



A Survey on Demodex Infections for Undergraduate Students in Some Universities in Ningbo City of Zhejiang Province of China

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Abstract

Objective: The purpose of this survey is to investigate the university students' face infections with Demodex, and explore the possible factors of Demodex infections. **Methods:** On this survey, the following pressure method is adopted. The operator has used sterilized thumb against the client part of the facial skin, observing mites under microscopy. **Results:** The results of the survey for the total Demodex infection rate were 32.50%. *Demodex folliculorum* infection rate was 39.49%, *Demodex brevis* infection rate was 49.74%, and the mixed infection rate was 10.77%. **Conclusions:** This survey shows that college students' Demodex infection rate is serious according to the corresponding social customs.

Keywords

College Students, Demodex Infection, Survey, Ningbo City

Subject Areas: Infectious Diseases, Respiratory Medicine

1. Introduction

Demodex families are kinds of small permanent parasitic mites, namely sebaceous follicle Demodex and brevis Demodex. The two parasites mainly parasitize the body of man's forehead, nose, chin and zygomatic places. Mechanical and chemical stimulation can cause skin diseases such as acne, seborrheic dermatitis, and folliculitis

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[1]. As a result of investigation, Demodex infection rate presents the different levels. Thus, we had investigated the Demodex infections in College students of Ningbo City from December 2012 to March 2013. The results have been shown as follows.

2. Materials

Investigated people: totally 600 people, 336 boys and 264 girls at 2009-2011 grades of college students of Ningbo City.

3. Methods

Survey methods [2]: The survey contents include personal diet, accommodation environment, hygiene, etc. At the same time, recording client's age, gender, facial disorders, health situation, the collective life and infection degree standards

Checking out any Demodex infections are considered to be positive. Infection degrees of each sample are calculated, all degrees are divided into 3 levels, level 1 is to be degree I (mild); level 2 is to be degree II (moderate); level 3 is to be degree III (serious).

Types of infections: The infection types are divided into three types: sebum Demodex infection, brevis infection and mixed infections with follicles.

All data are treated with spss12.

4. Results

4.1. The Infection Rates of Demodex Mites

All tables showed include 600 university students, among 195 infected students, male's infection rate was 35.71%, female's infection rate was 28.41%, infection rate between male and female students with P values were more than 0.05, which means no statistical significance (**Table 1**).

4.2. The Infection Degrees with Demodex Mites

Among 195 students infected, first-degree infection rate accounted for 72.82%, second-degree infection rate accounted for 15.90%, third-degree infection rate accounted for 11.28% (see **Table 2**).

4.3. Facial Diseases and Mite Infection

The face demonstrated seborrheic dermatitis, folliculitis of Demodex infection rates were greater than the normal facial skin infected, facial diseases and mite infection's P value was less than 0.01, there was a statistically significant difference (see **Table 3**).

Table 1. University students' facial Demodex infection rate.

Gender	Tested samples	Infection samples	Infection rate (%)
Male	336	120	35.71
Female	264	75	28.41
Total	600	195	32.50

Table 2. Infection degree of university students with facial Demodex mites.

Infection degree	Number	Rate (%)
First-degree	142	72.82
Second-degree	31	15.90
Third-degree	22	11.28

Table 3. The Demodex infections of facial skins.

The condition of facial skin	Number of tested people	Number of positive people	Positive rate (%)
Acne	82	45	54.88
Seborrheic dermatitis	32	15	47.34
Folliculitis or hair follicle expansion	29	12	41.38
Normal	457	123	26.91

4.4. Conditions of Demodex Infections among Students Who Use Skin Care Products and Those Who Don't Use

The number of students who use skin care products is 139, the positive rate was 30.48%, while the number of those who don't use was 56, positive rate was 38.89%. The positive rate for whom uses skin care products and those with products not used among students with Demodex infections, their P values are greater than 0.05, means no statistical significance (**Table 4**).

4.5. The Ratio of Different Infections with Demodex

Among 195 students' Demodex infections, simple follicle Demodex are 97 people, simple sebum Demodex are 77 people, and 21 people with mixed infections (**Table 5**).

4.6. Demodex Infections among Urban and Rural Students

Among 473 students who live in rural areas, 153 people are positive, the infection rate was 32.35%. Among 127 students who live in the city, 42 people were positive, urban the infection rate was 33.07%, where P values were greater than 0.05, which had no statistical significance (**Table 6**).

4.7. Different Ways of Cleansing Demodex Infections of Students

Cleansing 133 people with water, which is effective for 57 people, the positive rate was 45.86%; cleansing 49 people using soap, which is effective for 49 people, the positive rate was 26.53%; cleansing 411 people using cleanser, which is effective for 123 people, the positive rate of 29.93%; commonly using soap intergrated cleanser to cleanse 7 people, 2 were effective, the positive rate was 28.57%. Calculated with the chi-square test, P value was less than 0.05, with highly statistical significance (**Table 7**).

4.8. The Treatment of Facial Demodex Cases Using Various Drugs

Treating students with 2% mebendazole mixture , 39 cases were negative, negative rate was 78%; oral metronidazole tablets in patients, 43 were negative, negative rate of 86%; oral tinidazole tablets in patients, 44 were negative, negative rate of 88%; Compatibly treated with metronidazole ointment of pure pink and yellow snake patients, there were 47 negative, negative rate was 94%; Compatibly treated with sulfur ointment and glycerol patients, there were 49 negative, negative rate was 98%; patients treated with cream, 13 people were negative, negative rate was 26%. P values were less than 0.01, which were statistically significant (**Table 8**).

5. Discussion

Demodex infections are distributed worldwide, and the population infection rate abroad is about 27% - 100% [3], but the infection rate in China is about 20% - 70% [4]. The Demodex infection rate of all college students is greatly different, too. In the investigation into College students in some universities in Ningbo City, the Demodex infection rate is 32.50%, which is in accordance with the domestic normal infection rate. The main causes of the differences in the rate of infections with Demodex are attributed to geographical environment, climatic conditions, the season of checking, the site of checking and inspection methods, etc. In this research, we had investigated into the mites infections at the same population using scraping pressure method and sticking method. The results showed that the former method was better than the latter in the nose and face detection. The detection

Table 4. The comparison of Demodex mites infection between students who use and who don't.

Types	Number of tested people	Number of positive people	Positive rate (%)
Skin care products users	456	139	30.48%
No skin care products users	144	56	38.89%
Total	600	195	32.50%

Table 5. Different infection cases.

Infected with Demodex	Number of positive infections	Infection rate
Simplex mites	97	16.17%
Simplex sebum Demodex	77	12.83%
Mixed infections	21	3.50%
Total	195	32.50%

Table 6. Demodex infections among urban and rural students compared to the different situations.

Types	Surveyed	Positive numbers	Positive rate
Rural	473	153	32.35%
City	127	42	33.07%
Total	600	195	32.50%

Table 7. Cleansing Demodex infections on students with different ways compared to the infections' situations.

Types	Surveyed	Positive numbers	Positive rate
Shimizu	133	57	45.86%
Soap	49	13	26.53%
Cleanser	411	123	29.93%
Soap + cleanser	7	2	28.57%
Total	600	195	32.50%

Table 8. The treatment of demodex infections using different drugs.

Drugs	Number	Negative numbers	Negative rate
Treated with 2% mixture of mebendazole	50	39	78.00%
Treated with Oral metronidazole tablets	50	43	86.00%
Treated with Oral tinidazole tablets	50	44	88.00%
Pure powders with metronidazole ointment and yellow snake powders	50	47	94.00%
Sulfur ointment and glycerol capsules	50	49	98.00%
Cream coated	50	13	26.00%

rate is association with the amount of sebum. The more the amount of sebum is, the higher the detection rate is [4]. Demodex mites parasitic in hair follicles and sebaceous glands which mechanically stimulate and secrete some pathological factors can damage the hair follicles and sebaceous glands, leading to hair follicle expansion and epithelial degeneration; at the same time, they are also able to lead to the dermal telangiectasia, hyperplasia,

and blocking of sebaceous gland secretion. The worms can carry pathogenic microorganisms, when at concurrent bacterial infection, causing the hair follicle cell infiltration, fibrous tissue hyperplasia, performance for the local skin flushing, hyperaemia, inflammation, enlarged pores, and rough surfaces. In this paper, the total Demodex infection rate was 32.50%, the infection rate was 35.71% for males, and 28.41% for females. The differences from infection rate of male and female are not statistically significant, but most reports such as Zhang [5] find that men have a higher rate of infection than women, the cause of which still needs further study. We had detected the different types of Demodex infections mainly including *Demodex folliculorum*, *Demodex brevis* and mixed infections [6]. In infected persons, infections of Degree I accounted for 72.82% of the total, Degree II infections accounted for 15.90%, and Degree III infections accounted for 11.28%, which was consistent with the infections of Demodex mites reported before [7]. For patients with or without acne, our survey showed that infection rate of patients with acne was higher than those without acne, which had statistical significance. So, Demodex is one of the causes of acne for patients [8], and water cleansing is the destruction of drying and high-temperature conditions, making people susceptible to infection of vermiform mite. But if using soap and cleanser alkaline substances, normal human can resist the infection of vermiform mite. In the experimental groups with different treatments, the best use of combined sulfur ointment and glycerin coated metronidazole in pure powder and snake yellow ointment to the experimental groups, and the negative rate for infections reached 98% and 94%. We found that experiments coated with ointment smearing part had important significance for patients, the patients applied in nose and nasal groove parts, and the negative rate was higher than those applied in cheeks. Propagation on Demodex infections of populations who are more vulnerable to infection is necessary. Therefore, to prevent infection, we should enhance propaganda, enable students to understand the knowledge on Demodex prevention, developing good health habits, washing supplies special, paying attention to personal hygiene, keeping the face clean, trying to avoid close contact with patients, and cutting off the transmission route [9]. Patients with being positive for infections with acne, rosacea and other facial diseases should be timely treated, lest loss of illness would be incurred because of delay [10]-[12].

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