. However, *O. basilicum* had a cloudy zone of inhibition [Figure 2]. During treatment set up it was recorded that on multiple incidents, *O. basilicum* showed corrosive properties to plastic, often corroding through plastic containers. It was also observed that ketocanazole did not harbor any results after 1 day. *E. globulus* also began to show a zone of inhibition, with a very clear area of inhibition, unlike *O. basilicum* [Figure 3]. *Benzoicum Acidum* and *Kali Iodatum 30C* did not show any results after 1 day. Observations and measurements were recorded 2 days after the start of the trial. It was noted that some diffusion discs had dislodged and were in other locations besides the initial center of the SDA plate [Figure 3]. *Benzoicum Acidum 30C* and *Kali Iodatum 30C* had shown inhibition after 2 days of testing, with *Benzoicum Acidum* showing more inhibition. *E. globulus* showed high inhibition zones, following behind *O. basilicum* which showed the largest zone of inhibition. Ketoconazole showed approximately the same results as *Benzoicum Acidum 30C* and *Kali Iodatum 30C*.

"Figure 1: Growth Inhibition Zone The effect of each treatment’s growth inhibitory properties was a measurement of the inhibition zone after 2 days of treatment in the agent solutions on the SDA plate. The diffusion disc measurement was 5mm and each separate treatment consisted of *Benzoicum Acidum*, *Eucalyptus globulus*, *Kali Iodatum 30C*, *Ketoconazole*, and *Ocimum basilicum* on *C. albicans*. Ketoconazole is used as positive control. The p-value is < .00001. The result is significant at p < .05."
**Fungicidal effect**

This experiment tested efficacy of all 5 agents efficacy in treating an already present fungal infection [Figure 4]. Observations were recorded 1 day after application of agents. *Kali Iodatum 30C*, *Benzoicum Acidum*, and *Ketoconazole* had a slight zone of impact; that is, there were only slight indentations in the fungal colony [Figure 2]. *E. globulus* and *O. basilicum* showed no inhibition [Figure 2], but *O. basilicum* showed corrosive properties that fused petri plates together, making it impossible to open up the plate for closer inspection. *O. basilicum* plates showed no inhibition but they did show an oily residue on the surface of the fungal colony that reflected light [Figure 2]. All agents showed no changes in fungicidal properties or decrease in size of fungal colonies. There was no change noted for any of the days observed in the repeated treatment. After being moved to room temperature also there were no results or changes observed.

**Discussion**

**Growth inhibition**

Results showed that the growth inhibitory properties of all agents used are valid, but some are more effective in inhibiting fungal growth than others. Results were noticed after only 1 day of disc application which accounts for the preventative properties of these agents. It was thought that the ketoconazole would have the most effective inhibitory characteristic and prevent growth altogether due to its use as an allopathic treatment in already cultured fungal infections. However, ketoconazole did not have either the largest nor clearest zone of inhibition. Similarly, *Benzoicum Acidum 30C* and *Kali Iodatum 30C* did not yield the most effective inhibitory properties, although it was thought that because they are a homoeopathic “drug” they would be clinically more efficient in preventing fungal growth. However, *Benzoicum Acidum* yielded the least results with the smallest zone of inhibition after being moved to room temperature also there were no results or changes observed.
and *Kali iodatum 30C* showed similar results with a small inhibition zone slightly larger than *Benzoicium Acidum*. The agents that excelled in this treatment were the essential oils derived from *E. globulus* and *O. basilicum*. *O. basilicum* had the largest inhibition zone by far, and in some cases the fungal growth was very miniscule and sparsely located throughout the rim of the petri dish. These results correlate well with the observations taken during the application phase, where *O. basilicum* was found to have corrosive properties, thus meaning that this was a harsh essential oil that could easily corrode plastic and should be able to inhibit fungal growth. Although *O. basilicum* had the largest zone of inhibition, it did not have the clearest. The clearest inhibition zone belonged to the *E. globulus* SDA plates, that were the 2nd largest zones and they showed absolutely no fungal growth or colonies inside their inhibition zone. Results indicate that the proposed hypothesis is accepted, and homoeopathic drugs and tinctures are efficient in inhibiting fungal growth. One must consider that the essential oils used in this study may disperse throughout the agar plate and lead to challenges in identifying clear inhibitory zone borders. Although the edges were undefined, there was a clear indent in the *C. albicans* colony which coincides with growth inhibitory properties.

**Fungicidal effects**

This experiment tested the efficacy of each agent as a treatment for an existing and prevalent fungal infection. The method of incubation used in this study slightly varied from the standard 12 day incubation period. The results of this trial showed that none of the agents held an ability to efficiently treat or eradicate fungal growth and colonies. Initially the pipetting method was used but when that reared no viable results, diffusion disc testing was used. It was interesting to see the change in results with the change of methodology, where the pipetting method was used, the essential oils bore no results and the homoeopathic drugs and allopathic medicine only created an indent in fungal colonies. This can be attributed to the higher quantity of solution that was distributed through the diffusion disc. When discs are used, the concentrated solution is kept to one specific location and thus can be more effective in treating it. In future studies, a 1 day incubation of fungal colonies could be used to provide clearer difference of results when compared to other studies in the field of homoeopathy.

The aforementioned experiments were conducted to provide a detailed observation in regards to the efficacy of homoeopathic treatments and their inhibitory and fungicidal properties of *Candidal* infections. The inhibitory experiment showed that homoeopathic substances, specifically plant derived oils were most effective in preventing fungal growth. Clinically, this is relevant because it shows that it can successfully prevent the growth of *C. albicans* and therefore minimize the risk for infections that can result in a plethora of complications such as invasive candidiasis. This is a cautionary treatment that can be conducted in the initial stages of fungal growth, and can prevent the chance of opportunistic fungal infections especially in immunocompromised patients. The fungicidal experiment was conducted to find a homoeopathic treatment as a substitute to drug resistant cases of *C. albicans* with recurrent exposure to azole treatments. This hypothesis was disproved by multiple methods of application, where not even homoeopathic drugs showed an effective treatment. The allopathic agent used also did not rear successful results, which calls for a re-evaluation and adjustment of protocol. The findings were consistent with previous research done on homoeopathic drugs *Kali iodatum 30C* which showed more growth inhibition than *Benzoicium Acidum 30C*. However, that study did not include mother tinctures; therefore, the results of this study vary so as to include those agents. *E. globulus* was found to have a larger zone of inhibition than that of *O. basilicum* in past research, but that is not consistent with the data compiled in this experiment.

**Conclusion**

Future research should include assessing the components of *E. globulus* and *O. basilicum* and attempt combination treatment for the most effective results. *E. globulus* was found to have a clearer zone of inhibition, but *O. basilicum* had the largest measurement therefore a combination may result in a more efficient treatment. Furthermore, a revision of the fungicidal treatment protocol is needed to provide more results and data. It may be possible that one dose of the medication is not sufficient to combat an already cultured and developed fungal colony.

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Nil.

**Conflicts of interest**

None declared.

**References**

Efectos fungicidas de los medicamentos homeopáticos versus ketoconazol allopático en Candida albicans

Fondo: Candida albicans, representa más del 75% de todas las infecciones por Candida. Aparte de su creciente prevalencia, también es una de las cepas más resistentes a los medicamentos antifúngicos. La homeopatía es una alternativa a la medicación allopática y ha demostrado inhibir el crecimiento de hongos. **Objetivo**: El propósito de este estudio fue para determinar la efectividad de las tinturas y medicamentos homeopáticos versus el ketoconazol allopático en la inhibición del crecimiento y las propiedades fungicidas contra cultivos in vitro de C. albicans. **Materiales y métodos**: Se probó la eficacia de cinco agentes antifúngicos para inhibir el crecimiento de hongos y sus propiedades fungicidas en C. albicans cultivados. Los agentes probados fueron Eucalyptus globulus y Ocimum basilicum en forma de aceite esencial, Benzoicum Acidum 30C y Kali Iodatum 30C en forma de tableta, y se comparó con el efecto de 100 mg de ketoconazol en forma de polvo. **Resultados**: En el ensayo de inhibición del crecimiento, O. basilicum tuvo la mayor zona de inhibición seguida por E. globulus. El grupo de ketoconazol mostró tasas de inhibición similares con Benzoicum Acidum 30C y Kali Iodatum 30C mostró más inhibición que el ketoconazol. Los datos actuales sugieren que ningún agente individual tuvo un efecto fungicida efectivo sobre C. albicans, causando solo una reducción mínima en la superficie de la colonia de hongos. **Conclusiones**: Los resultados indican que los aceites esenciales O. basilicum y E. globulus fueron más efectivos en la inhibición del crecimiento. Sin embargo, tanto el aceite esencial como el tratamiento homeopático tenían propiedades fungicidas limitadas. Esto concluye que las alternativas homeopáticas pueden ser efectivas para prevenir las infecciones por hongos, pero pueden ser menos eficaces en el tratamiento de una infección por C. albicans completamente desarrollada.

Fungizide Wirkung von homöopathischen Arzneimitteln gegenüber allopatischem Ketoconazol bei Candida albicans

Effets fongicides des médicaments homéopathiques par rapport au kétoconazole allopathique sur Candida albicans

Contexte: Candida albicans, représente plus de 75% de toutes les infections à Candida. Outre sa prévalence croissante, c’est également l’une des souches les plus résistantes aux médicaments antifongiques. L’homéopathie est une alternative aux médicaments allopathiques et a montré qu’elle inhibait la croissance fongique. **Objectif:** Cette étude visait à déterminer l’efficacité des teintures et des médicaments homéopathiques par rapport au Kétoconazole allopathique en termes d’inhibition de la croissance et de propriétés fongicides contre les cultures in vitro de C. albicans. **Matériaux et méthodes:** L’efficacité de cinq agents antifongiques a été testée pour inhiber la croissance fongique et leurs propriétés fongicides sur la culture de C. albicans ; les agents testés étaient Eucalyptus globulus et Ocimum basilicum sous forme d’huile essentielle, Benzoicum Acidum 30C et Kali Iodatum 30C sous forme de comprimés, et comparés à l’effet de 100 mg de Kétoconazole sous forme de poudre. **Résultats:** Dans l’essai d’inhibition de la croissance, O. basilicum présentait la plus grande zone d’inhibition, suivi de E. globulus. Le groupe kétoconazole a montré des taux d’inhibition similaires avec Benzoicum Acidum 30C, et Kali Iodatum 30C a montré plus d’inhibition que le kétoconazole. Les données actuelles suggèrent qu’aucun agent individuel n’a eu un effet fongicide efficace sur C. albicans, ne provoquant qu’une réduction minimale de la surface de la colonie fongique. **Conclusion:** Les résultats indiquent que les huiles essentielles O. basilicum et E. globulus étaient les plus efficaces dans l’inhibition de la croissance. Cependant, tant les huiles essentielles que le traitement homéopathique avaient des propriétés fongicides limitées. Ceci conclut que les alternatives homéopathiques peuvent être efficaces dans la prévention des infections fongiques mais peuvent être moins efficaces dans le traitement d’une infection C. albicans pleinement développée.
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\[\text{कैंडिडा एल्बिकान्स में एल्ट्रॉपैथिक कीटोकोक्सॉजॉल की तुलना में होम्योपैथिक दवाओं के फ़ंगीसाइडेल प्रभाव}\]

पूर्वभुमि: कैंडिडा एल्बिकान्स, सभी कैंडिडा संक्रमणं में से 75 प्रतिशत के लिए जिम्मेदार है। इसकी बढ़ती हुई मौजूदगी के अतिरिक्त, यह एंटीफंगल दवा के विरुद्ध अत्यधिक प्रतिरोधी स्ट्रेस में से एक है। एल्ट्रॉपैथिक दवा का एक विकल्प होम्योपैथिक है और इससे फंगल का अंतरांत्रिक विकास दर्शाया है।

उद्देश्य: यह अध्ययन का उद्देश्य सी.एल्ट्रॉपैथिक के बिना कल्चर के विरुद्ध फंगीसाइडेल विशेषताओं तथा अवरोधन विकास में एल्ट्रॉपैथिक कीटोकोक्सॉजॉल के बजाय होम्योपैथिक अपमिश्रणों तथा दवाओं की प्रभावित को निर्धारित करना था। सामग्री एवं प्रणालियों: कल्चर सी होम्योपैथिक पर उनके कैंडिडा संक्रमण एवं अंतरांत्रिक फंगल विकास हेतु पांच एंटीफंगल कर्मों की भावहृद्यता जांची गई थी। जो कर्मकांड जांचे गए थे वे इस प्रकार हैं: तालिका तैयार करने के लिए यूक्रेनिट्स ग्लोबुलस एवं ओक्सीबेसिलिक, टेबलेट रूप वें बेंजोइडम एमिडम 30 सी एवं गालिन ग्राबोंमेटम 30 सी, तथा पाउडर रूप में 100 एमिडम ग्राबोंमेटम प्रभाव के साथ तुलना की गई थी। परिणाम: अंतरांत्रिक विकास परीक्षण में, ओ.बेसिलिक के बाद अंतर के इलामेंट ग्लोबुलस का अंतरांत्रिक क्षेत्र सबसे बड़ा था। कीटोकोक्सॉजॉल समूह ने बेंजोइडम एमिडम 30सी के साथ समान अंतरांत्रिक दरं दर्शाई थी, तथा काली ग्राबोंमेटम 30सी ने कीटोकोक्सॉजॉल के मुकाबले ज्यादा अंतरांत्रिक दर्शाई थी। मौजूदा आंकड़े सुझाते हैं कि किसी भी विशिष्ट कर्मकांड का सी.होम्योपैथिक प्रभाव के साथ फंगीसाइडेल प्रभाव नहीं है, और यह केवल फंगल कोशिका की मदद पर ध्यान बहुत न्यूकीरण कर रहा है। निष्कर्ष: परिणाम दर्शाते हैं कि ओ.बेसिलिक एवं इलामेंट ग्लोबुलस जैसे आवश्यकता तथा अंतरांत्रिक विकास में सबसे प्रभावी थे। हालांकि, दोनों आवश्यक तथा एल्ट्रॉपैथिक उपचार के सीमित फंगीसाइडेल लक्षण हैं। अतः इस निष्कर्ष निकालता है कि फंगल संक्रमणों के मामलों में होम्योपैथिक विकल्प प्रभावी हो सकते हैं अगर पूर्णत: विस्तारित तो प्रभावमय संक्रमण एवं उपचार में शायद कम प्रभावी हों।