SECTION 2

REVIEW

LITERATURE
Dermatophytoses consist a group of fungal infections, which involve keratinized tissue such as skin, hairs and nails. Dermatophytoses is the word used in order to differentiate it with Dermatophyte, which involve systemic mycosis. These Dermatophytes are fungi, which invade the keratinophilic tissue. Sabouraud 1910 classified them on the basis of clinical, cultural and microscopic characters. After words Langeron and Milo-chevitech (1930); Emmons (1934); George (1957); Ajello (1968) etc. have classified them on physiological, nutritional and morphological characteristics.

Several species of keratinophilic fungi has been isolated from soil. Most of these species are found to be parasitic on man and animals. *Trichophyton rubrum*, *Trichophyton mentagrophyte* and *Epidermophyton floccosum* has been found to cause infections of the foot like athlete’s foot or ringworm. *Trichophyton rubrum* and *Trichophyton mentagrophytes* have also been found to causes ringworm of the nails, disease called Onychomycosis. *Trichophyton rubrum* is often found frequently associated with the glabrous skin in the groin and on the covered surface specially under tight clothing at the waist. Species of *Trichophyton mentagrophyte* may at times be zoophilic which may cause ringworm of the beard or barber’s itch, the disease categorised as tinea barbae. *Trichophyton rubrum* may extend
over the body particularly to buttocks and waist area, the disease called dhobie itch. *Microsporum gypseum* has been reported to cause favus infection, which involves the scalp, and nails. *Trichophyton mentagrophyte* and *Microsporum gypseum* has also been reported on hairs and cause ringworm of the scalp.

White et al., 1950 isolated *Microsporum gypseum* from soil by baiting, in which they buried wool in the form of baits in the soil. Vanbreuseghem (1952) used hairs as bait in the soil. Stockdale (1964) used ‘hair bait’ method to induce ascomycetons state of dermatophyte. Neel & Emmons (1939) isolated dermatophyte from 93 of 354 employees in an industrial plant. Fuentes (1956) isolated *Microsporum nanum* from a lesion of the scalp of a boy, from the body of an adult and also swine.

Dermatophyte has also been reported to be associated with cellulitis and granuloma. Andrew J. Velazquez et al., 2002 reported preseptal cellulitis on right eyelid by *Trichophyton* to a ten year old healthy boy.

*Trichophyton* has also been found to develop dermatophyte granuloma in HIV-1 infected patient by Hadacek et al., 1999: Voisard. 1999 reported a case of dermatophytic granuloma by *Microsporum canis* in a heart lung recipient. Other persons have reported many such cases also.

A number of person have tried to investigate the antifungal activity of plant material against dermatophytes but no compiled
work so far has been done. Only few antibiotic substances have been available in the market, which cause after effects and are thus not safe for general use. Some of these antibiotics have already been referred in the introductory chapter. Some of the work on plant material that has so far been done is being given in the following text.

Boecker 1939; Brigg 1942; Osborn 1943; Haddleson 1944; Lucas 1944 reported antimicrobial activity of higher plants.

Scott et al., 1949 found that the leaves, stem and fruit skin of *Musa sapientum* inhibited the growth of *Trichophyton mentagrophyte*.

Lee and Chung, 1963 found inhibitory activity in ten medicinal plants against *Trichophyton rubrum*. Tetsuro et al., 1967 found the nut shell of *Juglans regia* toxic against *mentagrophyte*. Swarts and Medrik (1968) found corn berry juice fungitoxic against eight dermatophytes. Ahmad et al., 1973 found *Juglans regia* bark fungitoxic against *Microsporum gypseum*. Wollman et al., 1973 found *Pelargonium roseum* aerial part active against *Trichophyton mentagrophyte* in a dilution of 1:1000 dilution. Tansey and Appleton 1975 found the bulbs of *Allium sativum* active against *Microsporum gypseum* and *Trichophyton rubrum*. Mukharya and Dahia 1977 found root of *Plumbago* species active against *Microsporum gypseum*. Amer et al., 1980 found aqueous extract of *Allium sativum* toxic against *Microsporum gypseum*. *Trichophyton mentagrophyte* and *Trichophyton*

Dissalvo (1974) found that aqueous extract of *Baccharia glutinosa* leaves inhibited *Trichophyton mentagrophyte* and *Trichophyton rubrum*. Amer et al., (1980) found aqueous extract of *Allium sativum* toxic against *Microsporum gypseum*. *Trichophyton mentagrophyte* and *Trichophyton rubrum*. Kim & Kwang (1980) found aqueous extract of *Polygonum aviculare’s* leaves active against *Trichophyton mentagrophyte*. Dubey et al., (1982b) found aqueous extract (1:1 w/v) of *Citrus media* and *Erigeron bonariensis’s* leaves active against *Trichophyton*.
mentagrophyte. Fuzellier et al., 1982 found 5% that aqueous extract of Cassia alata’s leaves showed antifungal activity against dermatophyte. Prasad et al., 1982 found aqueous extract of Allium sativum at 1:10 concentration active against Microsporum canis. Which, they experimentally induced on rabbits. There was no side effect. Chun (1982) found aqueous extract of Allium sativum active against Trichophyton mentagrophyte and Trichophyton rubrum. Pandey et al., 1983 found that aqueous extract (1:1 w/v) of Ageratum houstonianum showed absolute inhibition of mycelial growth of Microsporum gypseum. Tripathi et al., 1983 showed toxicity of aqueous extract (1:1 w/v) of Iberis amara (seed) against Trichophyton mentagrophyte and Microsporum gypseum. Mall (1987) found aqueous extract of Eupatorium capillifolium and E. cannabinum leaves toxic against Microsporum gypseum, Trichophyton mentagrophyte and Trichophyton rubrum.

Hejtivanka et al., 1973 showed that the some workers used several extract of the plant materials like alcoholic extracts of cupressaceae family such as Thuyopsis dolabrata had the strongest activity against Trichophyton mentagrophyte and Trichophyton rubrum. Lalitha Kumari et al., 1965 found alcoholic extract of Areca catechu more efficacious against Trichophyton rubrum than its aqueous extract. Tripathi et al., (1978) found alcoholic extract of Inula racemosa’s root toxic to Microsporum canis and Trichophyton mentagrophyte. Bhatt & Saxena (1979) found extract in chloroform, acetone & alcohol Anagoissus leiocarpa seed to show toxicity against Microsporum
gypsum. Kuntze et al., 1979 found methanolic extract of Strobilanthes cusia (leaf) active against Trichophyton mentagrophyte. Khosa & Bhatia (1982) found alcoholic extract of Hypericum perforatum leaves toxic against some dermatophytes. Antonio et al., 1986 found alcoholic extract of fifty six species of higher plants active against dermatophytes.

Many workers have shown that the toxicity varied from one family of flowering plant to the other. Singh, 1987 reported strong fungitoxic activity of the family Meliaceae. Dixit and Tripathi, 1987 found strong antifungal toxicity in caesalpinaceae. Gilliver, 1947; Dixit, 1978; Singh et al., 1986 found strong fungicidal activity in Umbeliferae. Kishore et al., 1981 found Verbinaceae to be actively fungicidal. The fungicidal activity not only varies from one family to the other if also varies from plant to plant of the same family as already shown in the previous text. Even the fungitoxic substance vary from one part of the plant to other part within the same plant. Ahmed et al., 1973 found Juglan regia bark fungitoxic against Microsporum gypseum. Tansey and Appleton, 1975 found bulbs of Allium sativum active against Microsporum gypseum and Trichophyton rubrum. Mukharya and Dahia, 1977 found roots of Plembago species active against Microsporum gypseum. Chile et al., 1981 found the entire plant of Vinea rosca active against Trichophyton rubrum. In which leaves showed maxium activity. Similarly many workers like Singh, 1984, Rao & Rao, 1985; Tripathi, et al., 1988; 1990 etc. have found different parts of different plants fungicidal against dermatophytes. Fungitoxicity varied from one
genus to the other within the same family and also from one species to the other within the same genus as observed by Tripathi. 1980; Asthana, 1984 etc. Thus plants containing fungitoxicity are scattered throughout the flowering plant and their activity is not related to their taxonomic position. Even some parts of the same plant are more toxic than its other parts.

Many person have studied the antifungal activity of the oils extracted from the plants such as Chaturvedi, 1979; Grover & Rao 1979; Asthana et. al., 1982; Renu et. al., 1985; Kishore, 1985; Mall. 1987 etc. These have used oil after obtaining them from the plants. While others like Sharma & Singh 1979, tested the commercial oils for their fungitoxicity.

Various persons have tried determining the minimum inhibitory concentration of essential oils. Such as Pandey et. al., 1983 found 100 ppm. concentration of Ageratum haustoniaum oil to be MIC concentration against Microsporum gypseum. Singh et. al., 1986 found 900ppm concentration of Trachyspermum ammi against Trichophyton mentagrophyte.

Various persons have tried to findout the fungicidal or fungistatic nature of the oil. Pandey et. al., 1983 found Ageratum houstoniaum; Dubey 1981. Ocimum canum; Singh et. al., 1980 Cymbopogon martini oils to be fungistatic in nature while Pandey et. al., 1982; Kishore, 1985 exhibited fungicidal nature of some oils.
In-vivo investigations on toxicity of plant constituents against dermatophytes have also been studied. Vichkanova and Kuznetsova 1967 carried out preliminary investigations on essential oil of *Trapaeeolum majus*. They found it active against dermatophytes. Dixit *et al.*, 1990 found that essential oil of *Eupatorium cannabinum* and *E. capillifolium* in 1% ointment effective against experimentally induced ringworm on guinea pigs caused by *Microsporum gypseum*, *Trichophyton mentagrophyte* and *Trichophyton rubrum*.

Some workers have used plant materials to control various diseases. Steinhauer. 1993 found fungicidal activity of some compound from methanolic extracts of *Azadiracta indica*. Saraf *et al.*, 1991, 92 have found hair growth promoting activity of *Tridex procumbens* and have shown its hepatoprotective activity. Singh 1994 demonstrated the role of *Azadiracta indica* in common skin disorder in man. Kinungo *et al.*, 1992 have found it’s effect on the prolongation of clotting time of rabbit.

*Tinea capitis* is a common clinical pattern of dermatophyte infection observed predominantly in children. It is becoming a Public health problem in some countries due to increased incidence. (Labato M.N.; Vugia D.J; Frienden I.J., 1997 : 1999) (Skerkev *et al.*, 1996). Its aetiology varies according to the regions of the world. With *microsporum* species being one of the predominant pathogen in Europe. Mostly in the Mediterranean and some central European countries. This dermatophyte is
zoophic and is mainly acquired from infected animals (e.g. pets) but may also be transmitted by infected humans (Aly R. 1999).

Tinea capitis caused by Microsporum canis has been recognized as difficult to treat lower cure rates were achieved when compared with infections due to Trichophyton species (Krafchik, B. 1997). This may be in part due to the small spored ectothrix nature of the infection which makes it difficult for drugs to access.

Some reports have also indicated that Microsporum infections may require a longer duration of treatment to eradicate the infection compared with Trichophyton infections and that short-term terbinafine treatment is not associated with adequate cure rates (Hamm H. et al., 1999). (Dragos V.; Lunder M. 1997). However, the optimal treatment duration for Microsporum related Tinea capitis has never been determined clearly.

Onychomycosis and Tinea pedis are the most common fungal infections encountered by the podiatric physician. Fungal infections of the toes are not uncommon. With prevalence estimates in the population ranging from 6.5% to 13.7%. (Gupta A.K., Jain H., Lynde C.W., 2000) and (Elewski Be Charif M.A., 1997). Dermatophytes cause the majority of toenail onychomycosis. Onychomycosis may be the most common nail disorder in adults Gupta, A.K. et al., 1994.
Onychomycosis is a common infection in adults and accounts for 20% of all nail diseases. Approximately 30% of patients with dermatophyte infection on other parts of their body also have Tinea unguium, Onychomycosis affects toenails substantially more than fingernails. (Williams H.C., 1993).

The above review of literature shows that now-a-days dermatophytosis is spreading rapidly and is major concern the drugs available require a longer treatment and does not give adequate cure and the duration for treatment could not be properly determined. The potential for such treatment therefore lies in the Angiospermic plants as would be clear from the above text. Therefore, this work was undertaken to explore the possibility of a reliable treatment without any after effect.