IJD ORIGINAL ARTICLE

Familial risk of acne vulgaris in 8-13 year-old females: A case-control study

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Received: 16 April 2016
Accepted: 19 November 2017

Background: Acne vulgaris has a multifactorial pathogenesis; however, the exact role of genetic predisposition is not clear. Some studies have reported an association between familiy historyof acne and moderate to severe acne. In this study, we investigated the relationship between familiy history and prevalence of acne vulgaris in girls 8 to 13 years of age.

Methods: This case-control study enrolled 400 students. The participants were divided into two groups, case and control, with 200 students per group. The case group consisted of students with acne vulgaris and the control group included those without acne. The severity of acne was determined based on the Global Acne Grading Score (GAGS). The presence of acne in close relatives (father, mother, sister, brother) was determined through face to face interviews with participants' mothers and phone contacts with other family members. All collected data were analyzed by SPSS software.

Results: The case participants had a mean age of 10.62±1.71 years and those in the control group had a mean age of 10.54±1.70 years, which was not statistically significant. The mothers with acne vulgaris had the highest odds ratio (OR: 2.719, 95% CI: 1.788-4.133) between the case and the control groups. The ratio of encountering the probability with both parents developing acne vulgaris between the two groups was 2.346 (95% CI: 1.571-3.503).

Conclusion: This study revealed a significant relationship between positive familial history of acne and prevalence of acne vulgaris.

Keywords: acne vulgaris, familial risk, case-control study

Iran J Dermatol 2017; 20: 54-58

INTRODUTION

Acne is a chronic inflammation of the pilosebaceous units. This disease occurs earlier in girls, which can be attributed to the earlier onset of puberty in girls. Acne vulgaris is present in 40% of 17-year-old girls and 25% of 18-year-old boys. After this age, the prevalence rate of acne decreases; often, there is resolution by the age of 25 [1]. Several factors are involved in the pathogenesis of the disease; however, the precise role of genetic predisposition has not been precisely identified. The number, size, and activity rate of sebaceous glands are hereditary [2]. It has been reported that the prevalence and severity of acne is high among monozygotic twins. Some studies reported a relationship between familial history and moderate to severe types of acne [2].

The comparison of identical with non-identical twins in one study showed that the amount of sebum secretion and the number of comedones were the same in identical twins, but differed in non-identical twins. This finding reinforced the suggestion of an influence of

genetic factors on the prevalence of acne [2]. Other studies have also indicated the key role of genetic factors in the incidence of acne. A study reported both higher risk and incidence of acne in patients with positive familial history compared with a control group [3].

A positive familial history has greater role in the incidence of acne in female patients than males. In addition, familial history is significantly related to the incidence of acne at a lower age and non-inflammatory lesions [4]. Therefore, it can be hypothesized that developing acne vulgaris at an early age may indicate a genetic predisposition for the disease. This case-control study has evaluated female students aged 8 to 13 years to determine the relationship between familial history and prevalence of acne vulgaris.

MATERIALS AND METHODS

This case-control study included 8-13-year-old female students from the schools of Ardabil, Iran. A sample size of 200 was assigned for each group. The case group included students with acne vulgaris, while the control group included students without acne vulgaris. Cluster sampling was done in two districts (marginalized and non-marginalized) of Ardabil after which we chose students from 6 schools. We excluded students who were unwilling to participate in the study.

We recorded the students' demographics, and then the students were examined by a physician in a well-lit room. The severity of acne was determined based on the Global Acne Grading Score System (GAGS) [5]. We sent a letter to each the student's parents and asked them to visit the school for clinical examination and to record their history. First-degree relatives (father, mother, sister, and brother) completed a questionnaire that included demographic data and clinical findings during the clinical examination and face to face interview.

The reports of the students whose family members could not be present in the school were completed by phone calls to family members.

Statistical analysis

The collected data were analyzed by SPSS v16. The chi-square and t-tests were used for data analysis and 0.05 was the level of significance for all tests.

RESULTS

Patients had an average age of 10.62±1.71 years in the case group and 10.54±1.70 years in the control group. The average duration of acne vulgaris was 6.32±3.41 months in the case group. The earliest age of onset of acne was in the 7-8 year-old age group and the latest onset was the age of 12. There was mild acne in 131 (65%) patients. We observed that both parents had acne vulgaris in 50 (38.2%) of the children with mild acne. The percentage of parents that had moderate acne was 41%, for severe acne it was 50%. In the case group, only 6 out of 200 (3%) patients underwent medical treatment prior to enrollment in the present study.

The average age of the fathers was 39.88±2.29 years in the case group and 38.74±2.45 years in the control group. Mothers had an average age of 35.34±1.64 years in the case group and 33.62±2.65 years in the control group. In the case group, 53 (26.5%) fathers had acne; in the control group 33 (16.5%) fathers had acne. The chance of encounter with a father that had a positive familial history of acne in the case group was 1.82 times more than the control group (P=0.015; OR: 1.82; CI 95%: 1.120-2.97). In the case group, 99 (49.5%) mothers had acne vulgaris, whereas 53 (26.5%) mothers from the control group were diagnosed with acne vulgaris. Mothers that had a positive familial history of acne in the case group were 2.7 times more than the control group (P<0.001; OR: 2.71; % CI or: 1.788-4.133). The average age of brothers and sisters was 14.3±2.18

Table 1. The risk of families that suffer from acne in the case and control groups.

Variable	Odds ratio (OR)	95% CI	*P*-value
Presence of acne in the father	1.825	1.120-2.972	0.015
Presence of acne in the mother	2.719	1.788-7.133	<0.001
Presence of acne in both sisters and brothers	1.817	1.198-2.754	0.005
Presence of acne in both father and mother	2.346	1.571-3.503	<0.001
Presence of acne in the mother and child	2.750	1.822-4.151	<0.001
Presence of acne in the father and child	2.160	1.442-3.251	<0.001

years in the case group and 14.52±2.44 years in the control group (P=0.333). In the case group, 84 (42%) patients had siblings who developed acne vulgaris, whereas in the control group, 57 (28.5%) students had siblings who developed acne vulgaris (P=0.005). Table 1 shows the association between developing acne and familial history in both groups. The age of onset of acne in children with positive family histories was not statistically different than those with negative family history of acne (Table 2). The data analyses showed no significant relationship between the severity of acne and family history of the children (Table 3).

DISCUSSION

This study investigated the familial risk of acne in students, aged 8-13 years. We found a higher prevalence of acne vulgaris among the fathers and mothers of students in the case group than the control group. The rate of positive familial history in mothers and fathers in the case group (exposure to risk factor in case-control studies) was 2.7 times greater for fathers and 1.82 times greater for mothers than the control group. The familial history related to siblings in the case group indicated a significant difference from the control group. Among first-degree relatives (father, mother, and siblings), the mothers' family history of acne vulgaris was highly related to their daughters' development of acne. The high degree of mothers' developing acne compared to other family members might be justified by the disease progression in women that continues to an older age. While acne diminishes and disappears in most men by the age of 25, most women above the age of 25 suffer from acne. Therefore, the association between developing acne in mothers and their daughters could be attributed to the natural progress of acne in women [6-9].

The role of genetics in the development of acne was initially investigated in 1960. Prevoius studies showd that if one of the parents had acne or a previous history of acne, the child would have an 80% risk of acquiring acne [9]. The genetic models used by Burton *et al.* on monozygote and Dizygotic twins showed that 81% of different types of acne were intensified by genetic factors and the remaining 19% were under the influence of environmental factors [10]. According to previous studies, cases with a positive family history of acne had a lower age for developing the disease and more severe acne [11].

Goulden *et al.* observed that familial risk in the first degree relatives of patients over 25 years of age was significantly higher compared to first-degree relatives of non-patients [12]. In the present study, we assessed children less than 13 years of age and noted results consistent with the results of the study by Goulden *et al.* Both studies found an association between the risk of acne and family history. It could be concluded that genetic factors might be responsible for the lower age onset of acne in follicles prone to acne, lead to failure in

Table 2. Relationship between the age of onset of acne in children and a positive family history of acne in the case group.

Family history	Acne	Mean onset age (years)	SD	*P*-value
Father suffering from acne	Yes	9.47	1.23	0.309
	No	9.68	1.45	
Mother suffering from acne	Yes	9.37	1.26	0.068
	No	9.71	1.32	
Siblings suffering from acne	Yes	9.42	1.25	0.169
	No	9.67	1.35	

Table 3. The relationship between acne severity and family history in the case group.

Family history of acne	Acne	Mild		Moderate		Severe	
		Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
Fathers	Yes	101	68.7	41	27.9	5	3.4
	No	30	56.6	20	37.7	3	5.7
Mothers	Yes	72	65.5	34	30.9	4	3.6
	No	59	65.6	27	30	4	4.4
Siblings	Yes	73	62.9	37	31.9	6	5.2
	No	58	69	24	28.6	2	3.4

healing acne, and change of acne-prone follicles into the resistant type [13].

In this study, 65.5% of patients had mild acne, 30.5% had moderate acne, and 4% developed severe acne. In children with mild acne, 38.2% of parents had acne vulgaris. In those with moderate acne, the percentage of parents that had acne was 41% and for students with severe acne, 50% of their parents had acne. However, despite the high frequency of parents with acne in the children that developed severe acne, there was no significant relationship between the severity of acne and a family history in the first-degree relatives. This finding could be ascribed to the lower age of the surveyed population. Similar to another study that has reported familial history as a greater risk factor in females for developing acne compared to males, the present study included individuals who had lower acne onset age and non-inflammatory lesions. Thus it seems that higher incidence of severe acne in individuals with positive familial history is seen at older ages [14].

In a cross-sectional study that included 913 adolescents in the age range of 11-18 years old, it was shown that 16% of the adolescents' fathers and 25% of their mothers suffered from acne [15]. In the current study, 26.5% of fathers and 49.5% of mothers had acne at the time of conducting the present study. It could be conceived that in patients with acne and early onset of the disease, the probability of positive familial history is higher.

Ballanger *et al.* reported that the mothers' positive family history had a greater role in the occurrence of acne in children compared with the father's positive family history [16]. Ghodsi *et al.* reported that acne was common among Iranian adolescents and a genetic background accompanied by acne history in the mother could be a determining factor in the incidence of acne in these children. This finding was in line with the present study's results in which we noted that 49.5% of mothers and 26.5% of fathers had acne [17]. This point suggested that the mother, as the most important member of the family, played a significant role in the development of acne in children. Although the reason has not been determined, various hypotheses are the hyperactivity of enzymesimportant in acne pathogenesis, the high resistance rate of the Propionibacterium species, chronic stimulation of the immune system, and the role of genetics in females [18].

The risk of severe acne vulgaris incidence will increase, as the number of family members with positive acne vulgaris increases. In the current study, all family members of the 44 (22%) patients had acne, which was statistically significant. Among the groups, the incidence of acne was significantly higher in those whose entire family members (parents and siblings) had a positive history. This finding might confirm the role of genetics in the development of acne vulgaris among female students of this age group. Further studies with larger sample sizes are needed to confirm these results.

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