

Relationship between Atopic Dermatitis and Smoking: An Overview

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Abstract: Atopic dermatitis (AD) is characterized by chronic relapses of dermatitis in patients with an individual or family history of atopic disease. The onset of AD typically takes place in early childhood, although symptoms can begin or persist in the adult years. This research paper was aiming to overview the impact of smoking and its relation to atopic dermatitis (AD), we intended to overview the evidence reporting results about our concerned topic. We conducted a comprehensive review by searched the following databases through December, 2016: PubMed, EMBASE, Scopus, and the Cochrane Library. The search strategy was using some Mesh terms especially in searching the PubMed; “Atopic dermatitis” OR “Eczema” Combined with terms such; “smoking,” “cigarette,” “nicotine,” and “tobacco”. Active smoking and passive smoke direct exposure are connected with increased frequency of AD, in grownups and children. More research studies revealed the temporal relationship in between smoking and AD, and research studies to check out the systems of association, therefore the proof proved the effect of cigarette smoking or direct exposure to cigarette smoking in increasing the occurrence of atopic dermatitis. Future studies are required to determine the contribution of cigarette smoking toward cardiovascular risk in patients with AD. The risk of AD associated with cigarette smoking was especially high in the cigarette smoker mother children.

Keywords: Atopic dermatitis (AD), Individual or Family History.

1. INTRODUCTION

Atopic dermatitis (AD) is characterized by chronic relapses of dermatitis in patients with an individual or family history of atopic disease ⁽¹⁾. The onset of AD typically takes place in early childhood, although symptoms can begin or persist in the adult years ⁽¹⁾. Depending upon the age of onset, AD preferentially impacts particular areas on the skin. AD generally impacts flexural areas with lichenification in children (**Figure 2**), while adult-onset AD preferentially impacts the face and hands ⁽²⁾. Taking into consideration the familial propensity to specific antigen sensitization to AD, a complicated interplay of genetic and environmental factors may play a crucial function in the pathogenesis of AD ⁽³⁾. Numerous crucial environmental factors are considered risks for AD (**Figure1**), consisting of food allergens, aeroallergens and contagious agents such as *Staphylococcus aureus* ^(4,5).

Tobacco smoke has a variety of hazardous results on the immune system ⁽⁶⁾, e.g. on cellular and humoral immunity. The putative direct result of tobacco smoke on the skin is unclear ⁽⁷⁾, however smoke might straight impair skin-barrier function via the results of reactive oxygen types on keratinocytes ^(8,9). Many studies explored the relationship between tobacco smoke and various atopic diseases consisting of asthma, hay fever, allergic conjunctivitis, and AD. In particular, epidemiologic research studies showed a strong link between environmental tobacco smoke and asthma in the pediatric population, with an increased incidence of asthma and wheeze by a minimum of 20% ⁽¹⁰⁾. Additionally, smoke-free legislation has been associated with lower rates of health center visits for asthma ⁽¹¹⁾. On the other hand, a prospective population-based research study discovered a reduced risk of IgE-mediated allergic sensitization in sustained cigarette smokers compared to never ever smokers ⁽¹²⁾.

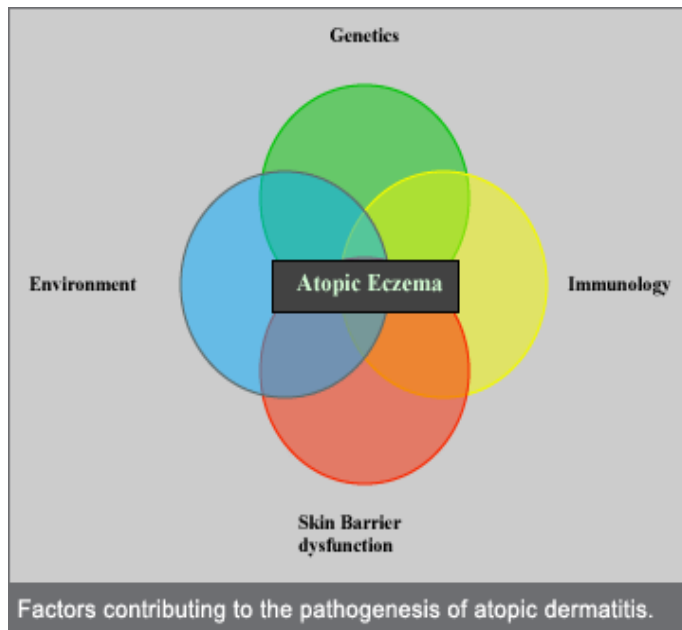


Figure 1.



Figure 2: Most affected area of AD in children

This research paper was aiming to overview the impact of smoking and its relation to atopic dermatitis (AD), we intended to overview the evidence reporting results about our concerned topic.

2. METHODOLOGY

We conducted a comprehensive review by searched the following databases through December, 2016: PubMed, EMBASE, Scopus, and the Cochrane Library. The search strategy was using some Mesh terms especially in searching the PubMed; “Atopic dermatitis” OR “Eczema” Combined with terms such; “smoking,” “cigarette,” “nicotine,” and “tobacco”. All search results with titles and abstracts written in English language were eligible for inclusion and human subject articles were also included. Other included all studies with reporting the relationship between AD and active smoking, passive smoke. RCTs, Reviews, systematic reviews, and meta-analysis studies were included except for case reports studies.

3. RESULTS

○ Reviewing the evidence that showed smoking as risk factor of AD:

Recent studies ^(13,14) demonstrated that US adults with AD had actually increased cardiovascular disease including high blood pressure, adult-onset diabetes and hypercholesterolemia, coronary artery disease, cardiac arrest, stroke, and peripheral vascular disease. In these research studies, ^(13,14) adult AD was connected with increased cigarette smoking and other bad health habits. Similarly, a Danish study discovered that grownups with AD had higher risk for cardiovascular disease,¹⁶ which appeared to be caused by bad health behaviors. Therefore, greater rates of smoking and other tobacco direct exposure in patients with AD is of utmost importance to cardiovascular risk and other health outcomes ^(13,14).

Although the advancement of AD was thought to occur in extremely early youth, just recently several groups from Japan, ⁽¹⁵⁾ Australia ⁽²⁾ and the U.S.A ⁽¹⁶⁾. have actually described adult-onset AD. Both classical AD and adult-onset AD cases present with intensive itching. Nevertheless, adult-onset AD differs from classical AD by preferentially impacting the face, hands and nonflexural areas ^(16, 17) and a prurigo-like pattern occurs more often in adult-onset AD ⁽¹⁸⁾. Except for a research study in Italy showing the result of patch tests in patients ⁽¹⁷⁾, no risk factors have actually been defined for adult-onset AD.

Association between active smoking and AD:

We have identified one large systematic review study ⁽¹⁹⁾ that examine the relation between smoking and AD, and showed in random-effects models ⁽¹⁹⁾, AD was connected with active smoking cigarettes (OR 1.87, 95% self-confidence period CI 1.32-2.63) (**Table 1**). The association between active smoking and AD frequency remained substantial in research studies

of both children (OR 2.19, 95% CI 1.34-3.57) and adults (OR 1.30, 95% CI 1.06-1.59), throughout all areas (North America: OR 1.66, 95% CI 1.42-1.93; Asia: OR 1.74, 95% CI 1.05-2.88; Africa: OR 8.41, 95% CI 3.66-19.32; Europe: OR 1.91, 95% CI 1.16-3.13), regardless of research study size ($n > 5000$: OR 2.08, 95% CI 1.31-3.32; $n < 5000$: OR 1.68, 95% CI 1.09-2.53)⁽¹⁹⁾. All research studies of active smoking were cross-sectional and had NOS score of 6 or greater. Only 2 studies included this organized review⁽¹⁹⁾ stratified AD frequency by the quantity of active smoking^(20,21). AD was significantly related to both moderate (OR 2.68, 95% CI 1.78-4.04) and comprehensive (OR 2.70, 95% CI 1.11-6.60) quantities of active smoking with similar impact sizes. No research studies took a look at the relationship in between AD seriousness and active smoking⁽¹⁹⁾.

Table 1: Random-effect models and sensitivity analyses for the association between smoking and atopic dermatitis⁽¹⁹⁾

Study subsets	OR (95% CI)		
	Active smoking, n = 20	Passive smoke exposure, n = 66	Maternal smoking during pregnancy, n = 2
Overall	1.87 (1.32-2.63)	1.18 (1.01-1.38)	1.06 (0.80-1.40)
Age			
Children <18 y	2.19 (1.34-3.57)	1.15 (1.01-1.30)	1.02 (0.81-1.27)
Adults ≥18 y	1.30 (1.06-1.59)	3.62 (1.71-7.69)	N/A
Study design			
Case-control/cross-sectional	1.87 (1.32-2.63)	1.19 (1.01-1.41)	1.14 (0.79-1.65)
Cohort/longitudinal	N/A	1.13 (0.79-1.61)	0.93 (0.65-1.34)
Region			
North America	1.66 (1.42-1.93)	1.28 (0.94-1.76)	0.49 (0.15-1.65)
South/Central America	N/A	1.95 (1.55-2.46)	N/A
Asia	1.74 (1.05-2.88)	1.22 (0.98-1.51)	1.59 (1.28-2.03)
Africa	8.41 (3.66-19.32)	2.23 (1.19-4.19)	N/A
Europe	1.91 (1.16-3.13)	0.96 (0.75-1.22)	0.94 (0.68-1.10)
Study size			
<5000	2.08 (1.31-3.32)	1.30 (1.07-1.59)	1.37 (0.94-1.95)
≥5000	1.68 (1.09-2.53)	1.02 (0.81-1.29)	0.77 (0.58-0.93)
NOS score			
<6	N/A	1.18 (1.11-1.26)	1.96 (1.50-2.64)
≥6	1.87 (1.32-2.63)	1.11 (0.91-1.36)	0.88 (0.67-1.16)
Amount of smoking	(n = 2)	(n = 11)	(n = 5)
Mild	2.68 (1.78-4.04)	1.21 (0.81-1.80)	1.09 (0.68-1.71)
Extensive	2.70 (1.11-6.60)	1.08 (0.74-1.59)	0.74 (0.36-1.51)

Bold indicates statistically significant associations ($P < .05$). Random-effect models were performed with history of atopic dermatitis as the dependent variable and active smoking, passive smoke exposure, or neonatal smoke exposure as the independent variables. Pooled OR and 95% CI were calculated. Sensitivity analyses were performed for children vs adults, North America vs South America vs Asia vs Africa vs Europe, study size < 5000 vs ≥ 5000 , Newcastle-Ottawa Scale of < 6 vs ≥ 6 , and mild vs extensive smoking. CI, Confidence interval; N/A, not available; NOS, Newcastle-Ottawa Scale; OR, odds ratio.

Tobacco Smoke Are Associated with Adult-onset Atopic Dermatitis:

We identified one hospital-based, cross-sectional, case-control study⁽²²⁾ that registered 83 patients. The age of start of AD in the patients varied from 22 to 64 years. Blood IgE levels were higher than basic normal values in the patients with adult-onset AD (729.22 ± 1990.63 vs. < 100 IU mL⁻¹). The patients with AD had a SCORAD severity index rating of 44.96 ± 21.16 and all had actually intense generalized itching; eight of the 83 patients with AD had asthma. The patients with AD had a substantially higher rate of smoking cigarettes (53%, 44 existing and ever cigarette smokers) than the controls (18.3%, 26 present and ever smokers). There was no significant difference in the ages that they started smoking cigarettes (23.66 ± 13.87 vs. 22.88 ± 4.73 years, respectively)⁽²²⁾. They discovered that a considerably greater percentage of nonsmokers with adult-onset AD had previous direct exposure to ETS (33%) compared with controls (12%). In this research study⁽²²⁾ they ran a several logistic regression analyses to figure out the risk factors for adult-onset AD. Changing for sex and age, we found that both present and ever cigarette smokers had a considerably greater OR for establishing AD compared with nonsmokers [4.994, 95% self-confidence interval (CI) ~1.66–15.37 and 3.619, 95% CI ~1.30–10.03, respectively] (Table 2)⁽²²⁾.

Table 2: Risk of smoking in adult-onset atopic dermatitis by multiple logistic regression. Sex, age and smoking status were included in the multiple regression analysis ⁽²²⁾

	Odds ratio	95% CI	P-value
Sex (male vs. female)	1.67	~0.75–3.75	0.205
Age	1.022	~0.99–1.04	0.097
Smoking/ETS exposure status (never smokers with low ETS as baseline)			
Nonsmokers with high ETS	2.215	~1.01–4.84	0.056
Former smokers	3.619*	~1.30–10.03	0.013
Current smokers	4.994*	~1.66–15.37	0.005

CI, confidence interval; ETS, environmental tobacco smoke. *Significant.

One included cross-sectional study ⁽²³⁾ revealed a significant association in between Environmental tobacco smoke (ETS) exposure and AD amongst school-age children in metropolitan, industrial, and rural areas in Korea. Both existing ETS exposure and smoking by household members during the mother's pregnancy and the child's infancy had significant unfavorable results on AD. Significantly, ETS exposure during pregnancy and infancy due to maternal smoking cigarettes increased the risk of AD two-fold. One of this study's essential contributions to the literature is its expedition of the effects of maternal cigarette smoking during pregnancy in Korea. After adjustment for possible confounding variables, atopic dermatitis was discovered to be highly associated with ETS, especially amongst children whose mothers had actually smoked during pregnancy and/or in the first year after birth (OR 1/4 2.06, 95% CI: 1.01- 4.22). This study ⁽²³⁾ results show that childhood exposure to ETS is a significant risk factor for atopic dermatitis.

In addition, previous research studies have actually shown that adverse youth experiences negatively impact health habits later on in life and might lead to greater rates of cigarette smoking ⁽²⁴⁾. It may be that AD has comparable detrimental impacts. 1 study found that grownups with AD had a substantially earlier age of smoking onset compared with those without AD ⁽¹⁴⁾. Interestingly, passive direct exposure to smoke was associated with a stronger result in adults than children, perhaps owing to postponed disease symptom with a cumulative dose-response effect of smoke exposure.40 Further investigation of the impact of passive smoke direct exposure on age of AD beginning would be useful to explore this observation. It is rather possible that smoking cigarettes is likewise associated with more extreme AD since smoking cigarettes is associated with greater occurrence of AD. Essentially no research studies examined the impacts of smoking cigarettes on AD seriousness. Therefore, future research studies are required to determine whether cigarette smoking is connected with more severe AD and whether smoking cigarettes cessation improves disease intensity ^(14,24).

Impact of Maternal smoking on children with AD.

Most studies of maternal smoking during pregnancy did not offer information about trimester(s) of smoke direct exposure. Additionally, virtually no studies examined the effects of smoking on AD seriousness. Most studies ^(25,26,27) depended on self-report of smoking cigarettes status instead of objective measurements of indoor smoke or metabolites of smoke exposure in participants. The effects of smoking cigarettes on AD might be modified by other factors, such as local distinctions of smoking cigarettes practices, environment, or both. To deal with these prospective local distinctions, we stratified designs by region and there were substantial differences. Nevertheless, there were insufficient data to enable additional expedition of such local distinctions. Lastly, the association with smoke could be puzzled by tension and neuropsychiatric conditions, which are also connected with AD ^(25,26,27).

4. CONCLUSION

Active smoking and passive smoke direct exposure are connected with increased frequency of AD, in grownups and children. More research studies revealed the temporal relationship in between smoking and AD, and research studies to check out the systems of association, therefore the proof proved the effect of cigarette smoking or direct exposure to cigarette smoking in increasing the occurrence of atopic dermatitis. Future studies are required to determine the contribution of cigarette smoking toward cardiovascular risk in patients with AD. The risk of AD associated with cigarette smoking was especially high in the cigarette smoker mother children.

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