Anti-Candida Effect of Allium Sativum

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ABSTRACT

Introduction: Allium Sativum, commonly known as garlic, is a bulbous plant with hermaphrodite flowers, a species in the onion genus, Allium, native to central Asia. The objective of this study was to review Anti-Candida species effect of Allium Sativum.

Methods: This review article was carried out by searching studies in PubMed, Medline, Web of Science, and IranMedex databases. The initial search strategy identified about 98 references. In this study, 49 studies was accepted for further screening and met all our inclusion criteria [in English, full text, therapeutic effects of Allium Sativum and dated mainly from the year 1992 to 2016]. The search terms were “Allium Sativum”, “therapeutic properties”, “pharmacological effects”.

Result: the antimicrobial efficacy of AGE to be dose and time dependent, producing five distinct time-kill profiles among the isolates tested.

Conclusion: the results from this review showed that garlic is an Anti-Candida herb. It showed that Fresh garlic extract possess a greater influence than garlic powder extract. The results of this study support the use of garlic in health products and herbal remedies. Meanwhile, more clinical trials should be conducted to support its anti-candidia effects.

Keywords: Allium Sativum, Phytochemicals, Therapeutic effects, Pharmacognosy, Alternative and complementary medicine
INTRODUCTION

The history of herbal remedies in the treatment of many diseases dated back to ancient times [1-24]. Allium Sativum, commonly known as garlic, is a bulbous plant with hermaphrodite flowers, a species in the onion genus, Allium, native to central Asia. Its close relatives include the onion, shallot, leek, and chive. It has been used both as a food flavoring and as a traditional medicine. It grows up to 1.2 m in height. It is pollinated by bees and other insects. Garlic along with cinnamon possess food preservative and antimicrobial property. It possess anti-inflammatory [25], anti-cardiovascular [26], anti-cancer activities [27, 28], antibacterial effect [29], antioxidant [30, 31].

Chemical compound

Alliin, a sulfur-containing compound found in garlic. Fresh or crushed garlic yields the sulfur-containing compounds alliin, ajoene, diallyl polysulfide’s, vinylthiins, S-allylcysteine, and enzymes, saponins, flavonoids, and Maillard reaction products, which are not sulfur-containing compounds [32]. The composition of the bulbs is approximately 84.09% water, 13.38% organic matter, and 1.53% inorganic matter, while the leaves are 87.14% water, 11.27% organic matter, and 1.59% inorganic matter [33].

Allicin, along with its decomposition products diallyl disulfide and diallyl trisulfide, are major contributors to the characteristic odor of garlic, with other allicin-derived compounds, such as vinylthiins and ajoene [34]. Garlic's strong-smelling sulfur compounds are metabolized, forming allyl methyl sulfide. Allyl methyl sulfide (AMS) cannot be digested and is passed into the blood. It is carried to the lungs and the skin, where it is excreted. Since digestion takes several hours, and release of AMS several hours more, the effect of eating garlic may be present for a long time [35].

RESULTS

Candida albicans

The effect of aqueous garlic extract on the macromolecular synthesis of Candida albicans was studied. Protein and nucleic acid syntheses and their growth were prohibited to the same extent, but lipid synthesis was completely suppressed. Blockage of lipid synthesis is probably a major agent of the anticandidal activity of garlic [36].

The effect of diallyl sulphide (DAS) and diallyl disulphide (DADS) on secretion of hydrolytic enzymes and dimorphism has been researched. Minimum inhibitory concentration (MIC) of DADS and DAS was determined to be 500 μg/ml and 40 μg/ml, in respect. The result showed both DAS and DADS considerably avoid proteinase, phospholipase secretion and dimorphism in C. albicans. So, they have anti-candidial effect [37].

In an animal study, the anti-candidial effect of garlic extract (Allium Sativum L.) was studied. Administration of alcoholic extract of garlic reduced the hyperglycemia, polydipsia, and polyphagia and associated weight loss of streptozotocin-treated rats. Administration of garlic extract significantly reduced C. albicans concentrations in liver and kidneys homogenates in infected control and diabetic rats. It is concluded that garlic extract meliorates candidia infection in diabetic rats [38].

Effect of garlic extract on the morphology transformation of Candida albicans was investigated. Garlic and its bioactive components can inhibit hyphae production and able to affect the expression level of SIR2 gene. Hyphal production is an fundamental virulence determinative of C. albicans for invasive infections, thus garlic and its components can be efficient not
only for out-migrating C. albicans strains existing in mucosal infections, but virulent strains triggering systemic or invasive candidiasis as well [39].

Putative targets for allyl alcohol (AA) were investigated by monitoring changes in intracellular responses after exposure of C. albicans cells to AA or a commercially available garlic extract. Changes typical of oxidative stress--NADH oxidation and glutathione depletion, and increased reactive oxygen species were observed microscopically and by flow cytometry [40, 41].

Antibacterial activity of AGE was tested. Analysis revealed the antimicrobial efficacy of AGE to be dose and time dependent, producing five distinct time-kill profiles among the isolates tested. The results of this study support the use of garlic in health products and herbal remedies in Nigeria [42]. The antifungal activity of garlic oil against Candida albicans were assessed. C. albicans stress responses to garlic oil treatment was observed. a large number of proteins were downregulated, leading to remarkable cutting of the normal metabolism and physical action of C. albicans [43].

Reducing effect of oral garlic on vaginal candida during the second half of the menstrual cycle in asymptomatic women was assessed. No evidence of positive effect of garlic on vaginal candidiasis was observed. Further studies might investigate longer courses or topical formulations [44].

The effects of fresh and freeze-dried extracts of Allium Sativum on the physiology and morphology of Candida albicans was examined. Fresh garlic extract possesses a greater influence than garlic powder extract. The present opportunistic pathogen C. albicans is sentient to garlic; resistance to the wide insight of active principles present is unseemly so that its anticanidal effects possibly prepare a main substitute way to chemotherapy [45].

The influence of the yeast starter cultures Debaryomyces hansenii and Candida utilis on fermented meat aroma was studied in model minces and in commercial-type fermented sausages. A fungi static test of the garlic powder added to the sausages indicated that garlic inhibits the growth of the yeast starter cultures [46].

The effect of pre-incubation of either Candida or buccal epithelial cells (BEC) with different concentrations of aqueous garlic extract (AGE) was tested. No statistical significance in the adhesion of BEC collected 30 min after oral rinse with AGE and control BEC was observed. The diminished adherence of C. albicans to BEC after exposure to various concentrations of garlic may have clinical relevance [47].

The vaginal cream containing garlic and thyme is effective as much as clotrimazole vaginal cream for the treatment of candida vaginitis and there is no difference between responses to treatment by these two drugs [48,49].

**CONCLUSION**

The results from this review showed that garlic is an Anti-Candida herb. It showed that Fresh garlic extract possess a greater influence than garlic powder extract. The results of this study support the use of garlic in health products and herbal remedies. Meanwhile, more clinical trials should be conducted to support its anti-candidia effects.
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