Zeynep Kamil Med J 2021;52(2):90–95
DOI: 10.14744/zkmj.2021.70037

ORIGINAL ARTICLE

# An evaluation of depression levels in asthmatic children and their mothers during the course of the disease

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## ABSTRACT

**Objective:** Asthma, which has gradually increased in children in recent years, imposes limitations on their development from various perspectives. This study was planned to investigate whether asthma, a chronic illness, causes depression in children and their mothers, and to provide psychological support if necessary.

**Material and Methods:** Two hundred and fifty asthmatic children randomly selected from children diagnosed with asthma, aged between 6 and 14 years, and under follow-up for at least 6 months, together with their mothers, were included in the study. One hundred and twenty-five volunteer children from the same age group admitted to the general pediatric clinic, and their mothers, were included in the control group. The Children's Depression Inventory was applied to the children under the guidance of a specialist psychologist, and the Beck Depression Inventory was administered to the mothers, and the data were then collected.

**Results:** Statistically significant differences were found between the asthmatic children and control group in terms of mean depression scale test for children scores (p=0.01). When asthmatic children were evaluated among themselves, a significant relationship was found between severity of asthma and frequency of depression. A significant relationship was found between length of disease and frequency of depression in asthmatic patients (p=0.01). Depression scores were higher in patients diagnosed with asthma and under follow-up for 4 years or more than the 3–4 years follow-up group. The frequency of depression was higher in the mothers of patients than in the control group mothers (p=0.001).

**Conclusion:** Every clinician involved in the treatment of asthma should be aware of the important role that psychological and social factors can play in children and their mothers. Psychological support should be provided for children and their mothers during the treatment of the disease.

**Keywords:** Asthma, child, depression, mother.

The article was previously presented as a poster at the 46th Turkish Pediatrics Congress (May, 18–22 2010).

**Cite this article as:** Çetiner N, Ergüven M, Yüksel Karatoprak E, Mutlu HH. An evaluation of depression levels in asthmatic children and their mothers during the course of the disease. Zeynep Kamil Med J 2021;52(2):90–95.

**Received:** August 05, 2019 **Accepted:** February 08, 2021 **Online:** June 18, 2021
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## INTRODUCTION

Despite advances being made in the treatment of asthma, a chronic disease frequently encountered in childhood, its prevalence, morbidity, and mortality are rising. This is a result of growing air pollution resulting from increased urbanization in recent years in particular, the use of motor vehicles in daily life, energy plants, power plants, and factories, and rising atmospheric ozone and sulfur dioxide levels, in addition to congenital factors.[1,2] The importance of psychological and social factors in the onset and course of childhood asthma is becoming increasingly recognized. Studies in the field of child health and diseases show that 18% of all children have emotional and behavioral problems, while the prevalence of such emotional behavioral problems rises to over 20% in children with chronic diseases.[3–5]

Studies based on parental reports have demonstrated 3 times greater behavioral problems in children with asthma than children with no chronic disease. In addition, children with asthma, irrespective of severity, are reported to exhibit higher levels of anxiety than children with no chronic disease.[6–10]

Asthma not only creates various difficulties for the child but also for the family. Although psychiatric disorders are more frequent in the parents of asthmatic children, it is unclear whether this is a response to living with a sick child or a general genetic disposition.[11]

Asthma, which has gradually increased in children in recent years, places limitations on children's development from various perspectives. This study was planned to investigate whether asthma, a chronic illness, causes depression in children and their mothers, and to provide psychological support if necessary.

## MATERIAL AND METHODS

Two hundred and fifty randomly selected children aged 6–14 years under follow-up due to mild-moderate-severe asthma for at least 6 months at our pediatric allergy clinic between October 2008 and February 2010 were included in the study, together with their mothers. Inclusion criteria were diagnosis of asthma by a specialist physician or being under follow-up due to previous diagnosis of asthma. Exclusion criteria were being in receipt of psychiatric treatment and use of medication, or the presence of any allergic disease other than asthma. Severity of asthma in the patient group was classified based on 2008 Global Initiative for Asthma criteria. One hundred and twenty-five children from the same age group, with no known chronic disease and with normal growth and development, presenting to the general pediatric clinic, and their mothers, were enrolled as the control group. Participants' age and gender and the family's sociodemographic characteristics were recorded. Family monthly income levels were classified as low (<600 Turkish lira [TL]), moderate (600–2000 TL), or high (>2000 TL) based on Turkish Statistical Institute data. Data were collected by applying the children's depression ınventory (CDI) to the children under the guidance of a specialist psychologist, and the Beck Depression Inventory (BDI) to the mothers. Approval for the study was granted by the hospital ethical committee (no. 52/F). Questionnaires were administered under clinical conditions. Data were recorded after receipt of written verbal consent following face-to-face interviews with all patients and parents meeting the inclusion criteria.

### CDI

The CDI was developed by M. Kovacs[12] and measures levels of depression in children and adolescents aged 6–17. There is no time limit, and the inventory can be completed in approximately 30 min. The inventory consists of 37 items, each of which contains three sentences from which the participant is asked to select one on the basis of the previous 2 weeks. Each sentence set consists of statements concerning childhood depression symptoms (sleep, appetite problems, etc.). Responses are marked on the form. The scale was completed by being read to the children. The child was asked to consider the previous 2 weeks and to select the most appropriate sentence from the three options given. Responses were scored from 0 to 2. The total of these scores yielded the depression score. The highest possible score on the scale is 54. High scores indicate a high level of depression or high severity. The scale cutoff point is 19. The scale is based on the BDI. It was developed in 1980 by Kovacs with the addition of questions specific to depression in childhood concerning areas such as school and relationships with friends. The language was also simplified to be comprehensible to children aged 6–17.

The validity and reliability of the Turkish language version of the scale were confirmed by Öy,[13] and the coefficient of reliability determined in the scope of that study was 0.71.

### BDI

The BDI was developed by Beck et al.[14] and is widely employed to measure depressive symptom levels. The reliability and validity of the Turkish language version were investigated by Hisli. A reliability coefficient of 0.71 was determined, together with a validity coefficient of 0.75 when the Hamilton Depression Rating Scale was used as a reference criterion. The aim of the inventory is to provide an objective measurement of the severity of depressive symptoms. The BDI consists of 21 depressive symptom categories. Each item is scored between 0 and 3, with a total possible maximum score of 63. The cutoff point for the BDI is 15.

Depression scores in children were analyzed in terms of associations with variables such as gender and age, parental consanguinity, number of siblings, birth number, the child's possessing its own room, family income level, maternal and paternal education levels, maternal and paternal ages, maternal employment status, paternal occupation, and severity and duration of disease using Statistical Package for the Social Sciences (SPSS) software. Depression scores in mothers were analyzed to determine relationships with variables such as number of children with asthma, severity of disease, age, education level, number of children, and income level using SPSS software.

### Statistical Analysis

Statistical analyses were performed on SPSS software. In addition to descriptive statistical methods (mean, standard deviation, and frequency), the study data were compared using the Chi-square test and the ANOVA test. The results were evaluated at a 95% confidence interval and with $p<0.050$ being regarded as statistically significant.

## RESULTS

The study involved 375 children, 164 (43.70%) girls and 211 (56.30%) boys. These were divided into two groups, with asthma (patient)

**Table 1: Patient and control group sociodemographic characteristics**

| Characteristics | Patient group (n=250) n | % | Control group (n=125) n | % | p |
|---|---|---|---|---|---|
| Gender | | | | | 0.120 |
| Male | 146 | 58 | 65 | 52 | |
| Female | 104 | 42 | 60 | 8 | |
| Consanguinity | | | | | 0.259 |
| Present | 51 | 20 | 22 | 18 | |
| Absent | 199 | 80 | 103 | 82 | |
| Number of siblings | | | | | 0.399 |
| 0 | 19 | 8 | 8 | 6 | |
| 1 | 162 | 64 | 85 | 68 | |
| >1 | 69 | 28 | 32 | 26 | |
| Birth number | | | | | 0.257 |
| 1 | 113 | 46 | 63 | 51 | |
| 2 | 96 | 38 | 43 | 34 | |
| 3 | 30 | 12 | 14 | 11 | |
| 4 or more | 11 | 4 | 5 | 4 | |
| Own room | | | | | 0.108 |
| Yes | 143 | 57 | 50 | 40 | |
| No | 107 | 43 | 75 | 60 | |
| Income level | | | | | 0.418 |
| Low | 73 | 29 | 31 | 25 | |
| Average | 159 | 64 | 92 | 73 | |
| High | 18 | 7 | 2 | 2 | |

| Characteristics | Patient group (n=250) n | % | Control group (n=125) n | % | p |
|---|---|---|---|---|---|
| Maternal age | | | | | 0.051 |
| 20–34 years | 102 | 41 | 40 | 32 | |
| 35–49 years | 148 | 59 | 85 | 68 | |
| Paternal age | | | | | 0.008 |
| 20–34 age | 49 | 20 | 9 | 7 | |
| 35 or over | 201 | 80 | 116 | 93 | |
| Paternal education | | | | | 0.318 |
| Elementary school or lower | 118 | 47 | 58 | 47 | |
| Middle school | 54 | 22 | 23 | 18 | |
| High school | 61 | 24 | 36 | 29 | |
| University | 17 | 7 | 8 | 6 | |
| Maternal education | | | | | 0.397 |
| Elementary school or lower | 171 | 69 | 82 | 65 | |
| Middle school | 32 | 13 | 20 | 16 | |
| High school | 40 | 16 | 22 | 18 | |
| University | 6 | 2 | 1 | 1 | |
| Paternal education | | | | | 0.172 |
| Clerical | 24 | 10 | 9 | 7 | |
| Manual | 136 | 54 | 66 | 53 | |
| Self-employed | 90 | 36 | 50 | 40 | |
| Maternal employment status | | | | | 0.449 |
| Housewife | 227 | 91 | 114 | 91 | |
| Working | 23 | 9 | 11 | 9 | |

(n=250) and without asthma (control) (n=125). The distribution of sociodemographic characteristics in the two groups is shown in Table 1.

Mean CDI scores were 27.81±3.01 among children with asthma and 24.87±2.87 among non-asthmatic children. The difference in mean CDI scores between the two groups was statistically significant (p=0.010).

The depression scores obtained were also compared with variables such as gender, parental consanguinity, number of siblings, the child's having its own room, family income level, parental education levels, maternal, employment status, and paternal occupation (Table 2).

Children's depression levels were analyzed according to health status and paternal occupation. Two-factor analysis of CDI scores and health status x father's occupation revealed significant variation in terms of paternal occupation [F(2.396)=6.97, p=0.03]. Post hoc analysis was applied to identify which occupation yielded a significant difference. Scheffe test analysis revealed a significant difference between the mean CDI scores of manual worker and self-employed fathers. The CDI scores of children with manual worker fathers were higher than those of children of self-employed fathers. However, the joint effect of disease status (with or without asthma) and paternal occupation on children's depression levels were not statistically significant [F(2.369)=1.708, p=0.183].

The patient group was also subjected to statistical comparison within itself based on variables such as severity of disease and duration of disease (Table 3).

Asthmatic children were classified in terms of disease severity based on respiratory function test results at the time of first presentation – mildly 31% (n=77), moderately 61% (n=154), or severely 8% (n=19) asthmatic. Severity of asthma was found to result in significant variation in children's depression levels. Post hoc analysis was applied to identify the severity of asthma responsible for significant variation. Scheffe test results showed a significant difference in mean CDI scores between children with mild asthma and those with moderate asthma. Mean CDI scores were higher in children with mild asthma than in those with moderate asthma.

Asthmatic children were also classified in terms of duration of disease, with 17% (n=43) having been asthmatic for 2 years, 15% (n=37) for 2–3 years, 16% (n=40) for 3–4 years, and 52% (n=130) for 4 years or more.

**Table 2: CDI scores according to sociodemographic characteristics in the patient and control groups**

| Sociodemographic characteristics | Patient group CDI Mean±SD | Control group CDI Mean±SD | p |
|---|---|---|---|
| Gender | | | 0.600 |
| Male | 27.92±2.76 | 24.83±2.75 | |
| Female | 27.66±3.33 | 24.91±3.3 | |
| Consanguinity | | | 0.060 |
| Yes | 28.88±3.87 | 24.68±2.99 | |
| No | 27.54±2.69 | 24.91±2.86 | |
| Number of siblings | | | 0.340 |
| 0 | 27.84±2.67 | 26.37±3.50 | |
| 1 | 27.74±2.89 | 24.87±2.56 | |
| >1 | 27.98±3.40 | 24.50±3.43 | |
| Own room | | | 0.770 |
| Yes | 27.86±3.09 | 25.06±2.31 | |
| No | 27.74±2.92 | 24.74±3.20 | |
| Income level | | | 0.353 |
| Low | 27.95±2.84 | 25.64±3.49 | |
| Average | 27.77±3.14 | 24.66±2.57 | |
| High | 27.55±2.61 | 22.50±4.94 | |
| Parental education | | | 0.228 |
| Literate | 31.00±2.82 | – | |
| Elementary school | 28.22±3.25 | 24.67±3.19 | |
| Middle school | 27.42 ±2.93 | 25.65±2.82 | |
| High school | 27.54±2.54 | 24.86±2.29 | |
| University | 26.88±2.82 | 24.12±3.09 | |
| Maternal education | | | 0.178 |
| Literate | 27.66±0.57 | – | |
| Elementary school | 28.23±2.96 | 25.03±2.77 | |
| Middle school | 27.66±3.11 | 24.90±3.83 | |
| High school | 27.90±3.09 | 24.40±2.19 | |
| University | 28.66±0.51 | 21.00±0.10 | |
| Paternal occupation | | | 0.183 |
| Clerical | 27.25±2.78 | 24.33±1.93 | |
| Manual worker | 28.60±3.21 | 25.16±3.27 | |
| Self-employed | 26.77±2.37 | 24.58±2.42 | |
| Maternal employment status | | | 0.615 |
| Housewife | 27.78±2.89 | 25.36±2.54 | |
| Working | 27.81±3.03 | 24.82±2.91 | |

CDI: Children's Depression Inventory; SD: Standard deviation.

**Table 3: CDI scores according to disease severity and duration in asthmatic**

| Disease severity and duration | CDI (Mean±SD) | p |
|---|---|---|
| Disease severity, n=250 | | 0.030 |
| Mild (77) | 28.57±3.27 | |
| Moderate (154) | 27.48±2.87 | |
| Severe (19) | 27.40±2.56 | |
| Disease duration | | 0.010 |
| ≤2 years (43) | 28.1±2.89 | |
| 2–3 years (37) | 28.2±2.93 | |
| 3–4 years (40) | 26.3±2.24 | |
| >4 years (130) | 28.0±3.01 | |

CDI: Children's Depression Inventory; SD: Standard deviation.

**Table 4: Maternal BDI scores according to possession of an asthmatic child and severity of asthma**

| The presence and severity of asthma | BDI (Mean±SD) | p |
|---|---|---|
| Asthma | | 0.001 |
| Yes | 14.26±8.1 | |
| No | 8.92±6.06 | |
| Asthma severity | | 0.070 |
| Mild | 12.98±8.8 | |
| Moderate | 14.5±7.8 | |
| Severe | 17.5±6.4 | |

BDI: Beck Depression Inventory; SD: Standard deviation.

Increased duration of disease was found to lead to significant variation in children's depression levels (p=0.010). Post hoc analysis was applied to identify the duration of asthma responsible for significant variation. Scheffe test results showed a significant difference between mean CDI scores in patıents with disease durations of 3–4 years and those with durations of 4 years or longer.

No statistically significant difference was observed between other variables in children.

Depression scores in mothers were subjected to statistical comparison according to variable such as possession of an asthmatic child, age, education level, number of children, and income level (Table 4).

A statistically significant difference in depression scores was determined between patient and control group mothers (p=0.010).

However, no significant relationship was found between severity of disease, age, education level, number of children, or income level and maternal depression levels.

## DISCUSSION

Asthma, a chronic disease frequently seen in childhood, is one of the main causes of restricted quality of life. Powerful emotions may sometimes exacerbate the disease and affect its course. Diagnosis and treatment reduced morbidity in asthmatic children and improves patients' quality of life. The principal aim in the treatment of asthma is to achieve control of the symptoms and improve patients' quality of life.[15,16]

The present study investigated the presence of depression in asthmatic children and their mothers. Mean CDI sores differed significantly between the patient and control groups. This shows that health status has a significant effect on childhood depression.

Bilfield et al.[17] reported greater psychosocial concerns in children with chronic disease compared to healthy children. Another study from Turkey reported that 20% of children with chronic health problems exhibited behavioral and emotional symptoms.[18]

Tousman reported that depression accompanied asthma in between 20% and 50% of children with the disease and that learned helplessness was observed in such individuals.[19]

Causes of depression include increased non-attendance at school due to asthma, children being raised with excessively protective attitudes on the part of their mothers and fathers, in turn leading to restriction of independence, weaknesses in physical development due to the disease and the idea that an attack may occur at any moment, frequent hospitalization or visits to hospital, and side effects of medications employed.

Whether or not an individual will be affected by the disease, and to what extent, depends on numerous factors. In addition to health status, this study investigated the effects on depression scores of a number of such variables, including sex, number of children, birth order, consanguineous marriage, number of rooms, family income status, parental education levels, parental ages, maternal employment status, and paternal occupation. Depression levels in children of manual worker fathers were significantly higher than those of children of self-employed fathers, although depression levels did not vary according to the variables of health status and paternal occupation. The fathers of both asthmatic and non-asthmatic children in this study were generally manual workers, and our findings show that asthma leads to depression in children. The high depression scores among children of manual worker fathers may be due to the difficult living conditions faced by such workers and perhaps to their also suffering from depression. Children of depressive parents are known to be at a greater risk of depression than children of non-depressive parents.[20,21]

This study also investigated whether depression levels of asthmatic children varied depending on the severity of the disease. Statistically significant differences were observed between the three groups' mean CDI scores. Post hoc analysis was applied to identify the degree of severity responsible for the difference and showed higher CDI scores in the mild asthma group. This was tentatively attributed to the difference in patient numbers among the groups. The lower number of patients in the severe asthma group compared to the other two groups also represents a limitation of this study.

One previous study reported that adolescents with moderate or severe asthma exhibited far greater hostility, anxiety, depression, and difficulty in controlling emotions than normal control individuals and adolescents with mild asthma.[18–22] Factors such as lack of hope for the future, fear of dying, a sense of being different, inadequacy, feeling abnormal, and a reduced quality of life have been implicated as causes of depression and anxiety in asthmatic adolescents.[23]

Janson et al.[24] reported that the severity of asthma had no effect on levels of depression in childhood.

In their adult study, Oğuztürk et al.[25] found no difference in depression scores between severe asthmatics treated in hospital and milder cases of asthma.

Some research has shown that depression scores vary in line with the severity of asthma, while other studies have reported no such variation. The results of studies on this subject are inconsistent. Further studies involving larger patient numbers, greater numbers of asthma groups with differing levels of severity, and with family groups with similar environmental factors affecting depression levels (such as maternal employment status and income level) might now be planned to resolve these inconsistencies.

Analysis of depression levels in terms of children's duration of disease revealed a statistically significant difference between the four groups established. Accordingly, patients with disease durations of 4 years or more had significantly higher CDI scores than those with durations of 3–4 years.

Ekşi[26] investigated the psychosocial aspect of asthma in a group of 60 patients aged 4–16 and reported no significant correlation between severity of disease and total Achenbach child behavior checklist scores, but observed negative correlation between severity of disease and the test's social competence scores. In other words, the greater the severity of the disease, the lower the child's social competence. Ekşi[26] concluded that the child's problems do not derive from the duration of the disease or its degree of severity, but deduced from interviews with others that children's problem scores were significantly correlated with the atmosphere in the home and particularly the attitudes of the mother.

Children with asthma and being treated for asthma, and their families, are at risk of secondary psychiatric problems. The sudden and unpredictable onset of asthma symptoms and complex therapeutic regimens impose various degrees of difficulty on families. Family problems flare up under this stress and lead to increasing difficulty in the child. Asthmatic children's inability to care for themselves adequately results in separation from normal socialization and athletic experiences, even if asthma is brought under control with modern treatments. Children with severe asthma can lose self-confidence due to the side effects of their medications. Parents experience severe stress due to financial anxieties, worries about their child's health, and increasing time requirements for treatment. These stresses can exacerbate psychiatric problems by compromising their relationship with the child. Increasing friction with the child increases the risk of emotional disorders in asthmatic children.[27]

The present study compared the depression scores of mothers with and without asthmatic children. The results showed a statistically significant difference in depressions cores between the two groups. Mothers are at risk for a number of reasons, including fear and helplessness during episodes, attempting to prevent the emergence of episodes due to physical exercise or psychological factors, the stress caused by medical care costs, loss of sleep, and continuous monitoring of the child's surroundings, anxiety, and guilt feelings.

Studies have also shown that chronic disease is a psychological risk factor for children and families.[27–29]

There are a number of limitations to this study. These include the fact that the participants were not equally grouped on the basis of sociodemographic characteristics, that the number of members of each asthma group was different, and the limited numbers of patients with severe asthma.

Factors affecting depression levels in this study included the presence of disease, duration of disease, and possession of a sick child. Asthma leads to psychiatric problems in patients and in their mothers. Due to this stress created in mothers by its chronic nature, asthma can further exacerbate children's psychiatric problems by impairing the relationship with an asthmatic child.

## CONCLUSION

Asthma is a chronic disease that adversely affects the lives of almost all patients, both psychologically and socially. The severity of the disease must not, therefore, be underestimated, and its impact on human life must be reduced to a minimum. Further, more extensive studies investigating psychopathology in children with chronic disease, parental attitudes, and quality of life perceptions are, therefore, now needed.

### Statement

**Ethics Committee Approval:** The Medeniyet University Göztepe Training and Research Hospital Clinical Research Ethics Committee granted approval for this study (date: 27.11.2008, number: 52/F).

**Informed Consent:** Written informed consent was obtained from patients who participated in this study.

**Peer-review:** Externally peer-reviewed.

**Author Contributions:** Concept – N.Ç., M.E.; Design – N.Ç., M.E., E.Y.K.; Supervision – N.Ç., M.E.; Resource – N.Ç., M.E., H.H.M.; Materials – N.Ç., M.E., E.Y.K.; Data Collection and/or Processing – N.Ç., E.Y.K., H.H.M.; Analysis and/or Interpretation – N.Ç., M.E.; Literature Search – N.Ç., E.Y.K, H.H.M.; Writing – N.Ç.; Critical Reviews – N.Ç., M.E.

**Conflict of Interest:** The authors have no conflict of interest to declare.

**Financial Disclosure:** The authors declared that this study has received no financial support.

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