Prevalence of Demodex Species on the face of people who attending King Chulalongkorn Memorial Hospital for routine check up.

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ABSTRACT:

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Background : Demodex are follicular mites found in human. Their roles in causing diseases are still inconclusive. Generally, it is part of human normal flora but in some situations it can cause unspecified dermatological concerns. To date, the diagnostic criteria for Demodicosis is equivocal and probably leading to inappropriately use of antiparasite medication against Demodex. Moreover, the data in our population are lacking.

Objective : To determine the prevalence of Demodex species in our population and compare the predictive value of various symptoms and signs.

Materials and Methods : People were randomly selected from patients who came for general check up at Preventive medicine department, Chulalongkorn memorial hospital from July 2009 to January 2010. First, the participants were asked to complete the questionnaires concerning about possibly related factors. Then the skin scrapings for scales from forehead, cheeks, nose and chin were done. Subsequently the scales were prepared and look for Demodex. In the settings that at least one Demodex was found it was reported positive. On the other hand, negative was reported when there was no evidence of Demodex.

Results : From 200 participants, the ratio of female : male was 137: 63 and the age range was 18 to 73 years old. Demodex mites were found in 41 participants (20.5%). The most common area was the nose and *D.folliculorum* was the most predominate species. The average density was one Demodex per person. Combination and oily skin complexion was statistically significantly associated with the presence of Demodex (P-value = 0.000). Non itching face was found to be statistically significantly associated with the nonpresence of Demodex (p-value = 0.022). These two factors were found to be independence.

Conclusions : The prevalence of Demodex species in our normal population is 20.5%. Therefore in dermatological practices, it is crucial to be aware of the demodex mite as a part of normal facial flora especially in combination and oily skin complexion.

Key words : Demodex, Prevalence, Face

บทคัดย่อ :

วีรุทัย สภานนท์ วิวัฒน์ ก่อกิจ กัญญรัตน์ กรัยวิเชียร การศึกษาความชุกของการตรวจพบไรเดโมเด็กซ์บนใบหน้าของผู้ที่มาตรวจสุขภาพที่โรงพยาบาลจุฬาลงกรณ์ วารสารโรคผิวหนัง 2553; 26: 85-94.

หน่วยโรคผิวหนัง ภาควิชาอายุรศาสตร์ คณะแพทยศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย

เดโมเด็กซ์จัดเป็นไรชนิดหนึ่งที่อาศัยอยู่ในต่อมขนของมนุษย์ บทบาทของไรชนิดนี้ในมนุษย์ยังไม่ทราบแน่ชัด การตรวจพบไรเดโมเด็กซ์บนใบหน้ามนุษย์ในบางกรณีนั้นมีความเกี่ยวข้องกับการเกิดผื่นผิวหนังหลายชนิดที่ไม่เฉพาะเจาะจง ในขณะเดียวกันก็สามารถตรวจพบไรเดโมเด็กซ์ได้ในใบหน้าของคนปกติ ข้อมูลเกี่ยวกับความชุกในประชากรไทยยังไม่เคยมีรายงาน

วัตถุประสงค์ : เพื่อศึกษาความชุกของไรเดโมเด็กซ์บนใบหน้าคนไทยและทำการวิเคราะห์ผลที่ได้กับปัจจัยต่างๆที่มีความเกี่ยวข้อง

วิธีการศึกษา : ทำการศึกษาโดยการสุ่มตัวอย่างจากผู้ที่มารับบริการตรวจสุขภาพ (check up) ที่แผนกผู้ป่วยนอกเวชศาสตร์ป้องกัน โรงพยาบาลจุฬาลงกรณ์ สภากาชาดไทย ระหว่างเดือนกรกฎาคม 2552 ถึงสิ้นเดือนมกราคม 2553 ให้

ผู้เข้าร่วมวิจัยตอบแบบสอบถามเพื่อเก็บเป็นข้อมูลพื้นฐานในแต่ละบุคคล และทำการตรวจด้วยวิธีขูดผิวหนังชั้นนอกที่บริเวณต่างๆบนใบหน้า หลังจากนั้นจึงนำไปตรวจหาไรเดโมเด็กซ์ด้วยกล้องจุลทรรศน์ ประเมินผลการตรวจโดยรายงานจำนวนที่ตรวจพบ และบริเวณที่ตรวจพบ รวมไปถึงการวิเคราะห์ข้อมูลจากแบบสอบถาม

ผลการศึกษา : ผู้เข้าร่วมการศึกษา 200 คน เป็นเพศชาย 63 คน เพศหญิง 137 คน อายุระหว่าง 18 ถึง 73 ปี พบว่าตรวจพบไรเดโมเด็กซ์บริเวณใบหน้ามีความชุกเท่ากับ 41 คนจาก 200 คนคิดเป็น 20.5% พบบริเวณจมูกหนาแน่นที่สุด *D.folliculorum* เป็นสปีชีส์ที่พบมาก และความหนาแน่นเท่ากับ 1 ตัวต่อผู้เข้าร่วมวิจัย 1 คน เมื่อประเมินปัจจัยต่างๆที่เกี่ยวข้องกับการตรวจพบไรเดโมเด็กซ์ พบว่าปัจจัยที่มีความเกี่ยวข้องกับการตรวจพบไรเดโมเด็กซ์อย่างมีนัยสำคัญทางสถิติ คือ สภาพผิวหน้าผสมถึงมัน (P-value = 0.000) และการที่ไม่พบอาการคันใบหน้าสอดคล้องกับการตรวจไม่พบไรเดโมเด็กซ์อย่างมีนัยสำคัญทางสถิติ (P-value = 0.022) ซึ่งปัจจัยทั้งสองนี้ส่งผลอย่างเป็นอิสระต่อกัน

สรุปผล : ความชุกของการตรวจพบไรเดโมเด็กซ์ในคนไทยเท่ากับ 20.5% นั่นคือในคนปกติสามารถตรวจพบไรเดโมเด็กซ์ได้ ดังนั้นการพิจารณาในแง่ของการรักษา จำเป็นต้องคำนึงถึงปัจจัยหลายๆชนิดที่มีความเกี่ยวข้องเช่นอาการและอาการแสดงที่สอดคล้องกับโรคผิวหนังที่เกิดจากไรเดโมเด็กซ์ (Demodicosis)

คำสำคัญ: เดโมเด็กซ์, ความชุก, ใบหน้า

Introduction

D.folliculorum and D.brevis are two species of Demodex mites commonly found in human[1-6.] Normally, their habitats are the pilosebaceous units. D.folliculorum is usually located in the follicular infundibulum. It is 0.3-0.4mm measured in length and has an elongated, striated abdomen[3-5;7]. D.brevis which as its named is shorter and also found in deeper sebaceous and meibomian glands. The egg of D.folliculorum are > 100 Um in length and arrowhead-shaped while those of D.brevis are < 65 Um and oval[3-5;7]

It is reported that Demodex mites are commensal organism.[1-3;6-8] Some of the studies in the past stated that they are normal flora, most commonly D.folliculorum. Generally, in healthy skin the D.folliculorum density is under five parasites in a centimeter square and they do not cause clinical symptoms in the majority of infested individuals.[3;9-16] On the other hand, some reports believed that whenever they multiplied and heavily infested the follicles they penetrated into the dermal tissue therefore turned their roles against human and became parasite.[2;8;11-13;15;17-19]

An increased number of Demodex mites was observed in dermatoses ; for example Pityriasis folliculorum, Rosacea, Perioral dermatitis. These conditions of Demodex related skin disease is called Demodicosis.[8;12;13;17] Which it is assumed as pathogenesis of these conditions. To date, there is still lack of definite criteria for diagnose Demodicosis leading to misconceptions about the role of these mite and overtreatment in general practice. The only criteria mentioned was a compatible clinical pictures together

with the presence of more than 5 mites per centimeter square[12;13;17]

A lot of factors were found associated with the presence of Demodex, Some studies suggested that D.folloculorum infestation rate increases with age, probably due to more amount in rate of sebum production in elderly[1]. Others factors found commonly associated were facial complexion, history of make up allergy, frequency of facial cleansing.[1;20]

Follicular mites show a predilection for areas of high sebum production. They are found numerous on the forehead, cheeks, nose and naso-labial folds[1;17;20]. Demodex are quite motile according to their dynamic life cycles[4;7]. Itching symptom sometimes pronouncedly related with the presence of Demodex. Also, there are a number of non specific sign and symptom associated had been described[14;17]

Our study was the effort to explain the role of this mite in normal population. Also, the associated factors found together with the present of Demodex

Material and methods

This study was conducted at the out patient department (OPD) department of preventive medicine, Chulalongkorn memorial hospital, between July 2009 and January 2010. This study was a cross-sectional descriptive study.

Study groups were randomized from the people who came for general check up at out patient clinic described above. 200 participants were enrolled. A questionnaire was administered to each of participants. It is devided in two sections, The self-answering questions which are the questions concerning demographic data, personal facial cleansing products, frequency of cleansing face, complexion type, history of makeup usage and allergy. Another section involve the physical examination-based answer which are clinically related demodicosis signs and symptoms questions for example; perioral dermatitis, rosacea, acne, blepharitis, history of topical corticosteroid usage, facial telangiectases, facial itching

After the questionnaire has been answered. The specimen was collected by skin scraping technique. The disposable blades were used to scrape the scales from all of the entire skin surfaces which were divided into 4 main areas including ; forehead (F), nose (N), cheeks (C), and chin (M) . Finally four slides were collected

After preparation, the slides were examined under light microscope at 10X and 40X magnification. The amount, species and area of Demodex found were recorded.

The data obtained from the study were evaluated by Windows 16.0 SPSS program using the Pearson chi-square test for continuity corrections

Outcome measures

The primary outcome measure was the presence of at least one Demodex on any area of the face, which will be reported as positive

Secondary outcome measures included the density of Demodex, the species, area, factors associated with the presence of Demodex

Results

Two hundred volunteers were participated in this study. All of them gave their inform consent. The participants were 137 (68.5%) females and 63 (31.5%) males. The average age were 39.44

The participants who were encountered at least one Demodex were 41(20.5%) people. According to this positive group, there were 10(24.4%) males and 31(75.6%) females. No statistical significance was determined between the prevalence of Demodex in male and female. (continuity correction x2 = 0.829, P=0.362)

When the distribution of prevalence of Demodex in the group according to facial complexion was examined, it was found to have occurred more frequently in combination to oily complexion (92.7%) than in normal to dry complexion (7.3%) with statistically significance (continuity correction x2 = 27.71, P=0.000) The odds ratio equals 15.3 (95%CI = 4.5-51.6) The distribution of Demodex by facial complexion is shown in Table 1

In relation to the symptom of facial itch, individuals whom denied any feeling of consistent facial itch was likely not had been infested with Demodex(67.3%) more than individuals with the symptom(32.7%) with statistically significance (continuity correction x2 = 5.274, P=0.022) The odds ratio equals 2.4 (95%CI = 1.2-2.4) The distribution of Demodex by facial itch is shown in Table 2

Table 1 Demodex distribution by facial complexion

Complexion	Demodex		Total
	Present	Absent	
Combination to oily	38(92.7%)	72 (45.3%)	110
Normal to dry	3 (7.3%)	87 (54.7%)	90
Total	41	159	200

x2 : P=0.000 , OR = 15.3 (95%CI = 4.5-51.6)

An examination of the individuals with respect to the age group was different but did not reveal any statistical significance (Pearson x2 = 1.448 , P=0.485)

The presence of Demodex according to the frequency of facial cleansing was different. In the group that clean the face more the once a day has found Demodex more frequently(85.4%) than in the latter group that clean face once a day(14.6%). However, there was no statistically significance (Pearson x2 = 0.017, P=0.896)

A comparison between the prevalence of Demodex with the individual's history of make up usage was presented. In the group that there is positive history found to have more Demodex(61%) than the negative history group (39%) but the number had no statistically significance. (continuity correction x2=0.034, P=0.855)

Table 2 Demodex distribution by facial itch

Facial itching	Demodex		Total
	Present	Absent	
Yes	22 (53.7%)	52 (32.7%)	74
No	19 (46.3%)	107(67.3%)	126
Total	41	159	200

x2 : P=0.022 , OR = 2.4 (95%CI = 1.2-2.4)

Unexpectedly, Demodex was found more pronounced in the group of individuals without history of make up allergy(63.4%) than in another group of positive history of allergic to make up(36.6%). It is found to be no statistically significance. (continuity correction x2 = 1.831, P=0.176)

The other results according to various symptoms for example facial redness, facial telangiectases, perioral dermatitis, and seborrheic dermatitis related with the presence of Demodex were not statistically significance as given in Table 3, 4, 5, 6 respectively

Demodex was detected in 9.8% of the individuals who stated that they had applied topical corticosteroid onto the face area which was less frequently found than another group that had not been corticosteroid usage (90.2%) with no statistically significance (continuity correction x2 = 0.02, P=0.887)

Demodex was presented in 24.4% of the individuals that had history of recurrent blepharitis which was less frequently found than another group that denied any history about it (75.6%). However, there was no statistically significance (continuity correction x2 = 0.000, P=0.985)

According to individuals with acne, Demodex was less frequently found(17.1%) than in the group without acne (82.9%). Likewise, there was no statistically significance (Pearson x2 = 0.044, P=0.833)

Table 3 Demodex distribution by facial redness

Facial redness	Demodex		Total
	Present	Absent	
Yes	5 (12.2%)	27 (17%)	32
No	36 (87.8%)	132(83%)	168
Total	41	159	200

x2 : P=0.613

Table 4 Demodex distribution by facial telangiectases

Facial telangiectasis	Demodex		Total
	Present	Absent	
Yes	5 (12.2%)	16 (10.1%)	21
No	36 (87.8%)	143 (89.9%)	179
Total	41	159	200

x2 : P=0.911

Table 5 Demodex distribution by perioral dermatitis

Perioral dermatitis	Demodex		Total
	Present	Absent	
Yes	18 (43.9%)	56 (35.2%)	74
No	23 (56.1%)	103 (64.8%)	126
Total	41	159	200

x2 : P=0.398

Table 6 Demodex distribution by seborrheic dermatitis

Seborrheic dermatitis	Demodex		Total
	Present	Absent	
Yes	17 (41.5%)	68 (42.8%)	85
No	24 (58.5%)	91 (57.2%)	115
Total	41	159	200

x2 : P=0.880

Demodex was most frequently seen in the nose localization (43.9%). D.folliculorum was the most frequently found species and most of the individuals had only single Demodex localization

Discussion

Demodex is believed to be one of human commensal organism which reside and nourished on our skin as a nonpathogenic organism[1;3-6]. In some situations, when it multiplies or penetrates deeper it can

cause diseases. Many skin conditions which had some features of demodicosis had been misdiagnosed and treated in the wrong directions. While in some instance for example ; acne, seborrheic dermatitis they had been overdiagnosed demodicosis without any evidences that assumed to be criteria for diagnosis demodicosis.

There are numerous studies in the past contributed in the findings of Demodex either in people with various skin diseases or in general population[1;3;5;6;16;19;21-25]. However, the studies about prevalence of Demodex in our population is still lacking. We performed the first study in prevalence of Demodex species in Thai population along with the studies of the factors associated with the findings

From our study, we assumed that the study group could be generalized as normal population since the people who came for general check up serve as a lot of differentiation in age group, sex , also skin conditions. The finding was from 200 people, 41 were positive for Demodex. That means the prevalence of Demodex in our population was 20.5% which was quite a significant number. We can stated that Demodex could be found living on our skin without causing any undesirable conditions.

The distribution of Demodex was found mostly on the nose which is believed to be rich in sebaceous and hair follicles therefore it was easier to detected Demodex in this area.

Only one Demodex was found localization per person and D.folliculorum was most frequently found. It could be explained by our method of detection. Although skin scraping is more suitable in tracing for Demodex in wide areas, it can yield only upper surface of the epidermis leading to the chances of missing some of the Demodex reside deeper including D.brevis

A lot of studies reporting the prevalence of Demodex concerning about age which the results has been diversity. Bulut(1) has claimed that the prevalence of Demodex in 857 people with normal facial skin is 24% and Demodex is less frequently found in the age over 46. In our study related with individuals from normal population, we recognized that the prevalence of Demodex was 20.5% and there is no statistically significance between the age of the individual and the prevalence of Demodex which was the same as a lot of recent studies about Demodex in normal population like the studies from Cao, Wang and Ozdemir[1;21;26]. We assumed that Demodex can be widely found in every age.

Even though there are publications reporting that there are relationship between the prevalence of Demodex and sex. Some studies stated that the infestation is more common among men when compared with women. Also, Ozdemir[1] has claimed

that the prevalence of Demodex in health personnel working in autopsy room has found more frequently among women. However, in our study we found that there has been no statistically significance among sex and the prevalence of Demodex. Which has been related with other publications

From our study, the factors that contributed to be statistically significance with the presence of Demodex was combination to oily complexion (P=0.000). While the lack of facial itch was found to be statistically significance (P=0.022) in associated with the negative finding of Demodex which will be discussed later.

Combination to oily complexion has been found to be one of the risk factors in the presence of Demodex (OR = 15.3) which was the same as a publication of Cao[21] from China. As the matter of fact that in combination to oily complexion had more distributed sebaceous and hair follicles on the skin[20]. Also the rate of sebum secretion is much higher than normal to dry complexion[20]. As a result, combination to oily complexion could generate suitable environment for growth and development of Demodex[4]. The underlying message is whenever the patient with clinically unlikely for diagnose demodicosis come to visit us. We should keep in our mind that there are chances in finding Demodex. Other criteria should be utilize for definite diagnosis.

In contrast with the presence of Demodex associated with the symptom of facial itch. In individuals who reported not having any facial itch was double less likely to found Demodex on their skin (OR =2.4). The explanation would be because during Demodex life cycle(4), the organism always motile in and out of the follicles leading to the symptom of irritation and itching. In condition that any people who have not affected with these symptom. It might be considered those people not infested with Demodex.

The limitations of our study are listed here. To begin with, the sample size of our study were 200 participants which were calculated from previous related publication. When we considered the factors that had statistically associated with the finding of Demodex. We might be able to see that the range of 95% confidence interval was quite wide. In statistical way it means that sample size might be too small to properly imply the result.

Secondly, The questionnaire might not be able to collect absolutely correct datas from the participants. Other directly procedure might be needed to gain the data.

Finally, The skin scraping method might not be able to reach entire of the Demodex on the skin. However, the reason has been described above.

Reference

1. Ozdemir MH, Aksoy U, Sonmez E, Akisu C, Yorulmaz C, Hilal A. Prevalence of Demodex in health personnel working in the autopsy room. Am J Forensic Med Pathol 2005;26(1):18-23.
2. Baima B, Sticherling M. Demodicidosis revisited. Acta Derm Venereol 2002;82(1):3-6.
3. Pena GP, Andrade Filho JS. Is demodex really non-pathogenic? Rev Inst Med Trop Sao Paulo 2000 ;42(3):171-3.
4. Rufli T, Mumcuoglu Y. The hair follicle mites Demodex folliculorum and Demodex brevis: biology and medical importance. A review. Dermatologica 1981;162(1):1-11.
5. Bonnar E, Eustace P, Powell F. Demodex mite in normal skin. The Lancet 1991;337:1168.
6. Burns DA. Follicle mites and their roles in disease. Clinical and experimental dermatology 1992;17:152-5.
7. Desch C, Nutting WB. Demodex folliculorum(SIMON) and D.Brevis Akbulatova of man: Redescription and reevaluation. The journal of parasitology 1972;58:169-77.
8. Akilov OE, Mumcuoglu KY. Immune response in Demodicosis. JEADV 2004;18:440-4.

9. Forton F. Standardized skin surface biopsy: method to estimate the Demodex folliculorum density, not to study the Demodex folliculorum prevalence. J Eur Acad Dermatol Venereol 2007;21(9):1301-2.
10. Karincaoglu Y, Esrefoglu SM, Bayram N, Aycan O, Taskapan H. Incidence of Demodex folliculorum in patients with end stage chronic renal failure. Ren Fail 2005;27(5):495-9.
11. Forton F, Seys B. Density of Demodex folliculorum in rosacea: a case-control study using standardized skin-surface biopsy. Br J Dermatol 1993;128(6):650-9.
12. Heacock CE. Clinical manifestations of demodicosis. J Am Optom Assoc 1986;57(12):914-9.
13. Forton F, Germaux MA, Brasseur T, De LA, Laporte M, Mathys C, et al. Demodicosis and rosacea: epidemiology and significance in daily dermatologic practice. J Am Acad Dermatol 2005;52(1):74-87.
14. Karincaoglu Y, Bayram N, Aycan O, Esrefoglu M. The clinical importance of demodex folliculorum presenting with nonspecific facial signs and symptoms. J Dermatol 2004;31(8):618-26.
15. Forton F, Seys B, Marchal JL, Song AM. Demodex folliculorum and topical treatment: acaricidal action evaluated by standardized skin surface biopsy. Br J Dermatol 1998;138(3):461-6.
16. El-Shazly AM, Ghaneum BM, Morsy TA, Aaty HE. The pathogenesis of Demodex folliculorum (hair follicular mites) in females with and without rosacea. J Egypt Soc Parasitol 2001 Dec;31(3):867-75.
17. Oleg E.Akilov, Yuri S.Butov. A clinico-pathological approach to the classification of human demodicosis. JDDG 2005;3:607-14.
18. Schaller M, Sander CA, Plewig G. Demodex abscesses: Clinical and therapeutic challenges. J Am Acad Dermatol 2003;49:S272-4.
19. Georgala S, Katoulis AC, Kylafis GD, Koumantaki-Mathioudaki E, Georgala C, Aroni K. Increased density of Demodex folliculorum and evidence of delayed hypersensitivity reaction in subjects with papulopustular rosacea. J Eur Acad Dermatol Venereol 2001 ;15(5):441-4.
20. Okyay P, Ertabaklar H, Savk E, Erfug S. Prevalence of Demodex folliculorum in young adults: relation with sociodemographic/hygienic factors and acne vulgaris. J Eur Acad Dermatol Venereol 2006;20(4):474-6.
21. Cao YS. [Facial Demodex infection among college students in Tangshan]. Zhongguo Ji Sheng Chong Xue Yu Ji Sheng Chong Bing Za Zhi 2009;27(3):271-3.
22. Aycan OM, Otlu GH, Karaman U, Daldal N, Atambay M. [Frequency of the appearance of Demodex sp. in various patient and age groups]. Turkiye Parazitol Derg 2007;31(2):115-8.
23. Czepita D, Kuzna-Grygiel W, Czepita M, Grobelny A. Demodex folliculorum and Demodex brevis as a cause of chronic marginal blepharitis. Ann Acad Med Stetin 2007;53(1):63-7.
24. Czepita D, Kuzna-Grygiel W, Kosik-Bogacka D. [Investigations on the occurrence as well as the role of Demodex follicuforum and Demodex brevis in the pathogensis of blepharitis]. Klin Oczna 2005;107(1-3):80-2.
25. Kemal M, Sumer Z, Toker MI, Erdogan H, Topalkara A, Akbulut M. The Prevalence of Demodex folliculorum in blepharitis patients and the normal population. Ophthalmic Epidemiol 2005;12(4):287-90.
26. Wang GY. [Investigation of Demodex infection among medical students]. Zhongguo Ji Sheng Chong Xue Yu Ji Sheng Chong Bing Za Zhi 2006; 30;24(2).