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Full Length Research Paper

Cutaneous infectious diseases in Tunisian adolescents

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Few studies have been completed in adolescent's cutaneous diseases. The aim of this work is to assess the adolescent epidemiological profile of the cutaneous infectious diseases and its evolution between 1997 and 2007. We have performed a comparative retrospective study on all adolescent outpatients attending Charles Nicolle's Hospital Dermatological Department on 1997 and 2007 and focused on cutaneous disease. The total number of outpatients was 9254 and 11343 on 1997 and 2007, respectively. Among this population, we counted 1155 teenagers on 1997 (12.4%) and 1176 teenagers on 2007 (10.63%). Comparatively, the results revealed that there were no significant differences in terms of age and gender between 1997 and 2007. For both years, the majority of cutaneous infections were of viral origin, followed by fungal dermatosis, bacterial dermatosis and finally parasitic dermatosis. We have noted a major modification in the skin infections profile: a decrease in bacterial skin diseases frequency ($P < 10^{-3}$), and an increase in warts (P = 0.02) and scabies (P = 0.014). Meanwhile, sexually transmitted diseases (STDs) including venereal warts have also considerably increased especially in teenage females (P = 0.059).

Key words: Warts, adolescents, pityriasis vesicular.

INTRODUCTION

Adolescents' health is an increasing concern over the last decades around the world and also in our country - Tunisia. The United Nations organisation report in 2003 defined adolescence as the period ranging between 10 and 19 years old, and concluded that we dispose of little knowledge about adolescents compared to other age groups (Fund of the Nations United for the population, 2003). The socioeconomic development and the epidemiological transition observed in our country have an impact on the health of the population and particularly of adolescents. Adolescence is a period of life with its own unique characteristics. Dermatological affections are the second consultation motives for children and teenager after ophthalmological affections (Bruijnzeels et al., 1998) with an impact on adolescent's health-related quality of life (Golics et al., 2009; Smith, 2001). Cutaneous infections and infestations are common problems in childhood and adolescence (Campbell and English, 2011). In Tunisia, cutaneous infections are the main infections in childhood (Kharfi et al., 2008) and in old people (Souissi et al., 2006).

The aim of this work is to assess the adolescent epidemiological profile of cutaneous infectious diseases through a retrospective hospital attendance study. We analyze the differences in consultation motives between 1997 and 2007.

MATERIALS AND METHODS

The study took place in the Capital of Tunisia, a north African country that has recently maintained a rapid economic development and so has reached a high level of development (ranked 94th out of 187 on the Human Development Index scale in 2011 (United Nations Development Program, 2011)

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The target population was adolescents, according to the definition of adolescence by the United Nations Organisation (Fund of the Nations United for the population, 2003).

We reviewed all adolescent outpatients who have attended Charles Nicolle's Hospital Dermatological Department during 1997 and 2007. We used a digitized data base. The data is updated daily by a specialized personnel. The coding of the data is realized by a doctor after each consultation. The studied variables for each patient were the age, gender and diagnosis. Thereafter, we only considered the patients with an infectious disease, and proceeded to a classification according to the microbial origin of the dermatosis, on four groups: bacterial, fugal, viral or parasitic disease. All mycological, parasitic and certain bacterial infections have been confirmed by a biological test. We treated separately sexual transmissible diseases (STDs). Data were analysed using SPSS 11. Analysis was realized first, by groups of disease, and then in details for each infectious dermatosis; we studied the distribution by gender in terms of absolute and relative frequency. We finally performed a comparative study on the results between 1997 and 2007, using the Pearson's Chi-square test and Fischer's exact test for the comparison of percentages, and Student's test for the comparison of means. The significance level was set at 0.05, using bilateral tests. This comparison seemed to be possible since the Department of Dermatology in Charles Nicolle's Hospital covers both regions.

The methodology of our study conformed to ethical principles applicable to any shape of medical search for the statement of Helsinki of the World Medical Association (Statement of Helsinki of the world medical Association, 2011).

RESULTS

In 1997, 1115 adolescents, among whom 520 were males and 635 were females, have consulted our department. The mean age of patients was 15.3 ± 2.7 years. We diagnosed 1254 dermatosis. We identified an infectious disease 525 times, which represents 41.8% of all dermatosis during this year.

In 2007, 1176 adolescents, 523 males and 653 females, were consulted. Their mean age was 15.0 ± 2.8 years. A total of 1430 diagnosis were made, 539 were infectious diseases, representing 37.7% of all dermatosis during this year.

The viral skin disease was the main aetiology of infectious dermatosis for both years (15.7% on 1997 and 16.9% on 2007), followed by fungal infections (13.5% on 1997 and 13.6% on 2007), bacterial infections (10.8% on 1997 and 4.7% on 2007) and finally parasitic disease (1.9% on 1997 and 2.5% on 2007). Table 1 summarizes all the infectious dermatosis.

The viral skin disease was the main aetiology of infectious dermatitis for both years, followed by fungal infections, bacterial infections, and finally, parasitic disease (Table 1).

Viral pathology was the first reason for consultation for both years. It has represented 37.5% of infectious dermatosis in 1997 and 44.7% in 2007. This pathology was more frequent among female adolescents mainly in 1997 (sex-ratio = 0.75 in 1997 and 0.99 in 2007) with no significant difference. The different clinical features of viral infections are reported in Table 2.

Fungal disease was the second cutaneous infection for both years. It has represented 13.5% and 13.6% of infection dermatitis, respectively in 1997 and 2007, without any significant difference (P = 0.90). The fungal infection was diagnosed among 83 males and 86 females in 1997 (sex-ratio = 0.96) and among 96 males and 99 females in 2007 (sex-ratio = 0.96). The different fungal cutaneous infections are reported in Table 3.

Dermatophytis were predominant during both years with a trend towards an increase (P = 0.06). Glabrous skin seat ranked the first among dermatophytosis (79.7% in 1997 and 68.2% in 2007), followed by nail seat (13.5% of dermatophytosis in 1997 and 25.5% in 2007) and dermatophytosis of the scalp (6.76% of dermatophytosis in 1997 and 6.36% in 2007). Toes folds were the most frequent localisation in glabrous skin (64.4% in 1997 and 42.7% in 2007). For scalp lesion, trichophytic ringworm was the most frequent for both years (4 cases in 1997 and 5 cases in 2007).

Yeast mycosis represented 6.5% of all dermatitis in 1997 and 5.9% in 2007, without any significant difference (P = 0.48). Pityriasis vesicular was the main yeast mycosis for both years (95.2% of yeast mycosis in 1997 and 94% in 2007), followed by mucosal candidiasis (1.2% of yeast mycosis in1997 and 3.6% in 2007) and onychia candidiasis (3.7% of yeast mycosis in 1997 and 2.4% in 2007).

Bacterial infections occupied the third place for both years (10.8% in 1997 and 4.7% in 2007). We noticed a significant decrease of bacterial dermatosis in 2007 ($P < 10^{-3}$), in specific and non- specific germs infections in both sexes.

Non-specific germs infections were the main bacterial infections for both years (6.4% of all dermatitis in 1997 and 2.7% in 2007, $p < 10^{-3}$), followed by Staphylococcal infections (3.9% in1997 of all dermatosis and 2.2% in 2007, p = 0.016). Tuberculous dermatitis was rare (1 case in 1997 and 1 case in 2007).

Parasitic infections represented 1.9% in 1997 and 2.5% in 2007 of all dermatosis. They were more frequent in 2007 without significant difference (P = 0.29). Scabies was the most frequent parasitic skin infections for both years (0.9% of all dermatosis in 1997 and 2% in 2007) with a significant increase in 2007 (P = 0.014). The rate of leishmaniasis was stable (0.8% in 1997 and 0.5% in 2007). Only 3 cases of pediculosis were observed in 1997 (0.2%) and no one in 2007.

STDs were more frequent in 2007 (1.2%) than in 1997 (0.7%), with no significant difference (P = 0.21) but sex-ratio dropped from 1.25 in 1997 to 0.54 in 2007. We noted a significant increase of venereal warts (44.4% of

Table 1. Infectious dermatosis in adolescents.

Infections	1997 (n = 1254)		2007 (n =1430)		P
	Number	%	Number	%	
Viral infections	197	15.7	241	16.9	0.42
Fungal infections	169	13.5	195	13.6	0.90
Bacterial infections	135	10.8	67	4.7	$<10^{-3}$
Parasitic infections	24	1.9	36	2.5	0.29

Table 2. Viral epithelial tumors.

Tumor	1997 (n = 1254)		2007 (n = 1430)		P
	Number	%	Number	%	
Warts	120	9.6	172	12.0	0.041
Verrucous papilloma	25	2.0	15	1.1	0.044
Molluscom contagiosum	8	0.6	14	1.0	0.33
Cutaneous herpes	4	0.3	5	0.3	-
Chikenpox	7	0.5	6	0.5	-
Zona	1	0.08	5	0.4	0.22
Eruptive fever	4	0.3	0	-	0.32

Table 3. Fungal infections.

Infection	1997 (n = 1254)		2007 (n =1430)		P
	Number	%	Number	%	
Dermatophytis	74	5.9	110	7.7	0.067
Yeast mycosis	82	0.5	84	5.9	0.48

STDs in 1997 and 94.1% in 2007, p=0.010).

Five cases of urethritis were observed in 1997 and one case of syphilis in 2007. Urethritis was not observed in 1997, and Syphilis was not observed in 2007. No case of VIH infection was observed.

DISCUSSION

In fact, our study consists on a retrospective analyse about cutaneous infections observed among adolescents in our department, in order to appreciate the differences in consultation motives between 1997 and 2007. The age bracket that we studied is often subsumed in one or the other period of life (children or adults). Few studies have focused on adolescents.

Through a review of the literature, infectious diseases remain the leading skin disorders. Infectious pathology was dominated by viral dermatosis followed by fungal, bacterial and parasitic (Parthasaradhi and Al Gufai, 1998; Elpern, 1985; Doe, 2001).

In Tunisia, kharfi (Kharfi et al., 2008) found that viral dermatosis is predominant in children (11% of all dermatosis), and Souissi et al. (2006) noticed viral infections in 6.8% in an old population.

Our study identified the predominance of viral dermatosis for both years, 15.7% in 1997 and 16.9% in 2007. Viral infections frequency among adolescents seems more important in children than elderly population in Tunisia. Furthermore, most studies have noted the progression of warts among cutaneous viral infections (Goh and Akarapanth, 1994). In a French study realised in 2000, warts represented 13.6% of all dermatosis and 58 to 70% of warts affected persons aged between 10 and 14 years (Lukasiewicz et al., 2002). In our study, warts have significantly increased between 1997 and 2007.

Problems related to fungal infections differ based on

regions and socioeconomic (Piérard et al., 2000; Anand and Gutpa, 1998; Dagnew and Ewing, 1991) factors. Athlete's foot is an emerging problem in developed countries while scalp ringworm is the most frequent mycosis in developing countries (Havlickova et al., 2008, Gibbs, 1996; Onayemi et al., 2005).

In Netherland, the incidence rate of fungal cutaneous infections in children less than 17 years old has increased; it was 25.7 in 1987 and became 35.2/1000pers/year in 2001 (Robbert, 2006). In the study of Tunisia, fungal pathology was dominant in old people (19.5% of dermatosis) with a predominance of onychia (Souissi et al., 2006), and was less frequent than in pediatric population (9.9% of dermatosis), ringworm has 10.7% dominance (Kharfi et al., 2008).

Our study showed the frequency of fungal disease, it constituted 13.5% of dermatosis in 1997 and 13.6% in 2007. It also showed some particularities among adolescents, like the predominance of pityriasis versicolor in this population, the persistence of ringworm in adolescents, and the scarcity of nail involvement. According to literature, the highest frequency of onycomycosis is observed in old population. Onychia seems to be an old patient's pathology (Souissi et al., 2006; Tuncel and Erbagci, 2005).

Our study identified a significant decrease of bacterial dermatosis in 2007. They represented 10.8% in 1997 and 4.7% in 2007. This decrease seems to be real even though its estimation in hospital is sometimes biased by the management in general or pediatric medicine, especially since it has been found in other studies in Tunisia (Souissi et al., 2006). The auto medication evaluated at 12.4% in Tunisia also contributes to the under-estimation of this dermatosis (Mokhtar et al., 1997). We can explain this decrease by the improvement of living standard. Concerning parasitic infections, a study on the epidemiological profile of cutaneous pathology realised in the governorate of Assiout in Egypt between 1994 and 1996, showed a clear predominance of parasitic infections that constituted 27.4% of all (Abdel-Hafez et al., 2003). Pediculosis was the most frequent parasitosis (19.4%) and represents 9.6% of dermatosis in male adolescents in Saudi Arabia (Bahamdan et al., 1996).

In Brazil, a cross-sectional study of cutaneous pathology in a rural region in the north, published in 2005 showed that pediculosis was present in 43.4% of the studied population; scabies was diagnosed in 8.8% of this population. Children aged between 10 and 14 years were the most affected (Heukelbach et al., 2003). In Netherland, the incidence rate of parasitic dermatosis in children less than 17 years was evaluated at 6.7% in 1987 and 7% in 2001 per 1000 persons/year.

In our study, parasitic infections have occupied the fourth rank of infectious dermatosis for both years without any significant difference between 1997 and 2007 but have revealed a significant increase of scabies in 2007. This increasing of scabies has been noticed in other studies in Tunisia (Kharfi et al., 2008; Souissi et al., 2006).

For STDs, adolescence constitutes a high risk factor of sexual infections. According to our study, STDs represented 1.0 and 1.3%, respectively, in 1997 and 2007. These frequencies are low in comparison with literature data. We suppose that there's an under estimation of STD's frequency in adolescents. Our results are biased by the management of this type of infections in other structures.

STD predominated in male in 1997 (sex-ratio = 1.25). In 2007, we noticed a feminine predominance. The review of literature reveals the same tendency of STDs getting higher in female population. Concerning the increasing of venereal warts, many studies have noticed it (Parent and Binet, 1998).

Conclusion

The findings of this study support that cutaneous infections among adolescents have probably changed during the period between 1997 and 2007. We have particularly noted the increase of simple and venereal warts, scabies and sexual disease in female population. A significant decrease of bacterial pathology was clear and a high frequency of pityriasis versicolor was assessed. This study shows the importance in screening the core evolution of STDs in order to improve the sexual education scheme and to develop a prevention plan on the other.

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