Original paper

Obsessive compulsive symptoms in mothers of children with atopic dermatitis

Velat Celik, Burcin Beken, Isık Gorker, Pinar Gokmirza Ozdemir, Necdet Sut, Mehtap Yazicioglu

Department of Paediatric Allergy and Immunology, Faculty of Medicine, Trakya University, Edirne, Turkey

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Abstract

Introduction: Maternal stress, depression and anxiety are associated with atopic dermatitis (AD) in offspring. However, the relationship between maternal obsessive compulsive symptoms (OCS) and AD in their children is unclear.
Aim: To investigate whether maternal OCS are associated with AD in offspring.
Material and methods: A total of 75 children with AD diagnosed by the paediatric allergist and 76 healthy children and their mothers were included in the study. A Turkish version of the Maudsley Obsessive Compulsive Inventory (MOCI-T) was used to assess OCS of mothers in both groups.
Results: Total MOCI-T score and slowness, doubt, and rumination subscale scores were higher in the AD group than in the healthy group ($p = 0.007$, $p = 0.001$, $p = 0.012$ and $p = 0.011$, respectively) but washing/cleaning and checking subscale scores did not reach a statistically significant difference ($p = 0.203$ and $p = 0.053$, respectively). There was no correlation between SCORing Atopic Dermatitis (SCORAD) and MOCI-T/subscales scores.
Conclusions: Our study provides evidence for associations between maternal OCS and infantile AD. The findings support recommendations for psychosocial support of mothers of children with AD.

Key words: atopic dermatitis, children, maternal, obsessive compulsive symptoms.

Introduction

Atopic dermatitis (AD) is a common inflammatory skin disorder characterized by itch and sleep disturbance [1]. Atopic dermatitis is difficult to manage. The caregivers may expend considerable effort to manage this troublesome disease. Efforts may include managing medications, devoting more time, providing reassurance, attempting to control itching, cooking special foods while avoiding others, and more [2]. Childhood AD can have a profound emotional, social and financial burden on family members, especially on mothers [2].

Faught *et al.* [3] reported that the mothers of young children with eczema attending hospital-based clinics experience significant stress, with 46% having a total stress score that requires professional consultation. The stress of caring for children affected by AD can cause some parents to feel anxious, depressed, and helpless [2, 4, 5]. On the other hand, maternal preconception and prenatal stress is found to be associated with AD in the offspring [5–7].

Obsessive compulsive disorder (OCD) is a complex condition characterized by recurrent intrusive, unwanted thoughts, urges, or images (obsessions) and repetitive behavioural or mental acts (compulsions) [8]. Obsessions cause distress and anxiety, and the compulsions aim to reduce anxiety, distress or prevent some dreaded situation. Over 90% of patients with OCD meet criteria related to other psychological disorders, including anxiety disorders, depression, personality disorders, bipolar disorder, eating disorders, and schizophrenia [9, 10]. The most common comorbid diagnoses are anxiety disorders (75.8%) [11].

Aim

Although the association between AD and maternal stress, depression and anxiety has been relatively well studied, data regarding the association between AD and maternal obsessive compulsive symptoms (OCS) are lacking. In this study, we aimed to investigate the relationship between infantile AD and maternal OCS.

Address for correspondence: Velat Çelik, Department of Paediatric Allergy and Immunology, Faculty of Medicine, Trakya University, Edirne, Turkey, phone: +90 555 3971116, fax: +90 284 2352338, e-mail: velatcelik@gmail.com
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Material and methods

Study population

This study was a cross-sectional survey conducted at the Paediatric Allergy Department of Trakya University Medical School (Edirne, Turkey) between March 2019 and September 2019. A total of 75 children with AD younger than 24 months and their mothers were included in the study. Atopic dermatitis was diagnosed by paediatric allergists involved in this study, according to the criteria defined by Hannifin and Rajka [12]. SCORing Atopic Dermatitis (SCORAD) index was used to evaluate the severity of AD. The control group included mothers of 76 healthy children younger than 24 months who visited the general practitioners for routine physical examination or vaccination.

Questionnaire

Paediatric allergists from the study team completed questionnaires via face-to-face interviews with mothers from both groups. The questionnaire solicited information on the infant's age and sex, maternal age, maternal educational level, monthly household income and number of children in the family.

Assessment of obsessive compulsive symptoms

The Maudsley Obsessive Compulsive Inventory (MOCI) was developed by Hodgson and Rachman [13] in 1977 to measure OCS. The validity and reliability of the Turkish version of MOCI (MOCI-T) was demonstrated by Erol and Savasir [14] in 1988 [15]. The original questionnaire consists of 30 self-administered yes/no choice questions. The Turkish version has seven additional questions, for a total of 37 questions. The MOCI-T reports a score on five obsessives–compulsive subtypes that include washing/cleaning (11 items), checking (9 items), slowness (7 items), doubting (7 items), and rumination (7 items). Some items in the inventory are repeated in subtypes; they are only counted once to create the total score. The cut-off of the MOCI-T total score or subscales score has not been determined for the Turkish population. Higher scores reflect increased severity of OCS [15]. In our study we used MOCI-T to measure the presence of OCS.

Statistical analysis

We performed statistical analysis using the IBM SPSS Statistics for Windows, V.25.0 (IBM, Armonk, New York, USA). The continuous variables were investigated using visual methods (histograms, probability plots) and analytical methods (Shapiro-Wilk's test) to determine whether they were normally distributed. Demographic data were presented as median (Inter quartile range (IQR)) for continuous data and as numbers and percentages for categorical variables. Possible associations between total MOCI-T scores/subscale scores and AD group were assessed with the Mann-Whitney *U* test due to non-normal distribution. Spearman correlation tests were used to determine the relationship between MOCI-T and the SCORAD index. *P*-values < 0.05, 2-sided, were considered statistically significant. A post hoc power analysis was applied based on the total MOCI-T score. The power of the study was calculated to be 81%, with an α level of 5% and an effect size of 0.465.

Ethical approval

The procedures followed were in accordance with the Helsinki Declaration of 1975, as revised in 2000, and with the ethical standards of the responsible committee on human experimentation (institutional and national). The Ethics Review Committee at the Trakya University Medical Faculty approved the study (approval number TÜTF-BAEK 2019/146). We obtained written informed consent from all participants.

Results

The study group included 75 AD patients and their mothers, and 76 healthy controls and their mothers. Ninety (59.6%) of the children were female and 61 (40.4%) were male. The median age of children with AD was 8 months, and the median age of healthy children was 6 months. A comparison of demographic variables for the children and their mothers is shown in Table 1. We did not find any statistically significant differences between the AD group and the healthy control group in terms of children's age, gender, mothers' age, mothers' education level, family monthly income, or the number of children in the family (Table 1). A comparison of MOCI-T and its subscales between AD and the control group was performed (Table 2). Total MOCI-T score and slowness, doubt, and rumination subscale scores were higher in the AD group ($p = 0.007$, $p = 0.001$, $p = 0.012$ and $p = 0.011$, respectively). The washing/cleaning and checking subscale scores did not reach a statistically significant difference ($p = 0.203$ and $p = 0.053$, respectively).

The median SCORAD score was 21 (IQR: 12–30), 67.3% of the patients had mild, 30.9% had moderate, and 1.8% had severe AD. There was no statistically significant correlation found between SCORAD and MOCI-T/subscale scores (data not shown).

Discussion

In this study we found that OCS were more common in mothers of children with AD. To the best of our knowledge, this is the first study to demonstrate an association between maternal OCS and AD in their children. We did not find any correlation between AD severity and MOCI-T/subscales. Our study highlights the relationship

Table 1. Demographic variables of children and mothers

Parameter		AD group	Healthy group	*P*-value
Children's age [months][a]		8 (6–11)	6 (4.6–12)	0.151
Children's gender[b]	Female	43 (57.3)	47 (61.8)	0.572
	Male	32 (42.7)	29 (38.2)	
Mothers' age[a]		29 (26–31)	29 (26.5–32)	0.525
Maternal educational level[b]	Primary school	9 (12)	7 (9.2)	0.464
	High school	23 (30.7)	18 (23.7)	
	University	43 (57.3)	51 (67.1)	
Monthly income, Turkish liras[b]	≤ 1500	8 (10.7)	6 (7.9)	0.694
	1501–4500	40 (53.3)	36 (47.4)	
	4501–10000	22 (29.3)	29 (38.2)	
	> 10000	5 (6.7)	5 (6.6)	
Number of children in family[a]		1 (1–2)	1 (1–2)	0.184

[a]*Median* (*inter quantile range*), [b]*n (%).*

Table 2. Association between maternal MOCI-T scores and infantile atopic dermatitis

Parameter	Healthy group *N* = 76 (IQR)	AD group *N* = 75 (IQR)	*P*-value
Total	12 (8–15)	15 (10–20)	0.007
Washing/cleaning	5 (4–7)	6 (4–8)	0.203
Checking	2 (1–3)	2 (1–4)	0.053
Slowness	1 (1–2)	2 (1–3)	0.001
Doubting	2 (1–3)	3 (2–4)	0.012
Rumination	2 (0–3.8)	3 (1–6)	0.011

AD – atopic dermatitis, IQR – inter quantile range, SN-AD – sensitization-negative atopic dermatitis, SP-AD – sensitization-positive atopic dermatitis.

between AD and psychological disorders in mothers of affected children.

Only one study has investigated the association between maternal OCS in AD children's mother [16]. In that study, Gunduz *et al.* [16] showed that having a child with AD does not influence mothers in terms of OCS and health related quality of life. The authors explained that the reason for not finding a difference in OCS scores between AD and control groups might have been due to the study being conducted in a private hospital where doctors could pay more attention and spend more time with patients. The authors also stated that good doctor relationships in the private hospital may have reduced parental anxiety, which may have led to low MOCI scores [16]. In a letter to the editor published in the same issue, it was noted that the exclusion of mothers who had previously used any neuropsychiatric medication could also explain the negative result [17]. In addition, although the Turkish validated version MOCI contains 37 questions, the authors' use of a 30-question questionnaire may have led to bias in the results. In our study, we did not exclude mothers who had taken any neuropsychiatric medication before, and we used the Turkish validated version of MOCI (MOCI-T) which contains 37 questions. For these reasons, we think that our results are more valid than the results of Gunduz *et al*.'s study.

The management of a child with AD is time-consuming. It has a high financial cost, it reduces parental work performance and attendance, and it disrupts the sleep quality of the child and the family [2, 16, 18]. Parents of children with AD can be particularly burdened by the emotional weight of seeing their children suffer. Social isolation can also be seen in parents of children with AD [18]. All these aggravating factors may impair the family's quality of life and increase anxiety, depression and stress. Increased anxiety, depression and stress are related to an increase in OCS [10, 18, 19]; this may have contributed to the results of our study. Our results are concordant with previous studies which have shown the relationship between childhood AD and maternal stress, anxiety and depression [2–7, 20].

The most common compulsive symptom in OCD is excessive/ritualistic cleaning/washing behaviour [21]. Excessive cleaning/washing behaviour might lead to

a decrease in the environmental microbiota, reduce children's contact with environmental microbes, and excessive use of cleaning agents/detergents which may disturb epithelial barrier. A prominent hypothesis is the hygiene hypothesis, which proposes that certain microorganisms protect against allergic diseases and that their loss, due to hygiene measures, results in an increase in allergy [22]. The epithelial barrier hypothesis states that disruptions to the epithelial barrier may be associated with an increase in allergic diseases [23]. Washing/cleaning subscale score did not reach a statistically significant difference between groups but total MOCI-T score was higher in the AD group than in the healthy group. The fact that our washing/cleaning subscale was not statistically significant among the groups weakens our speculation, but it does not preclude it.

In our study, we questioned maternal OCS at the time of the study. We do not know the prenatal psychological status of mothers in our study. We speculate that the OCS score of the mothers in our study might have been higher in the prenatal period. Uguz *et al.* [24] investigated whether maternal OCD during pregnancy affects foetal circulating tumor necrosis factor-α (TNF-α) levels by comparing cord blood TNF-α levels in newborn infants of women with and without OCD. Cord blood TNF-α levels were significantly higher in those foetuses whose mothers have OCD compared to the foetuses of healthy mothers [24]. Tumor necrosis factor-α is a proinflammatory cytokine [24]. Tumor necrosis factor-α induces the production of thymic stromal lymphopoietin (TSLP) by keratinocytes. Thymic stromal lymphopoietin ultimately contributes to the induction of allergic inflammation by producing Th2 cytokines. Tumor necrosis factor-a also affects the lipid organization [25]. The increase in Th2 cytokine releases and disruption of lipid organization may lead to the development of atopic dermatitis.

The brain and skin are functionally and anatomically related, as named "brain-skin axis". They arise from a common embryonic origin called ectoderm. The brain impacts the skin through different mechanisms. First of all, the mechanism is the hypothalamic-pituitary-adrenal (HPA) axis [26]. Prenatal maternal stress can activate the HPA axis, leading to increased release of glucocorticoids. Excessive glucocorticoid levels can result in persistent activation of HPA axis in the foetus. Prolonged excessive glucocorticoid exposure may drive the T helper (Th) 1/Th2 balance toward a Th2 type response, which may lead to allergic inflammation. In genetically susceptible children, that may lead to the development of AD in later life [27]. Secondly, it has been shown that stress can impair skin barrier function and homeostasis. Although the exact mechanism is still unclear, decrease in ceramide, pyrrolidone carboxylic acid and lipid synthesis in response to stress has been observed in several studies [28]. Transplacental transfer of stress mediators may disturb the development of foetal skin barrier function and homeostasis. Thus, it may contribute to the development of AD [28]. Furthermore, there has been an increasing interest in the effects of maternal stress on infant's gut microbiota. The gut microbiota formation begins in utero. Altered microbiota have a significant impact on the maturation and shaping of the immune system. Maternal stress has shown impact on the composition of infant's gut microbiota. This pathway could potentially change the immune system development and increase the risk of AD in children [29]. In this study, we did not evaluate the glucocorticoid levels, stress mediators or gut microbiota of the infants in the perinatal period. However, we think that the relationship we found between OCS and having a child with AD in our study is valuable in terms of laying a basis for new studies that will evaluate the role of the above-mentioned possible mechanisms in the brain-skin axis.

When considering our results and the well-known relationship between OCS and other psychiatric disorders we think that psychosocial support may be an important recommendation for mothers, especially those who have a child with AD or at risk of AD. Improved social support and the introduction of early intervention programs designed to improve the maternal infant relationship quality may reduce the risk of childhood AD [30]. Yoo *et al.* [31] showed that educational programs for mothers of children with AD proved effective in reducing their anxiety, improving their caregiving efficacy, and increasing the caregiving behaviours performed by the mothers. It was shown that education programs have long-term beneficial effects on eczema severity in childhood AD [32].

Our study has several limitations. First, the study was based on a questionnaire. The mothers did not have one-to-one psychiatric evaluations, and we cannot definitively claim the presence of OCD. The presence of anxiety and depression, which are other OCS-related conditions, was not questioned in our study. Another limitation is that the study population was not very large, and was selected from an urban area in Turkey. Our findings may not be generalizable or applicable to other populations. A strength of our study is that for the first time, we demonstrated the presence of maternal OCS in mothers of children with AD.

Conclusions

Mothers of children with AD showed higher OCS. The findings support recommendations for psychosocial support for mothers of children suffering from AD. Future studies with a larger patient group could examine the personalized psychiatric evaluation of mothers during pregnancy and postnatal period and the effects of psychological and social support on the risk of AD and other atopic disorders in offspring.

Conflict of interest

The authors declare no conflict of interest.

References

1. Langan SM, Irvine AD, Weidinger S. Atopic dermatitis. Lancet 2020; 396: 345-60.
2. Yang EJ, Beck KM, Sekhon S, et al. The impact of pediatric atopic dermatitis on families: a review. Pediatr Dermatol 2019; 36: 66-71.
3. Faught J, Bierl C, Barton B, et al. Stress in mothers of young children with eczema. Arch Dis Child 2007; 92: 683-6.
4. McKenzie C, Silverberg JI. Maternal depression and atopic dermatitis in american children and adolescents. Dermatitis 2020; 31: 75-80.
5. van der Leek AP, Bahreinian S, Chartier M, et al. Maternal distress during pregnancy and recurrence in early childhood predicts atopic dermatitis and asthma in childhood. Chest 2020; 158: 57-67.
6. Braig S, Weiss JM, Stalder T, et al. Maternal prenatal stress and child atopic dermatitis up to age 2 years: the Ulm SPATZ health study. Pediatr Allergy Immunol 2017; 28: 144-51.
7. El-Heis S, Crozier SR, Healy E, et al. Maternal stress and psychological distress preconception: association with offspring atopic eczema at age 12 months. Clin Exp Allergy 2017; 47: 760-9.
8. Brock H, Hany M. Obsessive-Compulsive Disorder. StatPearls. Treasure Island (FL); 2022.
9. Cervin M, Lazaro L, Martinez-Gonzalez AE, et al. Obsessive-compulsive symptoms and their links to depression and anxiety in clinic- and community-based pediatric samples: a network analysis. J Affect Disord 2020; 271: 9-18.
10. Krzyszkowiak W, Kuleta-Krzyszkowiak M, Krzanowska E. Treatment of obsessive-compulsive disorders (OCD) and obsessive-compulsive-related disorders (OCRD). Psychiatr Pol 2019; 53: 825-43.
11. Fenske JN, Petersen K. Obsessive-compulsive disorder: diagnosis and management. Am Fam Physician 2015; 92: 896-903.
12. Hanifin JM, Rajka G. Diagnostic features of atopic dermatitis. Acta Dermatovenerol 1980; 92: 44-7.
13. Hodgson RJ, Rachman S. Obsessional-compulsive complaints. Behav Res Ther 1977; 15: 389-95.
14. Erol N, Savasir I. Maudsley Obsessive compulsive question list. National Psychiatry and Neurological Sciences Congress Scientific Program Abstracts Book 1988.
15. Bez Y, Yesilova Y, Ari M, et al. Predictive value of obsessive compulsive symptoms involving the skin on quality of life in patients with acne vulgaris. Acta Derm Venereol 2013; 93: 679-83.
16. Gunduz S, Usak E, Ozen S, et al. Obsessive compulsive symptoms and quality of life in mothers of children with atopic dermatitis. Actas Dermosifiliogr 2017; 108: 432-7.
17. Olivera Pueyo J. Mothers of children with atopic dermatitis are not more prone to obsessive-compulsive symptoms. Actas Dermosifiliogr 2017; 108: 392.
18. Drucker AM, Wang AR, Li WQ, et al. The burden of atopic dermatitis: summary of a report for the national eczema association. J Invest Dermatol 2017; 137: 26-30.
19. McNally RJ, Mair P, Mugno BL, et al. Co-morbid obsessive-compulsive disorder and depression: a Bayesian network approach. Psychol Med 2017; 47: 1204-14.
20. Kage P, Zarnowski J, Simon JC, et al. Atopic dermatitis and psychosocial comorbidities – What's new? Allergol Select 2020; 4: 86-96.
21. Goodman WK, Grice DE, Lapidus KA, et al. Obsessive-compulsive disorder. Psychiatr Clin North Am 2014; 37: 257-67.
22. Strachan DP. Hay fever, hygiene, and household size. BMJ 1989; 299: 1259-60.
23. Akdis CA. Does the epithelial barrier hypothesis explain the increase in allergy, autoimmunity and other chronic conditions? Nat Rev Immunol 2021; 21: 739-51.
24. Uguz F, Onder Sonmez E, Sahingoz M, et al. Neuroinflammation in the fetus exposed to maternal obsessive-compulsive disorder during pregnancy: a comparative study on cord blood tumor necrosis factor-alpha levels. Compr Psychiatry 2014; 55: 861-5.
25. Danso MO, van Drongelen V, Mulder A, et al. TNF-alpha and Th2 cytokines induce atopic dermatitis-like features on epidermal differentiation proteins and stratum corneum lipids in human skin equivalents. J Invest Dermatol 2014; 134: 1941-50.
26. Mueller SM, Hogg S, Mueller JM, et al. Functional magnetic resonance imaging in dermatology: the skin, the brain and the invisible. Exp Dermatol 2017; 26: 845-53.
27. Shen Q, Zhang Q, Zhao J, et al. Association between maternal perceived stress in all trimesters of pregnancy and infant atopic dermatitis: a prospective birth cohort study. Front Pediatr 2020; 8: 526994.
28. Chen Y, Lyga J. Brain-skin connection: stress, inflammation and skin aging. Inflamm Allergy Drug Targets 2014; 13: 177-90.
29. Andersson NW, Hansen MV, Larsen AD, et al. Prenatal maternal stress and atopic diseases in the child: a systematic review of observational human studies. Allergy 2016; 71: 15-26.
30. Letourneau NL, Kozyrskyj AL, Cosic N, et al. Maternal sensitivity and social support protect against childhood atopic dermatitis. Allergy Asthma Clin Immunol 2017; 13: 26.
31. Yoo JB, De Gagne JC, Jeong SS, et al. Effects of a hybrid education programme for korean mothers of children with atopic dermatitis. Acta Derm Venereol 2018; 98: 329-34.
32. Futamura M, Masuko I, Hayashi K, et al. Effects of a short-term parental education program on childhood atopic dermatitis: a randomized controlled trial. Pediatr Dermatol 2013; 30: 438-43.