Identification of the Etiological Agents of Onychomycosis in Tehran (2011-2012)

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Abstract: Onychomycosis is one of the most common causes of dystrophycation of nails and comprises 30-50 % of nail diseases and is created by yeasts dermatophytes and saprophytic molds. Aim of this study was investigation of frequency of fungal agents in dystrophic nails of referring persons to mycology laboratory of Razi hospital in Tehran. This was a cross sectional study that was performed on 700 patients with dystrophic nails who were introduced to the laboratory. Sampling was carried out by non-probability and in access. Specimens were investigated by direct microscopic observation, culturing and if necessary complementary examinations. Relationship between variations deliberated by chi- square and fisher exact tests. Out of 700 introduced individuals with dystrophic nails 183 persons were contracted to onychomycosis, 104(56.8%) female and 79 (43.1%) males and more of them (31.1%) in the range of 50-59 of age wise. most of contracted persons were house holding women with distal subungual onychomycosis form (60.4 %).Yeasts with 110 cases (55.8%) and among them candida Albicans (42.7 %) were the most common etiologic agents of onychomycosis that were more often isolated from finger nails. Dermatophytes with 53 cases (26.9%) were more often isolated from toe nails and tiichophyton interdigital with (39.6 %) was the most common of them. 34 cases (17.3%) of saprophytic moulds and more often from toe nails were isolated and most common of them was aspergillus flavus. yeasts are most common causes of onychomycosis and more affection of house holding women to them probably is because of more contact of them to water and detergent that prepare background for affection to it.
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1. Introduction

Onychomycosis is the fungal infection of the nail, which is caused by various species of the dermatophytes, yeasts and molds. Onychomycosis represents up to 50% of all nail disorders and 30% of all superficial skin fungal infections diagnosed (Gupta et al., 2000). Clinically, onychomycosis is classified into various types: distal subungual onychomycosis (DSO), Lateral subungual onychomycosis (LSO), Superficial white onychomycosis (SWO), proximal subungual onychomycosis (PSO), Total dystrophic onychomycosis (TDO) and paronychia (Scher, 1996; Midgley and Moore, 1996). In onychomycosis, some factors such as diabetes, aging atopy, immunodefiency virus, immunosuppressive therapy, psoriasis, trauma, tinea pedis, hyperhydrosis and genetic considered as a predisposing factors and should be paid more attention. dermatoses such as psoriasis , lichen plan and melanoma can also cause nail alterations similar to onychomycosis , therefore diagnosis of fungal nail infections is critical (Walshe and English, 1966; Zaias et al., 1996). According to increase of prevalence of onychomycosis during the last decades as well as the role of various types of climate, socio-economical and occupational situations, regional investigations for determining causative fungal agents and its prevalence is necessary.

2. Material and Methods

During a period of one year (2011- 2012), 700 patients with dystrophic nails were examined that 183 cases were affected by onychomycosis. 56.8% of Patients were female. Appropriate specimens were collected, by scrapping of the nails. The direct mount from specimens was made by 20% potassium hydroxide and the remaining samples were cultured on sabouraud's dextrose agar and sabouraud's containing chloramphenicol and cycloheximid. All plates were incubated in 30C. For four weeks and examined at daily intervals for developing colonies. The fungi were identified by routine laboratory methods, in particular, the slide culture techniques, microscopic and macroscopic characteristics, germ tube test as well as chlamydospore formation.

3. Results

From suspected 700 cases of onychomycosis, 183 cases were positive based on laboratory findings. 104 (56.8%) were female and 79(43.1%) were males and more of them (31.1%) in the range of 50-59 years-old (table 1). Most of affected individuals were housewives with distal sulungual onychomycosis form (60.4 %) (table 2).

Yeasts with 110 (55.8%) cases and among them candida Albicans (42.7 %) were the most frequent etiologic agents of onychomycosis (table 3). Furthermore the yeasts are the dominant cause of onychomycosis in finger nails. Dermatophytes was accounted for 26.9% of fungal toe nails infections and trichophyton interdigital was responsible for most cases (39.6%) of dermatophyte induced onychomycosis. 34 cases (17.3%) of saprophytic molds were more often isolated toe nails (table 4). The most common species of them was aspergillus flavus (table 5).

Table 1: Distribution of age groups according the causative agents of onychomycosis and gender of patients

Age (Years)	Female		Male		Total		Dermatophyte		yeast		saprophyte		Total	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
0-9	2	1/9	3	3/8	5	2/7	1	1/9	3	2/8	1	2/9	5	2/5
10-19	5	4/8	1	1/3	6	3/3	1	1/9	3	2/8	2	5/9	6	3/04
20-29	9	8/7	6	7/6	15	8/2	4	7/5	9	8/2	4	11/8	17	8/6
30-39	13	12/5	12	15/2	25	13/7	6	11/3	15	13/6	4	11/8	25	12/7
40-49	17	16/3	17	21/5	34	18/6	16	30/3	15	13/6	4	11/8	35	17/8
50-59	37	35/6	20	25/3	57	31/1	19	35/8	30	27/2	10	29/4	59	29/9
60-69	14	13/5	12	15/2	26	14/2	6	11/3	22	20	3	8/8	31	15/7
70>	7	6/7	8	10/1	15	8/2	0	0	13	11/8	6	17/6	19	9/6
TOTAL	104	100	79	100	183	100	53	100	110	100	34	100	197	100

Table 2: Clinical types, causative agents and sites of involvement

Clinical type	Dermatophyte		Saprophyte		Yeast		Total		Finger nail		Toe nail		Finger and toe nail		Total	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Distal subungual onychomycosis	42	79/2	22	64/7	55	50	119	60/4	42	42	69	81/2	8	66/6	119	60/4
Superficial onychomycosis	7	13/2	1	2/9	0	0	8	4/1	0	0	8	9/4	0	0	8	4/1
Proximal sulungual onychomycosis	0	0	7	20/6	3	2/7	10	5/1	7	7	3	3/5	0	0	10	5/1
Total dystrophy onychomycosis	3	5/7	3	8/8	3	2/7	9	4/6	4	4	3	3/5	2	16/7	9	4/6
Lateral subungual onychomycosis	1	1/9	1	2/9	13	11/8	15	7/6	14	14	1	1/2	0	0	15	7/6
Paranychia	0	0	0	0	36	32/7	36	18/3	33	33	1	1/2	2	16/7	36	18/3
TOTAL	53	100	34	100	110	100	197	100	100	100	85	100	12	100	197	100

P Value< 0/001 (chi- square test)

Table 3: Distribution of the causative agents of onychomycosis according to site of involvement and gender of patients

Species of dermatophyte	Male		Female		Total		Finger nail		Toe nail		Finger and toe nail		Total	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
T. Interdigital	18	47/4	3	20	21	39/6	1	25	19	40/4	1	50	21	39/6
T. Mentagrophytis	6	15/8	2	13/3	8	15/1	0	0	8	17	0	0	8	15/1
T. Rubrum	14	36/8	6	40	20	37/7	1	25	18	38/3	1	50	20	37/7
T.Verucosome	0	0	4	26/7	4	7/5	2	50	2	4/3	0	0	4	7/5
TOTAL	38	100	15	100	53	100	4	100	47	100	2	100	53	100
P Value= 0/007 (chi- square test)							P Value= 0/187 (Fisher exact test)							

Table 4: Distribution of the causative agents of onychomycosis according to site of involvement and gender of patients

Species of saprophyte	Male		Female		Total		Finger nail		Toe nail		Finger and toe nail		Total	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Aspergillus Flavous	3	17/6	9	52/9	12	35/3	5	41/7	7	35	0	0	12	35/3
Aspergillus Fumigatus	3	17/6	1	5/9	4	11/8	1	8/3	3	15	0	0	4	11/8
Aspergillus Niger	2	11/8	1	5/9	3	8/8	1	8/3	2	10	0	0	3	8/8
Penicilium	4	23/5	3	17/6	7	20/6	3	25	2	10	2	100	7	20/6
Acromonium	4	23/5	2	11/8	6	17/6	2	16/7	4	20	0	0	6	17/6
Fusarium	1	5/9	0	0	1	2/9	0	0	1	5	0	0	1	2/9
Exophiala dermatitidis	0	0	1	5/9	1	2/9	0	0	1	5	0	0	1	2/9
Total	17	100	17	100	34	100	12	100	20	100	2	100	34	100
P Value= 0/301 (Fisher exact test)							P Value = 0/805 (Fisher exact test)							

Table 5: Distribution of the causative agents of onychomycosis according to site of involvement and gender of patients

Yeasts	Male		Female		Total		Finger nail		Toe nail		Finger and toe nail		Total	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Candida Albicans	11	35/5	36	45/6	47	42/7	38	47/5	5	31/2	4	28/6	47	42/7
C.parapcilusis	7	22/6	16	20/3	23	20/9	15	18/8	5	31/2	3	21/4	23	20/9
C.Tropicalis	3	9/7	13	16/5	16	14/5	13	16/2	1	6/2	2	14/3	16	14/5
C. Kerosei	6	19/4	8	10/1	14	12/7	8	10	3	18/8	3	21/4	14	12/7
C.Glaberata	1	3/2	3	3/8	4	3/6	2	2/5	0	0	2	14/3	4	3/6
C.Gillermondi	1	3/2	2	2/5	3	2/7	2	2/5	1	6/2	0	0	3	2/7
C.lositani	0	0	1	1/3	1	0/9	1	1/2	0	0	0	0	1	0/9
C.Famata	1	3/2	0	0	1	0/9	0	0	1	6/2	0	0	1	0/9
Rodotrolla	1	3/2	0	0	1	0/9	1	1/2	0	0	0	0	1	0/9
Total	31	100	79	100	110	100	80	100	16	100	14	100	110	100
P Value= 0/380 (Fisher exact test)							P Value= 0/300 (Fisher exact test)							

4. Discussion

Onychomycosis is one of the most common nail diseases with worldwide occurrence, although it has worldwide occurrence, but its frequency is variable which depends on different climatic, professional and socio-economic conditions. For example, a comprehensive survey from North Malawi found no onychomycosis thought there was a 1.5 to 2.5 %prevalence of dermatophytosis (Ponninghaus et al., 1996), while the stimated prevalence of onychomycosis in United Kingdom is 1.3 to 4.7% (Roberts, 1992). The frequency of onychomycosis increases with age, This infection is very rare in young children, common in young adults and very frequent in elderly (Ponninghaus et al., 1996; Baran et al., 1999). In this study, the highest prevalence was seen in the age range of 50-59 years. In our study, 183 cases of the samples were positive in both culture and direct vision. The etiological fungal agents were 26.9% dermatophytes, 55.8% yeasts and 17.3 %saprophytic moulds; this is not in agreement with one of the observation from Tehran (Haneke, 1989) in which dermatophyte were pointed out as the dominant cause of onychomycosis. According to Alvarecz et al. (2004), onychomycosis has been more prevalent in women and in the current study also 56.8% of people with onychomycosis were females with distal subungual onychomycosis form.

Among isolated species, Trichophyton rubrum is reported as a causative agent 50-75 % cases in Western Europe, North America and Asia (Gill and Marks, 1999). In the 1970s, the most common agents of onychomycosis in Iran were T.schoenleinni and T.violaceum, respectively (Ardehali, 1973; Khosravi and Mansouri, 2000). However, dermatophyte prophile in Iran follows the world pattern since 1980 for onychomycosis. In the most part of the Iran, this species were replaced by T.mentagrophytes and T.rubrum (Moghaddami and Shidfar, 1989; Shokouhi, 1981). In this survey, the most isolated dermatophytes were T.Interdigital (39.6%) and T.rubrum (37.7%).

In this investigation, yeasts were the most frequent causative agent of onychomycosis, which mainly involved women's finger nails, Similar to other investigation (Cohen et al., 1992; Zaini, 1986). We found Candida Albicans as the predominant isolated yeast (42.7%).

Based on several studies, none-dermatophyte moulds are considered pathogenic in about 5%of cases, but significant were seen differences in various geographical regions (Clayton, 1992; Summerbell et al., 1989; Williams, 1993). In this investigation, the causes of 17.3% of positive cases were moulds which were isolated mainly from toenails (58.8%). We found Aspergillus flavous as the most common non dermatophyte moulds. This was in contrast to observation of khosravi et al. (2000), in which scopolariopsis bervicaulis was the dominant species. Considering our results, which revealed high frequency of onychomycosis in elders and women, study of high–risk groups to improve their sanitary and health is recommended. Regarding high prevalence of yeast as major causes of onychomycosis and its variation in different climatic condition, determining causative agents is so imperative in rapid diagnosis and appropriate treatment.

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