Available online at www.scholarsresearchlibrary.com

Scholars Research Library

Der Pharmacia Lettre, 2017, 9 (4):163-168
(http://scholarsresearchlibrary.com/archive.html)

Der Pharmacia Lettre
Scholars Research Library
ISSN 0975-5071
USA CODEN: DPLEB4

Anti-Candida Effect of Allium Sativum

Mansoureh Masoudi[1], Rasoul Rahimi[2*],

[1]*MD in gynecology, Valiasr Eghlid hospital, Shiraz University of medical sciences, Shiraz, Iran*

2MD, Assistant professor of surgery, shahrekord university of medical sciences, shahrekord, Iran

***Corresponding author**: Rasoul Rahimi, MD, assistant professor of surgery, shahrekord university of medical sciences, shahrekord, Iran*

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 specie 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],anti-bacterial 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, vinyldithiins, *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 vinyldithiins 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 anticandidal 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.

REFERENCES

1. Miraj, S., A review of chemical components and pharmacological effects of Melissa officinalis L, Der Pharmacia Lettre, **2016.** 8 (6): p. 229-237.
2. Miraj, S. and Kiani, S., Study of pharmacological effect of Ocimum basilicum: A review. Der Pharmacia Lettre, **2016.** 8 (9) p. 276-280.
3. Miraj, S., Astragalus membranaceus : A review study of its anti-carcinoma activities, Der Pharmacia Lettre, **2016.** 8 (6):59-65.
4. Miraj, S., Study of pharmacological effect of Avena sativa: A review, Der Pharmacia Lettre, **2016.** 8 (9) p. 137-140.
5. S, MSK., Bioactivity of Sesamum indicum: A review study, Der Pharmacia Lettre, **2016.** 8(6) p.328-334.
6. Masoudi, M., Comparison of the Effects of Myrtus Communis L, Berberis Vulgaris and Metronidazole Vaginal Gel alone for the Treatment of Bacterial Vaginosis. Journal of clinical and diagnostic research: JCDR, **2016.** 10(3):QC04.
7. Miraj, S., Study of pharmacological effect of Thymus vulgaris: A review, Der Pharmacia Lettre, **2016.** 8(6) p.78-82.
8. Miraj, S., Pharmacological effect of Actiumlappa: A review study, Der Pharmacia Lettre, **2016.** 8(6) p.102-106.
9. Miraj, S., Astragalus membranaceus : A review study of its anti-carcinoma activities. Der Pharmacia Lettre, **2016.** p. 59-65.
10. Miraj, S., Study of therapeutic effects of Cynara scolymus L.: A review, Der Pharmacia Lettre, **2016.** 8(9) p.168-173
11. Miraj, S., A review study of therapeutic effects of Iranian borage (Echium amoenum Fisch), Der Pharmacia Lettre, **2016.** 8(6) p.102-109
12. Miraj, S., A review study of therapeutic effects of Salvia officinalis L. Der Pharmacia Lettre, **2016.** 8(6) p.299-303.
13. Miraj, S., Lack of Association between ESR1 and CYP1A1 Gene Polymorphisms and Susceptibility to Uterine Leiomyoma in Female Patients of Iranian Descent, Cell journal, **2016.** 16(2):225(9) p.137-140.
14. Seyyedi, F., Comparison of the Effects of Vaginal Royal Jelly and Vaginal Estrogen on Quality of Life, Sexual and Urinary Function in Postmenopausal Women. Journal of clinical and diagnostic research, JCDR, **2016.** 10(5) p.1-5.
15. Miraj, S., Pharmacological activities of Carum carvi L. Der Pharmacia Lettre, **2016.** p. 135-138.
16. Miraj, S., Study of antibacterial, antimycobacterial, antifungal, and antioxidant activities of Foeniculum vulgare: A review, Der Pharmacia Lettre, **2016.** 108-110.
17. Eftekhar, M., et al., The effect of luteal phase gonadotropin-releasing hormone antagonist administration on IVF outcomes in women at risk of OHSS, International journal of reproductive biomedicine (Yazd, Iran), **2016.** 14(8) p. 507-510.
18. Davar, R., Effect of adding human chorionic gonadotropin to frozen thawed embryo transfer cycles with history of thin endometrium, International journal of reproductive biomedicine (Yazd, Iran), **2016.** 14(1)p. 53-56.
19. Taghizade Mortezaee, F., Lack of Association between ESR1 and CYP1A1 Gene Polymorphisms and Susceptibility to Uterine Leiomyoma in Female Patients of Iranian Descent, Cell journal, **2014.** 16(2) p.225-30.
20. Miraj, S., Menstrual diseases as stated in canon fil-Tibb Der Pharmacia Lettre, **2016.** 8(6) p.261-268.

21. Miraj, S., Study of pharmacological effect of Mentha pulegium: A review, Der Pharmacia Lettre, **2016.** 8(9) p.242-245.
22. Jafari, A., the association of serum levels of folic acid and homocysteine in pregnant women with pre-elcampsia Iranian journal of obstetrics,gynecology and infertility, **2014.**
23. Davar, R., Effects of single dose GnRH agonist as luteal support on pregnancy outcome in frozen-thawed embryo transfer cycles: an RCT, Iranian journal of reproductive medicine, **2015.** 13(8) p.483.
24. Miraj, S., review of association between dietotherapy, dystemrament and prevention and treatment of diseases, Der Pharmacia lettre, **2016.**
25. Scott, Z., et al., Native Bee Diversity and Pollen Foraging Specificity in Cultivated Highbush Blueberry (Ericaceae: Vaccinium corymbosum) in Rhode Island. Environmental entomology, **2016.** 45(6) p.1432-1438.
26. Lopez, MD., Effect of climatic conditions and soil type on antioxidant compounds in organic and conventional blueberries (Vaccinium corymbosum L.), Planta medica, **2016.** 81(S 01) p.1-381.
27. Stull, AJ., Blueberries' Impact on Insulin Resistance and Glucose Intolerance. Antioxidants (Basel, Switzerland), **2016.** 5(4).
28. Gao, X., Overexpression of blueberry FLOWERING LOCUS T is associated with changes in the expression of phytohormone-related genes in blueberry plants. Horticulture research, **2016.** 3 p.16053.
29. Chu, W., Composition and morphology of cuticular wax in blueberry (Vaccinium spp.) fruits, Food chemistry, **2017.** 219, p.436-442.
30. Wang, H., Comparison of phytochemical profiles, antioxidant and cellular antioxidant activities of different varieties of blueberry (Vaccinium spp.), Food chemistry, **2017.** 217 p.773-81.
31. Silva, S., et al., Variation of anthocyanins and other major phenolic compounds throughout the ripening of four Portuguese blueberry (Vaccinium corymbosum L) cultivars, Natural product research, **2017.** 31(1) p.93-98.
32. Siddiq, M., Characterization of polyphenol oxidase from blueberry (Vaccinium corymbosum L.). Food chemistry, **2017.** 218 p.216-220.
33. Cheatham, CL., et al., Blueberry Consumption Affects Serum Uric Acid Concentrations in Older Adults in a Sex-Specific Manner. Antioxidants (Basel, Switzerland), **2016.** 5(4).
34. Zhan, W., et al., Effects of blueberries on migration, invasion, proliferation, the cell cycle and apoptosis in hepatocellular carcinoma cells. Biomed Rep. 2016;5(5):579-84.
35. Kanaya, N., et al., Whole blueberry powder inhibits metastasis of triple negative breast cancer in a xenograft mouse model through modulation of inflammatory cytokines, Nutrition and cancer, **2014.** 66(2) p.242-248.
36. Jeyabalan, J., Chemopreventive and therapeutic activity of dietary blueberry against estrogen-mediated breast cancer. Journal of agricultural and food chemistry, **2014.** 62(18) p.3963-3971.
37. Mak, KK. et al. Pterostilbene, a bioactive component of blueberries, suppresses the generation of breast cancer stem cells within tumor microenvironment and metastasis via modulating NF-kappaB/microRNA 448 circuit. Molecular nutrition & food research. **2013.** 57(7) p. 1123-1134.
38. Montales, MT., et al., Repression of mammosphere formation of human breast cancer cells by soy isoflavone genistein and blueberry polyphenolic acids suggests diet-mediated targeting of cancer stem-like/progenitor cells, Carcinogenesis, **2012.** 33(3), p. 652-660.
39. Adams, LS., Whole blueberry powder modulates the growth and metastasis of MDA-MB-231 triple negative breast tumors in nude mice,The Journal of nutrition, **2011.** 141(10) p. 1805-12.
40. Faria, A., et al., Blueberry anthocyanins and pyruvic acid adducts: anticancer properties in breast cancer cell lines, Phytotherapy research: PTR, **2010.** 24(12), p.1862-1869.

41. Adams, LS., Blueberry phytochemicals inhibit growth and metastatic potential of MDA-MB-231 breast cancer cells through modulation of the phosphatidylinositol 3-kinase pathway, Cancer research, **2010.** 70(9) p. 3594-3605.
42. Seeram, NP., et al., Blackberry, black raspberry, blueberry, cranberry, red raspberry, and strawberry extracts inhibit growth and stimulate apoptosis of human cancer cells in vitro, Journal of agricultural and food chemistry, **2006.** 54(25), 9329-9339.
43. McAnulty, LS., et al., Six weeks daily ingestion of whole blueberry powder increases natural killer cell counts and reduces arterial stiffness in sedentary males and females. Nutrition research (New York, NY), **2014.** 34(7) p.577-584.
44. Qi, C., (Blueberry anthocyanins induce G2/M cell cycle arrest and apoptosis of oral cancer KB cells through down-regulation methylation of p53). Yi chuan = Hereditas. **2014.** 36(6) p.566-573.
45. Bunee, A., et al., Anthocyanin determination in blueberry extracts from various cultivars and their antiproliferative and apoptotic properties in B16-F10 metastatic murine melanoma cells. Phytochemistry, **2013.** 95 p. 436-444.
46. Lee, CM., et al., BlueBerry Isolate, Pterostilbene, Functions as a Potential Anticancer Stem Cell Agent in Suppressing Irradiation-Mediated Enrichment of Hepatoma Stem Cells. Evidence-based complementary and alternative medicine: eCAM. **2013.** p. 258-425.
47. Tsuda, H., et al., Antioxidant Activities and Anti-Cancer Cell Proliferation Properties of Natsuhaze (Vaccinium oldhamii Miq.), Shashanbo (V. bracteatum Thunb.) and Blueberry Cultivars. Plants (Basel, Switzerland), **2013.** 2(1) p. 57-71.
48. Zu XY, Zhang ZY, Zhang XW, Yoshioka M, Yang YN, Li J. Anthocyanins extracted from Chinese blueberry (Vaccinium uliginosum L.) and its anticancer effects on DLD-1 and COLO205 cells. Chinese medical journal. **2010.** 123(19):2714-9.
49. Simmen, FA., Lack of efficacy of blueberry in nutritional prevention of azoxymethane-initiated cancers of rat small intestine and colon, BMC gastroenterology, **2009.** 9 p.67.