

INVESTIGATIVE REPORT

Prevalence of Acne Vulgaris in Chinese Adolescents and Adults: A Community-based Study of 17,345 Subjects in Six Cities

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Acne vulgaris is a common skin condition in adolescents. The prevalence of acne is thought to vary between ethnic groups and countries. A large-scale community-based study was performed in six cities in China to determine the prevalence and possible risk factors for acne in the Chinese population. A total of 17,345 inhabitants were included in this study. Of these, 1,399 were found to have acne. No acne was found in subjects under 10 years of age, and only 1.6% in the 10-year-old group had acne. Prevalence then increased rapidly with age, up to 46.8% in the 19-year-old group. After that, it declined gradually with age. Acne was rare in people over 50 years of age. In subjects in their late teens and 20s, acne was more prevalent in males, while in those over 30 years of age it was more prevalent in females. In subjects with acne, 68.4% had mild; 26.0% had moderate and 5.6% had severe acne. In adult acne, persistent acne was much more common (83.3%) than late-onset acne (16.7%). Smoking and drinking were found to be associated with adolescent acne, while no association was found between diet and acne. These results suggest that the prevalence of acne in the Chinese population is lower than that in Caucasian populations, and that adult acne is not uncommon in Chinese subjects. *Key words: acne; China; community-based study; prevalence; risk factors.*

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Acne vulgaris is a chronic inflammatory disease of the pilosebaceous follicles, characterized by comedones, papules, pustules, cysts, nodules and, occasionally, scars. Acne is a common skin condition in adolescents. The pathogenesis of acne is thought to include follicular hyperproliferation, excess production of sebum, inflammation, and proliferation of *Propionibacterium acnes*. Acne occurs primarily in the seborrheic areas, such as the face, neck, and upper trunk. Previous studies have

shown that the prevalence of acne in adolescents (1–7) and adults (8–12) varies between ethnic groups and countries. In Australia, acne was found in 27.7% of students aged 10–12 years and 93.3% of 16–18-year-olds (1). A study in Peru showed that the prevalence of acne in 12-year-old and 17-year-old students was 16.33% and 71.23%, respectively (2).

Acne occurs not only in adolescents, but also in people over 25 years of age (adult acne or post-adolescent acne) (8–12). In a community-based study performed in Germany, acne was found in all age groups and the prevalence was as high as 13% in people over 59 years of age (9).

In China, although some epidemiological studies have been performed in adolescents, no community-based multi-centre study has been published. We carried out a large-scale community-based study in six cities in China in order to determine the prevalence of acne in the Chinese population.

SUBJECTS AND METHODS

This study was performed in six cities in China, covering the North (Taiyuan city and Langfang city in Shanxi and Hebei Provinces), the Northeast (Hailar city in Inner Mongolian Autonomous Region), the East (Zibo city in Shandong Province), the Southwest (Xichang city in Sichuan Province) and Central China (Jiaozuo city in Henan Province). In each city, communities were selected by cluster sampling method and inhabitants in these communities were visited at home. They were asked to complete the questionnaires and were examined for the presence of acne by dermatologists (investigators). Acne was defined by the presence of comedones, papules, pustules, nodules, cysts and scars on the face, neck and upper trunk. The presentation of scars alone was not included. The severity of acne was classified using a three-point grading scale. Mild acne was defined as grade I acne of Pillsbury Grade (13). Moderate acne included grade II and grade III. Severe acne was grade IV. Subjects with acne who were under 25 years old were defined as having adolescent acne and those over 25 years old as having adult acne. Adult acne was further classified as persistent acne (continual acne from adolescence) and late-onset acne (onset after 25 years of age).

For drinking behaviour, subjects were divided into non-drinkers, mild to moderate drinkers (one to three alcoholic drinks per week) and heavy drinkers (more than four alcoholic drinks per week). One alcoholic drink was defined as 360 g of beer (12.6 g of ethanol), 103 g of rice wine (12.5 g of ethanol), or

30 g of liquor (12.9 g of ethanol). Each participant was asked whether he or she had ever drunk at least one alcoholic drink per week continuously for 6 months or longer. If the answer was yes, he or she was defined as a drinker and was asked about the amount of alcohol consumed.

For dietary habits, a greasy/spicy diet was defined as having greasy/spicy meals at least 3 days per week for 6 months or longer.

Epidata and SPSS were used for data analysis. The significance of the results were determined with the χ^2 test.

RESULTS

Study population

A total of 17,345 inhabitants (7,858 males, 9,487 females) from the original sample of 19,974 completed the questionnaires and received dermatological examinations. The age of the study population ranged from 1 to 99 years (mean 41.8 years).

Prevalence of acne

In all 17,345 inhabitants, 1,399 were found to have acne (820 males, 579 females). No acne was found in subjects under 10 years of age, and only 1.6% in the 10-year-old group had acne. The prevalence of acne increased rapidly after that. The highest prevalence was found in the 19-year-old group (46.8%), then it declined gradually with age, with 11.7% in 30-year-old group and 2.2% in 40-year-old group. Acne was rare in subjects over 50 years of age (Fig. 1).

The prevalence of acne in males and females is shown in Fig. 1. Acne occurred earlier in girls (at 10 years old) than in boys (at 12 years old). In young teenagers, females showed a higher prevalence than males. From late teens to 20s, the prevalence of acne was higher in males than in females. However, the prevalence of acne in females was higher than in males in subjects over 30 years of age. When we divided the age group by 5 years, the prevalence of acne was 10.5% in the 10–14-year-old group. The highest prevalence was seen in the 15–19-year-old group (38.0%), followed by the 20–24-year-old group (36.0%). Only 1.4% subjects had acne in the 40–44-year-old group (Table I).

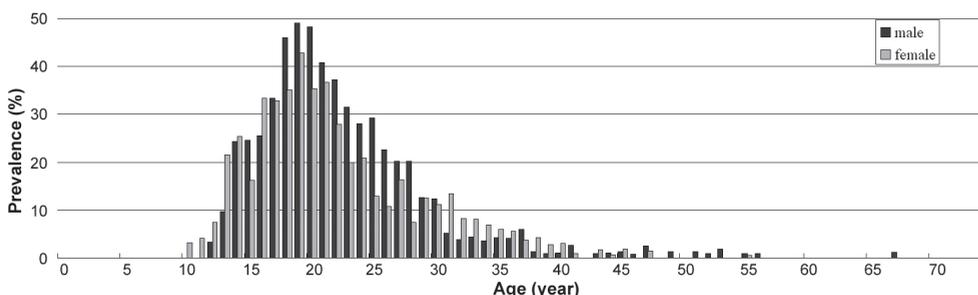


Fig. 1. The prevalence of acne in Chinese males and females. Acne occurred at early adolescence, reached its highest level of prevalence in 19-year-old subjects and declined gradually with age. Acne occurred earlier in females than in males. From the late teens to 20s, acne was more prevalent in males, while it was more prevalent in female subjects over 30 years of age. Acne was very rare in subjects over 50 years of age.

Table I. Prevalence of acne in Chinese subjects of different ages

Age, years	n	Prevalence		
		Male % (n)	Female % (n)	Total % (n)
1–9	1,009	0 (0)	0 (0)	0 (0)
10–14	711	8.4 (29)	12.6 (46)	10.5 (75)
15–19	947	41.3 (222)	33.7 (138)	38.0 (360)
20–24	1,637	40.0 (406)	30.1 (198)	36.0 (604)
25–29	1,024	21.2 (91)	12.0 (71)	15.8 (162)
30–34	1,119	6.4 (33)	9.6 (66)	8.3 (99)
35–39	1,465	3.2 (20)	4.6 (39)	4.0 (59)
40–44	1,404	1.1 (6)	1.5 (13)	1.4 (19)
45–49	1,218	1.2 (6)	0.9 (6)	1.0 (12)
50–54	1,392	0.7 (4)	0 (0)	0.3 (4)
55–59	1,234	0.4 (2)	0.1 (1)	0.2 (3)
>60	4,069	0.0 (1)	0.0 (1)	0.0 (2)
Total	17,345	10.4 (820)	6.1 (579)	8.1 (1,339)

Severity of acne

Of all 1,399 subjects with acne, 68.4% had mild acne (males 63.0%, females 76.0%). 26.0% had moderate acne (males 29.9%, females 20.6%), and 5.6% had severe acne (males 7.1%, females 3.4%).

Adolescent acne and adult acne

In 1,399 subjects with acne, 1,039 (74.3%) had adolescent acne and 360 (25.7%) had adult acne. In adult acne, 83.3% had persistent acne and 16.7% had late-onset acne. The clinical features of adolescent acne, persistent acne and late-onset acne are shown in Table II. In adolescent acne, males were predominant. In persistent adult acne, males and females were equally affected, while in late-onset adult acne, females were predominant. Late-onset acne had a milder severity grade and a less premenstrual flare-up than the other two types (Table II).

Risk factors for acne

As acne was not found in subjects under 10 years of age, and the prevalence was very low in people older than 50 years of age, the risk factors were analysed in subjects in the age range 10–49 years.

Table II. Clinical features of adolescent acne and adult acne in Chinese subjects

	Adolescent acne, %	Adult acne	
		Persistent acne, %	Late-onset acne, %
Gender distribution			
Male	63.2	47.4	31.6
Female	36.8	52.6	68.4
Severity of acne			
Mild	68.9	64.9	77.2
Moderate	25.6	28.4	21.1
Severe	5.5	6.7	1.8
Premenstrual flare-up (female)	47.5	54.7	38.5

To study the relationship between acne and smoking, subjects were divided into non-smokers, ex-smokers and smokers. In adolescents (<25 years of age), the prevalence of acne was significantly higher in smokers (40.6%) and ex-smokers (37.5%) than in non-smokers (29.4%; $\chi^2=26.662$; $p=0.000$). In adults (over 25 years old), the prevalence of acne was 6.3% in smokers and 5.3% in non-smokers ($\chi^2=2.673$; $p=0.263$) (Table III).

In adolescents, the prevalence of acne was 41.2% in heavy drinkers, 41.4% in mild to moderate drinkers, and 28.8% in non-drinkers, showing a significantly higher prevalence in drinkers ($\chi^2=36.162$; $p=0.000$). In adults, the prevalence of acne was 5.5% in heavy drinkers, 5.8% in mild to moderate drinkers, and 5.5% in non-drinkers ($\chi^2=0.198$; $p=0.906$) (Table III).

No association was found between dietary habits and acne. Of adolescents with greasy/spicy diet, 30.1% were found to have acne, compared with 33.5% in those with normal diet ($\chi^2=2.105$; $p=0.147$). In adults, acne was found in 5.7% of subjects with greasy/spicy diet and 5.2% with normal diet ($\chi^2=0.769$; $p=0.381$) (Table III).

Impact of acne on quality of life

Among 1,399 subjects with acne, 30.8% reported that acne had a negative impact on their quality of life, while others experienced no effect. 79.7% subjects regarded acne as "natural" and only 17.2% considered it as a

Table III. Relationship between drinking/smoking and acne in adolescents and adults

	Prevalence of acne in adolescents		Prevalence of acne in adults	
	%	n/N	%	n/N
Smoker	40.6	215/529	6.3	104/1655
Ex-smoker	37.5	6/16	7.1	5/70
Non-smoker	29.4	818/2786	5.3	242/4584
Heavy drinker	41.2	28/68	5.5	39/710
Mild to moderate drinker	41.4	236/570	5.8	73/1254
Non-drinker	28.8	775/2693	5.5	239/4345
Greasy/spicy diet	30.1	749/2456	5.7	98/1893
Normal diet	33.5	290/875	5.2	253/4416

disease. Only 33.5% had their acne treated (39.0% in females, 29.6% in males).

DISCUSSION

This study was conducted in order to obtain the prevalence of acne in the Chinese population. Studies in other countries have shown that the prevalence of acne varies (Table IV). It has been reported that Asians have a lower prevalence of acne than Caucasians (14, 15). A study in Peru found that Peruvian Indians who were considered to have an Asiatic origin had significantly less acne than Peruvian whites or Mestizos (mixture of white and Indian) (2). In this study, the highest prevalence in the Chinese population was 46.8%, which was much lower than that reported in Caucasians (1, 3, 9). This difference might be related to genetic background and/or lifestyle. Sampling methods and study population may also explain some differences between studies. Some studies were performed in school students, and thus only obtained the prevalence in teenagers and those in their early 20s (1, 2, 5, 6). In two studies, although they were community-based studies, the study populations were small (8, 9). Some studies were performed with working people (16). Moreover, only a few studies have examined the prevalence of acne in adults (Table IV) (17).

This study included 17,345 inhabitants, covering all age groups. This allowed us to obtain the prevalence of acne in people of different ages. We found that acne occurred earlier in females than in males. Prevalence was highest in those aged 19 years, then declined gradually with age. We found that males were predominant in adolescent acne, while females were predominant in adult acne. This is similar to two studies in the UK (3, 8). This study revealed that acne was rarely seen in people over 50 years of age, which is quite different from that reported by Schafer et al. (9), who found that the prevalence of acne was as high as 13% in Germans over 59 years of age.

This study also found that cases of adult acne account for 25% of the total acne population, and that most cases of adult acne are of persistent acne. Although adult acne has been studied previously (8–12), few studies have examined the clinical differences between late-onset acne and persistent acne. We found that late-onset acne had a milder severity grade and less premenstrual flare-up. We also found that females were predominant in late-onset acne, while males and females were equally affected in persistent acne. It has been reported that more than one-third of women with adult acne have additional clinical features of hyperandrogenicity (18). Hormone examinations and hormone therapies may be needed for women with adult acne, especially those with late-onset acne (17, 19). Since this is a community-based study, no laboratory investigation was included.

Table IV. Prevalence of acne in different countries and study populations

Year, country (reference)	Subjects (n)	Study design	Prevalence of acne in male subjects	Prevalence of acne in female subjects
1998, Australia (1)	Adolescent (2,491)	Cross-section	30.7% in 4–18-year-olds; ranging from 1.8% in 7–9-year-olds to 97.8% in 16–18-year-olds	41.2% in 4–18-year-olds, ranging from 4.3% in 7–9-year-olds to 89.8% in 16–18-year-olds
1998, Peru (2)	Adolescent (2,214)	Cross-section	45.9% in 12–18-year-olds, ranging from 7.6% in 12-year-olds to 68.8% in 18-year-olds	36.4% in 12–18-year-olds, ranging from 26.1% in 12-year-olds to 45.2% in 18-year-olds
1979, UK (3)	Adolescent + adult (2,155)	Cross-section	3% clinical acne in 40–49-year-olds 6% physiological acne in 50–59-year-olds	5% clinical acne in 40–49-year-olds 8% physiological acne in 50–59-year-olds
1997, China (5)	Adolescent (6,531)	Cross-section	Ranging from 2.1% in 10-year-olds to 59.5% in 18-year-olds	Ranging from 3.0% in 10-year-olds to 44.0% in 18-year-olds
1999, UK (8)	Adult (749)	Community-based	40% in 25–58-year-olds Clinical acne was 3%	54% in 25–58-year-olds Clinical acne was 12%
1992, USA (10)	Adolescent + adult (20,749)	Random stratified sample	34% in 15–44-year-olds	27% in 15–44-year-olds
2001, Germany (9)	Adolescent + adult (896)	Community-based	No prevalence by gender was available. 10.8% in 5–13-year-olds, 61.7% in 14–19-year-olds, 64.0% in 20–29-year-olds, 43.5% in 30–39-year-olds, 24.3% in 40–49-year-olds, and 9.1% in 50–59-year-olds	

Previous studies on the association between lifestyle factors, such as smoking, drinking and diet, and acne have shown conflicting results (20–25). Due to the cross-sectional nature of our study, it was not possible to characterize the time sequence of acne and smoking/drinking. Although our study indicated a higher prevalence in smokers and drinkers in the adolescents, no affirmatory relationship between drinking/smoking and acne can be established because some individuals may start smoking or drinking after the onset of acne or even as a consequence. Adolescent health is strongly linked to behaviour (26). If an individual experiences low self-esteem, he or she may be vulnerable to adverse behaviour, in particular smoking and alcohol misuse (26). The presence of acne is a common reason for low self-esteem in young people (6, 27). Therefore, acne may not only make young people at risk of adverse behaviour, but subsequent adverse behaviour could also perpetuate the skin disease, resulting in a vicious circle.

We found that only one-third of subjects with acne had their acne treated (39.0% of females, 29.6% of males). That was similar to the study in Hong Kong, which showed that less than 40% of adolescents with acne received treatment (28). Stern (29) also reported a female:male ratio of 5:3 for dermatologist visits because of acne. In this study, 79.7% of subjects with acne regarded acne as a natural physiological process during adolescence. Such belief prevented them from seeking medical care, suggesting a requirement to educate this group of people about the nature of acne and the importance of treatment.

To our knowledge, this is the first multi-centre, community-based study performed in China on the prevalence of acne in a large study population. However, the fact that six cities were selected for this study does imply a limitation in terms of representation, in light of the fact that China has 31 provinces and more than 600 cities. Furthermore, we did not use the Cardiff Acne

Disability Index or the Dermatology Life Quality Index (DLQI) to analyse the impact of acne on quality of life. These are two main limitations of this study.

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