

ORIGINAL ARTICLE

Medicine Science 2020;9(4):844-7

Investigation of demodex spp prevalence in medical laboratory students **Ahmet Yilmaz¹**,  **Onder Akkas²**¹Ataturk University, Vocational School of Health, Department of Medical Laboratory Techniques, Erzurum, Turkey²Igdir University, Vocational School of Health, Department of Medical Laboratory Techniques, Igdir, Turkey

Received 29 April 2020; Accepted 01 July 2020

Available online 08.10.2020 with doi: 10.5455/medscience.2020.04.068

Abstract

This study focused on the prevalence of *Demodex* spp. in the students at Igdir University Vocational School of Health Services (VSHS) and on possible factors for this occurrence. The study was conducted with a total of 171 students (in the 18–52 age group, mean age: 21.33±3.14, of whom 73 were male and 98 were female) between January 2018 and May 2018. Samples were taken from the students' faces - especially the nasal root, forehead, and cheeks - using the cellophane tape method. The samples were analyzed under a microscope, without dyeing, at 10X and 40X magnifications. To discover possible causes for the *Demodex* spp. prevalence, a survey was given to the same students. In this investigation, 59 out of 171 students were found to have *Demodex* spp. There was no immediate relationship between the prevalence of *Demodex* spp. and variables such as gender, age, family type, the presence of chronic disease, or facial hygiene. However, the ratio of *Demodex* spp. prevalence reached 19% in students who habitually ate dried nuts and fruits compared to those who did not. We concluded that the *Demodex* spp. infestation was very high in students at VSHS. We also detected a negative correlation between the prevalence of *Demodex* spp. and the habit of eating dried nuts and fruits.

Keywords: *Demodex* spp, prevalence, infestation, risk factors**Introduction**

Demodex spp. are ectoparasites that live in hair follicles and oil glands, especially on the human face; they are transmitted from person to person by direct contact and can cause pathologies through their reproductive process [1,2]. Two *Demodex* species, *D. folliculorum* and *D. brevis*, have been identified in humans so far [3]. *D. folliculorum* is more common than *D. brevis*. *Demodex* mites are not usually found in newborns, but they can be transmitted from colonized family members during childhood and early adolescence [4]. Several studies report that *Demodex* species can cause numerous diseases, which is present without symptoms, and an increase in incidence with age [4–7]. This study investigates the prevalence of *Demodex* spp. concerning different variables in the students at the Igdir University Vocational School of Health Services (VSHS) laboratory program since such parasites are particularly common in young people.

Material and Methods

This study was conducted between May 2018 and January 2018 with 171 students at Igdir University VSHS. These students

completed a voluntary patient informed consent form, and none of them disclosed any dermatological problems. Also, a questionnaire was applied to the students to reveal possible risk factors for the occurrence of *Demodex* species. Samples were taken from the students' faces - especially the nasal root, forehead, and cheeks - using the cellophane tape method.

Cellophane tape method: The cellophane tape cut in approximately 5 cm long is adhered to the areas specified on the person's face, especially the nose root, forehead, and then it is removed and adhered to a clean slide. Transparent duct tape was used for this process, which was found to be more sticky and with better results [8]. The samples were analyzed, without dyeing, under a microscope at 10X and 40X magnifications by an expert in the VSHS Microbiology Laboratory. Ethics approval was obtained from the Ataturk University Faculty of Medicine Clinical Research Ethics Committee for our research (Date: 03.12.2015/ Decision No:17).

Statistical Analysis

The data obtained in the study were analyzed using frequencies and percentiles. The chi-squared test was used in addition to descriptive statistics. The SPSS 22 program was used for the analysis of the data.

*Corresponding Author: Ahmet Yilmaz, Ataturk University, Vocational School of Health, Department of Medical Laboratory Techniques, Erzurum, Turkey,
E-mail: aymet25@hotmail.com

Results

A total of 171 medical laboratory students at Iğdir University VSHS in the 18–52 age group (mean age: 21.33 ± 3.14), of whom 73 were male and 98 were female, participated in this research. *Demodex* spp. were detected in 59 (34.5%) of the 171 students. By gender, they appeared in 38.4% of the male students and 31.6% of the female students. These results showed that, although the positivity of *Demodex* spp. in males was higher than in females, the difference was not statistically significant ($p > 0.05$).

The highest positivity rates were detected as follows: 66.7% in the >27 age group; 56.3% in those who lived alone or with friends; 35.5% in those who had acne and itching on their face; 37.3% in individuals who did not use soap when washing their face; and 42.9% in those with a chronic disease. The results were not statistically significant in each group (Table 1). Of those who responded “Yes” to the question “Do you have a habit of eating dried nuts and fruits?” 27.5% had a positive rate of *Demodex*, whereas the rate was 46.3% in those who answered “No.” The difference between the groups was significant ($p < 0.05$). The egg and adult form of the parasites are shown in Figures 1 and 2.



Figure 1. *Demodex* spp. adult X40 magnification.

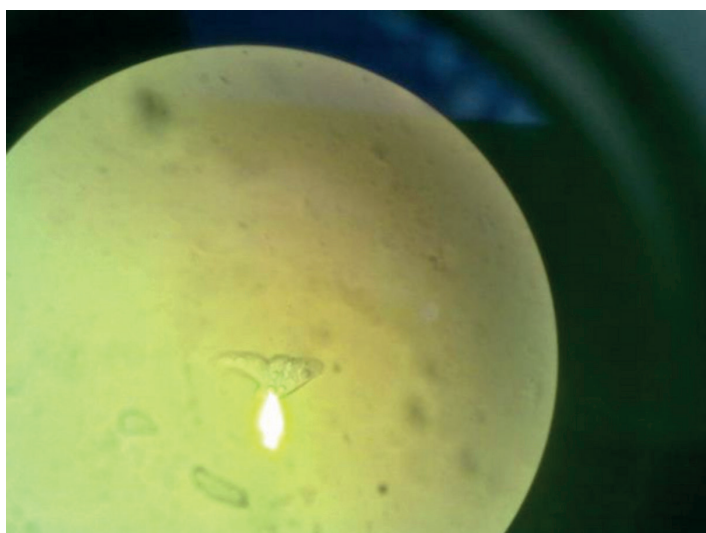


Figure 2. *Demodex* spp egg X40 magnification.

Discussion

Numerous studies have been conducted on the prevalence of *Demodex* species in the world and Turkey specifically. According to these studies, *Demodex* infestations are common and do not differ in terms of race or gender, but they do increase in incidence with age [9–10]. *Demodex* infestations can be directly transmitted by close contact with hosts. The parasites can also be indirectly transmitted on items such as towels, combs, blankets, bath sponges, and evening clothes [11]. Commonly used methods to diagnose the appearance of *Demodex* species include cellophane lams, punch biopsies, skin swabs, and standard superficial skin biopsies (SSSB) [12].

In China, Ru-Juan et al. found a rate of 37.03% positivity in their study of 316 medical students using the cellophane tape method [13]; Cao et al. found a rate of 36.3% among 512 university students [14]; Ding and Huang found a rate of 11.58% among 613 university students [15]. In Turkey, however, Karaman et al. found a positive parasite ratio of 37% in 300 students surveyed [9]; Yazar et al. found a rate of 2.9% in the samples collected from 171 individuals [16]; Miman et al. found a positive rate of 11% in 100 students [17]. In this study, *Demodex* spp. was present in 34.5% of 171 students in total. The results were in line with many other studies, and these high rates in healthy people are considered remarkable. The difference between the results of this type of research varies depending on many factors such as the diagnostic method used, the groups studied, and the region of the study. Also, the results of this study may have been affected by the stress caused by the final exams, which coincided with our study. Also, the prevalence of *Demodex* mites has been reported to be the highest level in the 20–30 age group, where the rate of sebum secretion is highest [18].

Considering the results of the studies on the relationship of *Demodex* positivity with gender: Cao et al found a 39.3% positivity in males, and 34.3% in females [14]; In a different study by Roihu et al the incidence of *Demodex* spp was 59% in males and 30% in females [19]; and, according to the study by Karaman et al the 37.1% of the male students and 36.2% of the female students had such parasite [9]; In the study by Tas Cengiz et al *Demodex* mites were identified in 47.4% of female patients and 48.3% of male patients [20]. In our study, *Demodex* spp was positive in 38.4% of male students and 31.6% of female students (Table 1). Although there was a higher rate of positivity in males, the difference was not statistically significant.

Upon identifying intense *D. Folliculorum* in individuals with a weak immune system, Ozcelik et al found in their study that patients with chronic renal failure had a higher rate of positivity than the control group [21]. Akdeniz et al in their study of patients with diabetes showed a higher level of *D Folliculorum* positivity than in the control group patients and reported that the result was statistically significant [22]. In this study, positivity rates were higher in students with a chronic disease than in healthy students, but the difference was not statistically significant.

In the literature, some reports are showing some foods and beverages (hot beverages and spicy food) may increase *Demodex* inflammation [23,24]; however, to the best of our knowledge, no study investigated the effect of the habit of eating dried nuts and

Table 1. Distribution of Demodex spp according to various variables

Variables concerning the questionnaire items	Demodex spp.		Total	P-value
	Positive n (%)	Negative n (%)		
Gender				0.226
Male	28 (38.4)	45 (61.6)	73	
Female	31 (31.6)	67 (68.4)	98	
Age groups				0.285
18-22	49 (35.8)	88 (64.2)	137	
23-27	8 (25.8)	23 (74.2)	31	
>27	2 (66.7)	1 (33.3)	3	
Place of residence, family				0.135
Alone or with a friend	9 (56.3)	7 (43.8)	16	
Nuclear family	31 (30.7)	70 (69.3)	101	
Extended family	19 (35.2)	35 (64.8)	54	
Do you have acne, itching on your face?				0.821
Yes	33 (35.5)	60 (64.5)	93	
No	23 (32.4)	48 (67.6)	71	
Frequency of itching?				0.821
1-2 times a week	11 (42.3)	15 (57.3)	26	
1-2 times a month	19 (32.2)	40 (67.8)	59	
1-2 times a year	3 (37.5)	5 (62.5)	8	
Do you wash your face with soap?				0.373
Yes	40 (33.3)	80 (66.7)	120	
No	19 (37.3)	32 (62.7)	51	
What do you use to wash hair in the bathroom?				0.293
Soap	4 (25.0)	12 (75.0)	16	
Shampoo	55 (34.5)	100 (64.5)	155	
Do you use the bath sponge on your face?				0.371
Yes	26 (36.6)	45 (63.4)	71	
No	33 (33.0)	67 (67.0)	100	
Do you have a chronic illness?				0.340
Yes	6 (42.9)	8 (57.1)	14	
No	53 (33.8)	104 (66.29)	157	
Do you have a habit of eating dried nuts and fruits?				0.025
Yes	28 (27.5)	74 (72.5)	102	
No	31 (46.3)	36 (53.7)	67	
What is BMI*?				0.270
Under 25	44 (36.4)	77 (63.6)	111	
25 and above	7 (22.6)	24 (77.4)	31	

*Body Mass Index

fruits on the *Demodex* infestation. On the other hand, studies are reporting that skin dryness facilitates pathogenicity for *Demodex* folliculorum[25]. It is known that dried nuts and fruits are good for dryness of the skin. In our study, the *Demodex* prevalence was higher in those who responded no to the question "Do you have a habit of eating dried nuts and fruits?", and the difference between the groups was significant.

Conclusion

Remarkably, *Demodex* spp infestation was as high as 34.5% in the students, who were surveyed within the scope of the study and who had no complaints in this regard. There was no correlation between the variables, such as gender, age groups, the presence of chronic disease, family type, and soap use habits when washing face and *Demodex* prevalence. Although there was a direct relationship between the prevalence of *Demodex* in those who did not have the habit of eating dried nuts and fruits, further research on this issue will be beneficial.

Conflict of interests

Authors declare that they have no conflict of interests among them regarding the publication of this paper

Financial Disclosure

The authors declared that this study has received no financial support.

Ethical approval

Ethics approval was obtained from the Atatürk University Faculty of Medicine Clinical Research Ethics Committee for our research (Date: 03.12.2015/ Decision No: 17)

References

- Yolasıgırmaz A, Budak S. Demodicosis. In: Ozcel MA, Ozbel Y, Ak M, eds, Ozcel's medical parasitic diseases. Meta Publication. 2007; 891-4.
- Cheng AM, Sheha H, Tseng SC. Recent advances on ocular *Demodex* infestation. *Curr Opin Ophthalmol*. 2015;26:295-300.
- Biernat MM, Rusiecka-Ziółkowska J, Piątkowska E, et al. Occurrence of *Demodex* species in patients with blepharitis and in healthy individuals: a 10-year observational study. *Japan J Ophthalmol*. 2018;62:628-33.
- Lacey N, Raghallaigh SN, Powell FC. *Demodex* mites—commensals, parasites or mutualistic organisms. *Dermatology*. 2011;222:128-30.
- Sun J, Gui X, He J, et al. The relationship between infestation of *Demodex* folliculorum and epidermal neoplasm on face. *Zhongguo Ji Sheng Chong Xue Yu Ji Sheng Chong Bing Za Zhi*. 2005;23:428-31.
- Czepita D, Kuźna-Grygiel W, Kosik-Bogacka D. Investigations on the occurrence as well as the role of *Demodex* folliculorum and *Demodex brevis* in the pathogenesis of blepharitis. *Klin Oczna*. 2005;107:80-2.
- Desch C, Nutting WB. *Demodex folliculorum* (Simon) and *D. brevis* akbulatova of man: redescription and reevaluation. *J Parasitol*. 1972;58:169-77.
- Yazar S, Özcan H, Çetinkaya Ü. Investigation of *Demodex* sp using cellophane tape method among university students. *Türkiye Parazitolo Derg*. 2008;32:238-40.
- Karaman U, Koloren Z, Enginyurt O, et al. The epidemiology of *demodex* mites at the college students living in dormitories in the city of Ordu. *Türkiye Parazitolo Derg*. 2014;38:166-71.
- Arici MK, Sumer Z, Topaklara A, et al. Incidence of *Demodex* of folliculorum on the eyelash in normal population and in blepharitis patients. *MN-Ophthalmol*. 2002;9:51-3.
- Rusiecka-Ziółkowska J, Nokiel M, Fleischer M. *Demodex*-an old pathogen or a new one?. *Adv Clin Exp Med*. 2014;23:295-8.
- Karaman U, Sener S, Celik T, et al. Investigation of *Demodex* spp by histopathologic method in cases involving infectious and benign states of the skin. *J Turgut Ozal Med Cent*. 2008;151:5-7.
- Ru-Juan Z, Xue-Rong Y, Ying Z, et al. Investigation on *Demodex* infection status and influencing factors in medical students in Wuhu City. *Zhongguoxue xi chongbing fang zhi za zhi*. 2017;29:358-62.
- Cao YS, You QX, Wang L, et al. Facial *Demodex* infection among college students in Tangshan. *Zhongguo ji sheng chongxueyu ji sheng chongbing za zhi*. 2009;27:271-3.
- Ding Y, Huang X. Investigation of external auditory meatus secretion *Demodex* folliculorum and *Demodex brevis* infection in college students. *Lin chuanger bi yanhouke za zhi*. 2005;19:176-7.
- Yazar S, Özcan H, Çetinkaya U. Investigation of *Demodex* sp using cellophane tape method among university students. *Türkiye Parazitolo Derg*. 2008;32:238-40.
- Miman O, Simsek K, Özselcuk S, et al. Investigation of *Demodex* spp prevalence among university students. *J Kocatepe Med*. 2008;9:37-9.
- Zomorodian K, Geraimishoar M, Saadat F, et al. Facial demodicosis. *Eur J Dermatol*. 2004;14:121-2.
- Roihu T, Kariniemi AL. *Demodex* mites in acne rosacea. *J Cutan Pathol*. 1998;25:550-2.
- Cengiz ZT, Yılmaz H, Uce-Ozkol H, et al. The prevalence of *Demodex* spp in patients admitted to the parasitology laboratory of the Dursun Odabas Medical Center in Yuzuncu Yil University. *Türkiye Parazitolo Derg*. 2014;38:9-11.
- Ozcelik S, Sümer Z, Degerli S, et al. The incidence of *Demodex* folliculorum in patients with chronic kidney deficiency. *Türkiye Parazitolo Derg*. 2007;31:66-8.
- Akdeniz S, Bahceci M, Tuzcu AK, et al. Is *Demodex* folliculorum larger in diabetic patients?. *J Eur Acad Dermatol Venereol*. 2002;16:539-41.
- Luo XH, Li J, Chen C, et al. Ocular Demodicosis as a Potential Cause of Ocular Surface Inflammation. *Cornea*. 2017;36:9-14.
- Yun SH, Levin F, Servat J. *Demodex* folliculitis presenting as periocular vesiculopustular rash. *Orbit*. 2013;32:370-1.
- Turan N, Kapicioglu Y, Sarac G. The effect of skin, sebum, pH, and moisture on *Demodex* infestation in Acne Vulgaris and Rosacea patients. *Türkiye Parazitolo Derg*. 2017;41:143-7.