ABSTRACT : Ayurveda, the traditional medicine of India is catering to the health needs of the people since the early days of human civilization. Ayurveda is one of the leading medicinal sciences in this modern world. In traditional Chinese medicine, Islamic medicine, folklore medicine and the Ayurvedic system of medicine, several spices and herbs including garlic are described to possess medicinal properties. In China, garlic tea has long been recommended for fever, headache, and cholera. The present study was carried out with the objectives to check the antimicrobial effect of Allium sativum or garlic oil on some known strains of bacteria like Staphylococcus aureus, Propionibacterium acne, Escherichia coli, and Bacillus subtilis causing acne. We also compared the activity of Chinese variety of garlic with the local variety. Chinese variety was found to have more activity than the local variety. When oil was heated the activity was lost. The present study is a prerequisite step for using this oil in a cream base and to take the clinical trials.

Key words : Garlic oil, antibacterial activity, acne

INTRODUCTION:

Acne vulgaris is a chronic inflammatory skin disorder involving the pilosebaceous follicles, characterized by comedones, papules, pustules, cysts, nodules, and often scars, chiefly on the face, neck, and upper trunk. It is produced by hyperkeratosis, which retains keratin and sebum, and the main microorganisms involved are Propionibacterium acne (Williams, 2012) and staphylococci. As a family of skin disorders, acne is one of the most prevalent dermatologic diseases in the world. It usually affects almost everybody during the life (Scheinfeld, 2007).

The pathogenesis of the disease is complex but dependent on several factors including androgen-mediated stimulation of sebaceous gland activity, colonization of the bacterium P. acnes (an anaerobic bacterium as a normal constituent of the skin microbial flora), and inflammation (Toyoda and Morohashi, 2001). For many years, antibiotics have been used to treat Acne vulgaris. However, antibiotic resistance has been increasing in prevalence within the dermatologic setting (Swanson, 2003). To overcome the problem of antibiotic resistance, medicinal plants have been extensively studied as alternative treatments.

This in-vitro study was aimed at the antimicrobial effect of Allium sativum oil on some known strains of bacteria like Staphylococcus aureus, Propionibacterium acne, Escherichia coli, and Bacillus species. The comparative activity of Chinese variety and local variety was studied. Chinese variety was found to have more activity than the local variety and when oil was heated the activity was lost.

MATERIALS AND METHODS:

Media and chemicals used for growing organisms were Nutrient agar (Hi-Media pvt ltd.), Blood agar (Hi-Media pvt ltd.), Beef extract (Hi-Media pvt ltd.), Tryptone (Hi-Media pvt ltd.), NaCl (SRL), Agar (Hi-Media pvt ltd.), Methanol (SRL), Ether (SRL), Carbon tetrachloride (SRL), Iodine (SRL).

Preparation of Garlic Oil (Augusti K. T, 2005): Garlic bulbs were weighed, cleaned and sliced into small pieces. The pieces were grinded to make pest using mortar and pestle. Methanol is used for extraction. Enough methanol was added in such a way to keep paste fully immersed and kept in conical flask for overnight. The mixture was filtered with ordinary filter paper. The residues remained behind were further extracted with methanol and procedure was repeated to filtrate. Both the extracts were mixed. Methanol was allowed to evaporate and oil was collected. Oil was extracted thrice with diethyl ether and ether soluble fraction was collected. Ether was allowed to evaporate off on water bath and oil was collected.

Method used for screening the effect of garlic oil: The Agar Well method was used for checking the effect. Cultures were spreaded on the appropriate agar. By using cork borer wells were made and 0.1ml of oil sample was poured in the well. Then plates were kept for incubation, which were observed for zone formation due to effect of garlic oil. Zone was measured and compared with different samples like local variety garlic oil, Chinese variety garlic oil, commercial garlic oil and mixture of these.

TLC of garlic oil: The Solvent system used for separation of garlic oil was Carbon tetrachloride: Methanol: Water (60:30:3) and locating agent used was Iodine (Iodine chamber).

RESULTS AND DISCUSSION:

Garlic oil of both the varieties showed good inhibiting activity on all four organisms, which are main causative agents of acne. This shows that garlic oil can be used against the acne. Both the varieties are active on acne causing bacteria. When oil was heated the activity was lost. Chinese variety was showing more activity than the local variety. RF values of both Garlic varieties were obtained to be almost same with same band color. GC reports shows that the active compounds...
present are Allyl disulfide, Methyl allyl trisulfide, Allyl trisulfide, Allyl sulfide, and Diallyl tetrasulfide.

Fig. 1 Effect of garlic oil on *Propionibacterium acne*
Well No 1: Oil from Chinese variety (No clear zone)
Well No 3: Commercial garlic oil available in Ayurvedic shops (20 mm)
Well No 2: Oil from Chinese variety (22 mm but not clear)

Fig. 2 Effect of garlic oil on *Escherichia coli*
Well No 1: Oil from local variety (20 mm)
Well No 2: Oil from Chinese variety (22 mm but not clear)
Well No 3: Mixture of oils (25 mm)
Well No 4: Commercial oil (28 mm)

Fig. 3 Effect of garlic oil on *Staphylococcus aureus*
Well No 1: Oil from local variety (17 mm but not clear)
Well No 2: Oil from Chinese variety (25 mm)
Well No 3: Mixture of oils (25 mm)
Well No 4: Commercial oil (32 mm)

Fig. 4 Effect of garlic oil on *Bacillus subtilis*
Well no 1: Oil from Local variety. (17 mm but not clear)
Well no 2: Oil from Chinese variety. (30 mm)
Well no 3: Mixture of oils. (25 mm)

Fig. 5 Effect of garlic oil on Pus Sample
Well no1: Oil from gawthi variety. (20 mm but not clear)
Well no 2: Oil from Chinese variety. (23 mm)

Fig. 6 TLC of garlic oil from two different varieties
TLC of garlic oil local variety (Rf value 0.66)
TLC of garlic oil Chinese variety (Rf value 0.71)

Fig. 7 Gas chromatography report by (ALNAP Database Ref. ID: 8751)
1) Allyl disulfide (33.0%); 2) Methyl allyl trisulfide (1.5%); 3) Allyl trisulfide (57.8%); 4) Allyl sulfide (1.9%); 5) Diallyl tetrasulfide (1.5%) [All peaks confirmed by GC-MS].

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