

Prevalence of *Candida* in saliva and skin lesions of Psoriasis Vulgaris patients

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Abstract:

Knowledge is of great importance; therefore it is very crucial to use an antifungal agent as additional treatment for psoriasis in patients. This study was designed to evaluate the presence of *Candida albicans* and other species of *Candida* in the saliva and skin of 50 psoriatic patients. The result of this study was compared to the control group of 50 healthy people. This research study was carried out from July 2011 to July 2012 on fifty (50) psoriatic cases. Demographic information such as age, sex, psoriasis duration, involved areas and severity of involvement, family history, possible past diseases, and drug history were collected. Quantitative evaluation was carried out on the saliva and skin culture of both healthy (control) and psoriatic patient to diagnose candida. *Candida albicans* was found in 34% of the saliva of patients with psoriasis and only 2% was found in the control group which was statistically significant ($P < 0.05$). Smear and culture of *Candida* in the saliva of patients with psoriasis was 46% and 18% in the control group, statistically significant at $P < 0.05$. From the quantitative evaluation, among the 46% of psoriatic patients and 18% of control group with *candida*, 28% and 2% were severe, respectively. The severity of *candida* between case and control groups was statistically significant ($P < 0.05$). Oral Candidiasis can be observed more commonly in Psoriatic patients compared to normal ones.

Keywords: *Candida*, psoriasis vulgaris, saliva, skin.

Introduction

Psoriasis is a chronic inflammatory skin disease with a high prevalence of approximately 2% (Christophers *et al.*, 2001; Myers *et al.*, 2006; Raychaudhuri *et al.*, 2001). Psoriasis vulgaris or chronic plaque psoriasis is the classic and most common

form of psoriasis presentation. The other forms of psoriasis include guttate, erythrodermic and pustular psoriasis. This disease is characterized by papulosquamous plaques well-defined from surrounding normal skin. These plaques are red or salmon pink, covered by white or silvery scales, and the plaques may be thick, thin,

large or small. The severity of the lesion is measured by Psoriasis Area Severity Index (PASI). Environmental and genetic factors, as well as super antigens and toxins from *Candida* species, may play various roles in the exacerbation and persistence of psoriasis (Taheri *et al.*, 2014; Leung *et al.*, 1993). Most psoriasis patients have a diminished quality of life in comparison with healthy individuals, particularly with reference to sexual dysfunction, anxiety, depression, self-esteem, and nutritional condition (Heller *et al.*, 2012). In the present study, the presence of *Candida albicans* and other species of *Candida* were evaluated in the saliva and skin of fifty (50) psoriatic patients and were compared to a control group of fifty (50) healthy people. Moreover, the correlation between the severity of psoriasis and the amount of *Candida* in the saliva and skin by PASI was also evaluated.

Objectives: This study evaluated the presence of *Candida albicans* and other species of *Candida* in the saliva and skin of 50 psoriatic patients and compared them to a control group of 50 healthy people.

Materials and Methods

This cross sectional study was performed on 50 psoriatic cases, referred to the dermatology ward of Qaem Hospital in Mashhad, from July 2011 to July 2012. The case group consisted of individuals with Psoriasis vulgaris, diagnosed by clinical manifestations and confirmed using histopathology. The disease passed 2 weeks of treatment by Anthralin and synthetic vitamin D3. The control group (50 individuals) did not have psoriasis or any inflammatory dermatitis or skin lesions in the experimental areas and they were matched with the case group according to age (± 3 years) and sex. Demographic

information and medical condition of participants including age, sex, psoriasis duration, involved areas and severity of involvement, family history, possible past diseases, and drug history were collected. All the patients and healthy people who had a history of smoking for more than 30 years, diabetes, AIDS, Cushing's disease, pregnancy, corticosteroids or any other immunosuppressive therapies, using OCP, false teeth and orthodontics, antibiotic therapy and chemotherapy and ages below 15 and over 60 were excluded from the study. The severity of psoriasis was determined according to PASI. This method evaluates the severity of psoriasis according to the affected psoriatic area and the features of the plaques, which include infiltration, erythema, and desquamation of the plaques. Saliva samples were collected using a sterile swap and the sterile scales blade were used for sampling of patients' lesions and healthy skin in the control group. Indirect examination was conducted, all scales and saliva were placed on a clean slide by 10% KOH. Each sample was dyed with Gram and methylene blue methods and then carefully observed under a microscope. For the quantitative evaluation of yeast like cells, indirect field observation terms like "mild", "moderate", and "severe" with the following definitions were used (Nunez *et al.*, 2010):

The presence of 1 to 2 *candida* in each microscopic field: mild.

The presence of 3 to 5 *candida* in each microscopic field: moderate.

The presence of more than 5 *candida* in each microscopic field: severe.

At first, samples were cultured using a sterile loop in corn meal agar media, then a chromogenic agar medium (*Candida* diagnostic agar [CDA]) was used for the

differentiation of *Candida* spp. because different species of *Candida* produce different colors in this culture medium.

Results

The culture of *Candida* spp. in the saliva of patients was 46% and in the control group was 18% (*candida* incidence in psoriatic patients was 2.5 times more than in the healthy group) which was statistically significant ($P<0.05$) (Fig. 1). It should be noted that 20% of those in the patient group had clear lesions in their oral cavity.

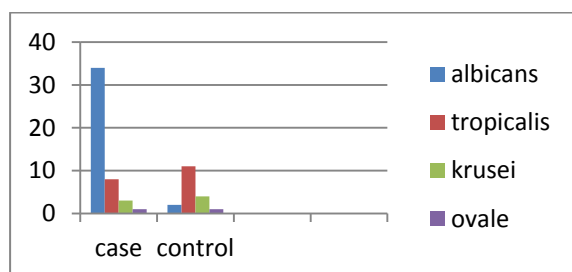


Fig. 1. Prevalence of different *Candida* species in the saliva of patients with psoriasis vulgaris referred to Qaem hospital dermatology clinic

C. albicans was present in 34% of saliva samples from patients and only 2% of samples from the control group were statistically significant ($P<0.05$). In addition, other *candida* species such as *Candida tropicalis* (8%, 11%), *Candida krusei* (3%, 4%) and *Candida ovale* (1%, 1%) were distinguished in a chromogenic agar medium, in the saliva sample of patients and the control group (12% in patient and 16% in the control group).

In quantitative evaluation, among the 46% of psoriatic patients with *candida*, 28% were severe, 18% were moderate and none of them were considered as mild.

Furthermore, among the 18% of control group with *candida*, 2% were severe, 16% were moderate and none of them were considered as mild. However, the severity of

candida between case and control groups was statistically significant ($P<0.05$) (Fig. 2). In skin samples, only 2% of patients were positive for *C. albicans* and all of them were considered as mild. Individuals in the control group were negative to *C. albicans*. In this study, psoriasis severity was calculated using PASI score. According to the results, there was a significant difference between the amount of *candida* contamination in saliva and severity of psoriasis (Fig. 3).

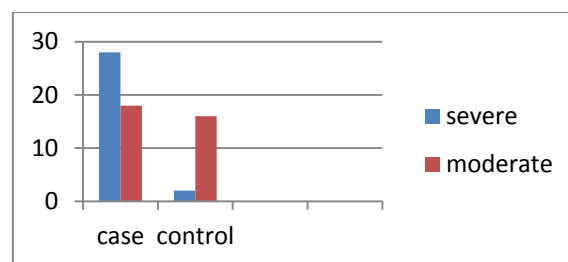


Fig. 2. Prevalence of *Candida* infection severities in the saliva of study groups

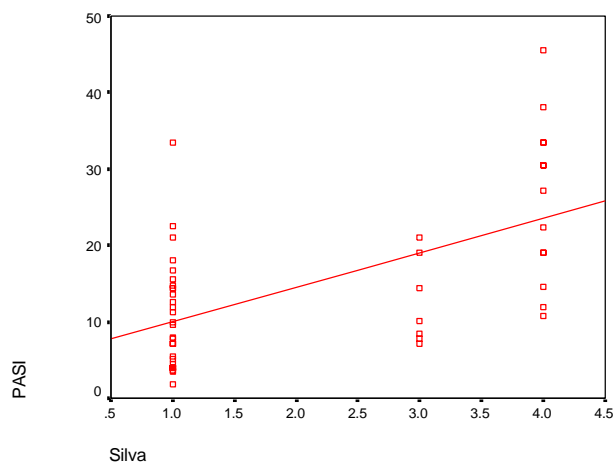


Fig. 3. Relation between Psoriasis severity according to PASI score and *Candida albicans* infection in the saliva of patients referred to Qaem hospital dermatology clinic

The duration of psoriasis, differs from 4 months to 40 years (mean=6.37 years and SD=9.19). There was no significant difference between psoriasis duration and *candida* infection severity ($P=0.90$). Moreover, there was no significant difference between patients age ($P=0.80$), sex ($P=0.69$) of patients, and family history ($P=0.73$) with *candida* severity in saliva samples.

Discussion

This study investigated the associations between *Candida* and psoriasis as revealed by studies dating back to the early 1980s (Rosenberg *et al.*, 1981). The results of this study show a significantly higher prevalence of *Candida* colonization in patients with psoriasis compared with the control group. The results of the present study and other studies show that a treatment of systemic antifungal was very effective in some of the psoriatic patients, especially those with mouth lesions (Taheri Sarvtin *et al.*, 2014; Waldman *et al.*, 2001; Rezaei *et al.*, 2004). The result of the present study showed a higher prevalence (2.5 times) of oral candidiasis in the mouth of patients with psoriasis compared to healthy control subjects ($P < 0.05$), which is in line with the results of other studies (Buchner *et al.*, 1976; Skinner *et al.*, 1982; Hernández-Pérez *et al.*, 2008). As shown in other studies, the mouth is a suitable place for colonized *Candida* (Vazquez *et al.*, 2002; Hamilton *et al.*, 1992). Skinner reported that in 14 psoriatic patients, the disease was associated with oropharyngeal *Candida* (Skinner *et al.*, 1994). Another study showed a significantly higher prevalence of *candida* colonization in psoriatic patients, which was observed in the mouth (32%) (Olesen, 2012; Picciani *et al.*, 2013). However, some studies believe that feces is more reliable than saliva for the evaluation of associations between *Candida* and psoriasis (Taheri Sarvtin *et al.*, 2014). Henseler and Tausch reviewed the medical records of 44695 dermatological patients and concluded that psoriatic patients had 1.3-1.6 higher relative risk of developing mucocutaneous candidiasis compared to healthy individuals (Henseler, 1995). In the current study, using the cultured saliva for *candida* isolation, 34% of the subjects were positive for *C. albicans* a finding that concurs with other studies (Leibovici *et al.*,

2008; Waldman *et al.*, 2001). Thus, colonization by this species in patients with psoriasis should be considered as a risk factor for the exacerbation of psoriatic signs in the mouth. In the past two decades, a higher incidence of non-*albicans* species has been reported, particularly in immune-compromised subjects (Krcmery *et al.*, 2002). Future comparative *candida* studies, using different *Candida* species may be required. Flytstrom and Jennifer, did not find any significant correlation between candidiasis and skin psoriatic patients. Flytstrom showed that none of the 32 untreated patients with skin psoriasis were culture positive for *Candida* (Flytström *et al.*, 2003; Jennifer *et al.*, 2005). This result shows that in addition to genetic and immunological defects, the condition of the organ is also important. In the present study, some further steps were taken for the identification of the linkage between *Candida* and psoriasis. The correlation between *Candida* severities of psoriatic patients were examined in culture and a remarkable severity of *Candida* in psoriatic patients compared to the control group in saliva samples was found. Based on PASI definition, the clinical severity of psoriasis was categorized as mild (PASI scores of < 11), moderate (PASI scores of 11–49), or severe (PASI scores of > 50) (Fredriksson *et al.*, 1978). In this study, it was a correlation between the quantity of *Candida* in saliva and the severity of psoriasis according to PASI ($P < 0.05$) because most of the patients included in this study had a severe and moderate form of disease. In mild form of psoriasis, the PASI technique is not reliable in measuring the severity of psoriasis; therefore, another measurement method should be used (Taheri Sarvtin, 2014; Krcmery *et al.*, 2002). In the present study, similar to the findings of other studies, there was no significant relationship between age,

sex, and family history to psoriasis (Leibovici *et al.*, 2008; Ahmad *et al.*, 2012). It should be noted that *Candida* is one of the triggers that can induce or exacerbate psoriasis which may be a risk factor for oral candidiasis. Hence, in such conditions the use of an antifungal agent as an additional treatment for psoriasis is recommended.

Conclusion

It could be concluded that *candida* colonization can be observed more commonly in psoriatic patients compared to normal ones. This study therefore recommends that all psoriatic patients, especially those who have severe disease, be examined for *Candida* spp. and treated with antifungal drugs.

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Authors' Contributions

Mohammad Javad Yazdanpanah, Fakhrozaman Pezeshkpoor, Soror Zaman Family and Farhad Fathimoghadam coined the initial idea and prepared the proposal. Sona Sepahi collected the samples and did the laboratory work with Aliakbar Shamsian. Elham Moghaddas analyzed the data and prepared the manuscript. All authors edited the manuscript.

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References

- Ahmad, A. B., Azmi, M. G., Mustafa, M., 2012. Oral *Candida* colonization and candidiasis in patients with psoriasis. *Oral medicine*, 114(5): 610-5.
- Buchner, A., Begleiter, A., 1976. Oral lesions in psoriatic patients. *Surgery Oral Medicine Oral Pathology*, 41: 327-32.
- Christophers, E., 2001. Psoriasis - epidemiology and clinical spectrum. *Clinical Experimental Dermatology*, 26: 314-320.
- Fredriksson, T., Pettersson, U., 1978. Severe psoriasis – oral therapy with a new retinoid. *Dermatological*, 157: 238–244.
- Flytström, I., Bergbrant, I. M., Brared J., 2003. Microorganisms in intertriginous psoriasis: no evidence of *Candida*. *Acta Dermato Venereologica*, 83: 121-123.
- Hamilton, J. N., Thompson, S. H., Scheidt, M. J., 1992. Correlation of the subclinical *Candida* colonization of the dorsal tongue surface with the Walter Reed staging scheme for patients infected with HIV. *Oral Surgery Oral Medicine Oral Pathology*, 73: 47- 51.
- Heller, M. M., Wong, J. W., Nguyen, T. V., 2012. Quality-of-life instruments: evaluation of the impact of psoriasis on patients. *Dermatology Clinical*, 30: 281–291.
- Henseler, T., 1995. Mucocutaneous candidiasis in patients with skin diseases. *Mycoses*, 38:1:7-13.
- Hernandez, P.F., Jaimes-Aveldeañez, A., Urquiza-Ruvalcaba, M. L., 2008. Prevalence of oral lesions in patients with psoriasis. *Medicine Oral Pathology Oral Cir Bucal*, 13: 703- 8.
- Jennifer, A., Steele, M. D., Pearl C., 2005. Topical tacrolimus in the treatment of inverse psoriasis in children. *Search Results. Journal of the American Academy of Dermatology*, 53: 713- 716.
- Krcmery, V., Barnes, A. J., 2002. Non-*Candida albicans* spp. causing fungaemia: pathogenicity and antifungal resistance. *Journal Hospital Infections*, 50: 243-60.

12. Leibovici, V., Alkalay, R., Hershko, K., 2008. Prevalence of *Candida* on the tongue and intertriginous areas of psoriatic and atopic dermatitis patients. *Mycoses*, 51: 63-6.
13. Leung, D. Y. M., Walsh, P., Giorno, R., 1993. A potential role for superantigens in the pathogenesis of psoriasis. *Journal Investigation Dermatology*, 100: 225-8.
14. Myers, W. A., Gottlieb, A. B., Mease, P., 2006. Psoriasis and psoriatic arthritis: clinical features and disease mechanisms. *Clinical Dermatology*, 24: 438-447.
15. Nunez, M. J., Novio, S., Suarez, J.A., Balboa, J., Freire-Garabal, M., 2010. Effects of Psychological Stress and Fluoxetine on Development of Oral Candidiasis in Rats. *Clinical Vaccine Immunology*, 17(4): 668-673.
16. Olesen, A. B., 2012. Chronic Skin Disease and Risk of Infection. *The Open Infectious Diseases Journal*, 6: 60-64.
17. Picciani, B. L., Michalski-Santos, B., Carneiro, S., 2013. Oral candidiasis in patients with psoriasis: Correlation of oral examination and cytopathological evaluation with psoriasis disease severity and treatment. *American Academy of Dermatology Journal*, 68: 986-90.
18. Raychaudhuri, S. P., Farber, E. M., 2001. The prevalence of psoriasis in the world. *European Academy of Dermatology and Venereology*, 15: 16-17.
19. Rezaei, A., Shahmoradi, Z. A., Asilian, A., 2004. Investigation of the association between psoriasis and oral *candida albicans*. *Journal of Arak University of Medical Sciences*, 7: 34 – 38.
20. Rosenberg, E. W., Belew, P. W., 1981. Microbial factors in psoriasis. *Archives of Dermatology*, 4: 118-143.
21. Skinner, R. B., Rosenberg, E. W., Belew, P. W., 1982. Improvement of psoriasis with cholestyramine. *Archives Dermatology*, 118-144.
22. Skinner, R. B., Rosenberg, E. W., Noah, P. W., 1994. Psoriasis of the palms and soles is frequently associated with oropharyngeal *Candida albicans*. *Acta Dermato Venereologica*, 186: 149-50.
23. Taheri Sarvtin, M., Shokohi, T., Hajheydari, Z., Yazdani, J., Hedayati, M. T., 2014. Evaluation of *candida* colonization and specific humoral responses against *Candida albicans* in patients with psoriasis. *International Society of Dermatology: Home*, 53: 1423-1541.
24. Vazquez, J. A., Sobel J. D., 2002. Mucosal candidiasis. *Infectious Disease Clinical North America*, 16:793-820.
25. Waldman, A., Gilhar, A., Duek, L., 2001. Incidence of *Candida* in psoriasis: a study of the fungal flora of psoriatic patients. *Mycoses*, 44: 77-81.