Study of Relationship among Androgenic Hormones and Dermatophytosis Due to Microsporium Gypseum

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Abstract

The inhibitory effect exerted by steroid hormones on the in vitro growth characteristics of dermatophytes is poorly understood. As a hypothesis this inhibition could result from fungal adaptation to the human host. Therefore, in this study the susceptibility of microsporium gypseum to androgenic hormones was done. As a result, progesterone, testosterone, and estradiol proved to reduce fungal growth, whereas, hydrocortisone had no such effect. In general, microsporium gypseum were shown to be more susceptible to steroid hormones. However, since fungal response to hormones consisted of growth inhibition and occurred only at steroid concentrations much higher than present in human, it cannot be assumed to contribute to this adaptation.

Key words: androgenic hormones, Dermatophytosis, microsporium gypseum.

Introduction

Dermatophytosis is one of the dermal mycosis that results from the group of fungus actions in the keratinized tissue (such as hair, nail, and skin keratinized tissue) that called dermatophytes. Dermatophytes is a group of keratinophilic fungus that known from many years. Nowadays 41 species of dermatophytes were identified that totally divided into three geniuses (with notice to the asexual phase) with names microsporium, trichophyton, epidermophyton. Dermatophytosis is not contagious disease and probably specific agents in sufferance to this disease are effective. physical and chemical agents can be effective in reveals of dermatophytosis pathogenesis in human which some people are sensitive and some other are resistance and might be dermatophytes also shown difference susceptible against of this agent. Of physical effective agents can be refer to temperature, moisture and PH that have difference effects on several dermatophytes. Several chemical factors such as hormones, fatty acids and amino acids in skin can be effective in dermatophytes growth [5,6]. Androgen, also called androgenic hormone or testosterone, is the generic term for any natural or synthetic compound, usually a steroid hormone that stimulates or controls the development and maintenance of male characteristics in vertebrates by binding to androgen receptors. This includes the activity of the accessory male sex organs and development of male secondary sex characteristics. Androgens were first discovered in 1936 [2,8]. Androgens are also the original anabolic steroids and the precursor of all estrogens, the female sex hormones. The primary and most well-known androgen is testosterone. A subset of androgens, adrenal androgens, includes any of the 19-carbon steroids synthesized by the adrenal cortex, the outer portion of the adrenal gland (zonula reticularis—innermost region of the adrenal cortex).
that function as weak steroids or steroid precursors, including dehydroepiandrosterone (DHEA), dehydroepiandrosterone sulfate (DHEA-S), and androstenedione. Besides testosterone, other androgens include: first, Dehydroepiandrosterone (DHEA) which is a steroid hormone produced in the adrenal cortex from cholesterol. It is the primary precursor of natural estrogens [7]. DHEA is also called dehydroisoandrosterone or dehydroandrosterone. Second, Androstenedione (Andro) which is an androgenic steroid produced by the testes, adrenal cortex, and ovaries. While androstenediones are converted metabolically to testosterone and other androgens, they are also the parent structure of estrone. Use of androstenedione as an athletic or body building supplement has been banned by the International Olympic Committee as well as other sporting organizations. Third, Androstenediol is a steroid metabolite and act as main regulatory agent of gonadotropin secretion. Fourth, Androsterone which is a chemical by-product created during the breakdown of androgens, or derived from progesterone, that also exerts minor masculinising effects, but with one-seventh the intensity of testosterone. It is found in approximately equal amounts in the plasma and urine of both males and females. Fifth, Dihydrotestosterone (DHT) which is a metabolite of testosterone, and a more potent androgen than testosterone in that it binds more strongly to androgen receptors. It is produced in the adrenal cortex. Physiological mediators of human host that interfere with pathogenic fungi are of particular interest in clinical mycology. An example for such mediators is steroid hormones [1,5]. For this reason, we measured serum level of androgen hormones levels in dermatophytosis patients due to microsporum gypseum and in control group in order to determine the effects of sex hormones on dermatophytosis in vivo.

**Table 1**: Mean serum concentration of androgenic hormones in dermatophytosis patients and in healthy individuals

<table>
<thead>
<tr>
<th>Groups</th>
<th>Androgenic hormones serum concentration (mean ±SD)</th>
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<tbody>
<tr>
<td></td>
<td>Testosterone</td>
</tr>
<tr>
<td>Microsporum gypseum</td>
<td>4.86 ±1.63</td>
</tr>
<tr>
<td>Control group</td>
<td>6.50 ±1.82</td>
</tr>
</tbody>
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**Discussion:**

Our results shown that progesterone, testosterone, androstadiol proved to reduce fungal growth, whereas, hydrocortisone had no such effect. In one study carried out by Hashemi and Sarasgani, [5], revealed that testosterone level of serum in patients with dermatophytosis due to E. floccosum without androgenic disorder was significantly lower than those of normal individuals. That is compatible with our research results. In one other study were done by Jochen Brasch and Dagmar Gottschalk. 1992, obtained that in agar dilution assays progesterone, testosterone and androstadiol proved to reduce fungal growth, whereas hydrocortisone had no such effect. That is compatible with our research results. Androgenic hormones are present within the pilosebaceous units of human skin have different inhibitory effects on the growth of some dermatophytes [3]. On the other hand these hormones are metabolized within human follicular tissue, therefore it may be speculated that they might

**Materials and Methods**

After examination by dermatologists the patients were admitted to the Sina hospital, Tabriz, Iran. The patients were sampled by the scraping of lesions. None of them had taken antifungal agent at least 20 days before sampling. All specimens were examined by KOH 10% and cultured on sabouraud dextrose agar containing cyclohexamide and chloramphenicol. A blood sample was also taking from each patient with dermatophytosis due to microsporum gypseum as well as control group. The sera was dispersed immediately and then frozen at -20°C in order to keep the serum stability. After the sampling, the frozen sera were defrosted and the levels of androgenic hormones were measured in both groups by means of the enzyme linked immunosorbentassay (ELISA) method. Commercially available kits from DRG international, Ins. (New York, N.K., USA) were used. The serum hormone levels of all groups were compared using student’s T test. P values<0.05 were considered significant statistical analysis was done by SPSS software, version 8 [5].

**Results:**

The patient group comprised of 50 patients, 30-45 years old with confirmed dermatophytosis caused by microsporum gypseum. The control group consisted of 30 age matched male volunteers with no previous history of dermatophytosis. The serum concentration of the tested hormones is shown in Table 1. Our results show that progesterone, testosterone, androstadiol proved to reduce fungal growth, whereas, hydrocortisone had no such effect.
influence the colonization of hair follicles by dermatophytes [4]. Thus, can concluding that androgenic hormones have inhibitory effects on Dermatophytosis due to Microsporum gypseum.

References