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# Maternal temperament and anxiety sensitivity in children with foreign body aspiration

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## SUMMARY

**OBJECTIVE:** Foreign body aspiration is one of the childhood emergencies that thoracic surgeons are interested in, and it can cause morbidity and mortality. Although the relationship between various behavioral problems related to children and foreign body aspiration has been investigated so far, there is no study investigating the relationship between maternal temperament and anxiety sensitivity. This study aimed to investigate the relationship between maternal emotional temperament, anxiety sensitivity, and foreign body aspiration.

**METHODS:** Mothers of 18 children with foreign body aspiration have been evaluated by a thoracic surgeon, and 18 healthy controls have also been included in the study. Maternal emotional temperament has been measured with the Temperament Evaluation of Memphis, Pisa, Paris, and San Diego – Auto questionnaire scale, and anxiety sensitivity has been measured with the Anxiety Sensitivity Index-3.

**RESULTS:** There has been no statistically significant difference between groups in terms of maternal emotional temperament and anxiety sensitivity. In the logistic regression analysis conducted to determine the predictors of foreign body aspiration, it is determined that the mother's anxious temperament has predicted foreign body aspiration significantly.

**CONCLUSION:** As a result of the study, it can be concluded that mothers' anxious temperament can be considered a risk factor for foreign body aspiration because it affects parenting skills and children's ability to manage behavioral problems. Consistent results could be able to be obtained with studies including larger samples on the subject.

**KEYWORDS:** Foreign bodies. Child. Mothers. Temperament. Anxiety.

## INTRODUCTION

Foreign body aspiration (FBA) is a common cause of emergency admissions and is most common during the early childhood period. It is the leading cause of distress, morbidity, and accidental infantile deaths in children, as well as being the fourth leading cause of death in primary school children[1]. In the United States reports, children who have foreign bodies in their airways exhibit similar risk factors to those previously mentioned, such as being male, being under 5 years old, and not having private insurance. The mortality rate was reported as 2.75%, and older age, urban hospital settings, and teaching hospital status increased mortality risks[2].

It is a known fact that maternal psychopathology is a serious factor that affects both the mother's and the child's health. There are data suggesting that maternal psychiatric disorders might be associated with injuries in children. In a recent population-based study, it has been mentioned that maternal depression was linked to a higher risk of injury in offspring throughout childhood when compared with offspring of mothers who had no history of depression. In the mentioned study, the strongest correlation was observed during the first year of life[3]. Taking these data into consideration, it can be thought that injuries in children might also be related to psychopathology in mothers. In addition to anxiety and depression, anxiety sensitivity could be an important maternal characteristic among children with injury and FBA. Anxiety sensitivity describes how much people find anxiety-related feelings upsetting and how seriously they take these feelings as posing a social, psychological, or physical threat. Anxiety sensitivity differs from state and trait anxiety in that it expresses a relatively stable structural feature and reveals the occurrence of an anxiety disorder in the future[4]. To the best of our knowledge, there is no study in the

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literature that investigates the association between maternal anxiety sensitivity and childhood injury or FBA.

Several psychiatric disorders and behavioral challenges have been found to be related to FBA. Turgut et al. have reported a potentially high prevalence of ADHD symptoms among children presenting to emergency services due to unintentional ingestion of foreign bodies. This could be interpreted as children with ADHD are at an increased risk for FBA[5]. In addition, psychological problems are found more common in children with foreign body ingestion than in the controls[6], and when compared with healthy children, children who had ingested caustic had impulsive behavior. In addition to impulsivity, hyperactivity is a risk factor for caustic ingestion in children under the age of 5 years[7].

In addition to psychopathology, the association between children's temperament profiles and injuries has also been investigated. In a former study, it was suggested that aggressive behavior was linked to all accidental injuries after adjusting for psychosocial factors such as social class, crowding, mother's psychological distress, age, and marital status, as well as child's sex. After accounting for the covariates, overactivity was only linked to injuries that did not necessitate hospitalization. Compared with children with low scores on both behavioral scales, children with high activity and high aggression scores had a 1.9 relative risk of injuries that required hospitalization[8]. However, in a recent study, none of the three temperament types identified by the Childhood Behaviour Questionnaire have been linked to a higher risk of fracture[9]. Similarly, Zhang et al. have also suggested that parenting style could play an important role in mediating children's temperament and recurrent unintentional injury[10]. When these data are evaluated together, it can be thought that not only the temperament of the child but also the factors related to parents might play a role in accidents and injuries.

It appears that psychological factors associated with both parents and children might also be associated with FBA. Although there have been several studies that examine the association between mothers' psychiatric disorders and children with FBA, there is no study conducted on the temperament characteristics of mothers. In addition, there is no study on anxiety sensitivity, which is considered a temperament trait, either. This study aimed to compare the temperament characteristics and anxiety sensitivity of mothers of children treated for FBA with mothers of healthy children.

## METHODS

A total of 36 mothers have been included in this study (18 mothers of children with FBA were considered the patient group and 18 mothers of healthy children were considered the control group). The patient group was chosen from the mothers of children with FBA that admitted to thoracic surgery clinics of Niğde Training and Research Hospital and Uşak Training and Research Hospital. The control group was chosen from the mothers of children with mild symptoms (i.e., consultancy, upper respiratory tract infection, and so on) that were admitted to Niğde Training and Research Hospital Pediatric Outpatient Clinic. The sample consisted of only the mothers of the children with FBA and the healthy ones. As FBA is a condition that is usually managed under emergency department circumstances, the participants were asked to fill out the scales during the follow-up appointments. At the follow-up appointment, after the child was evaluated, the mother was asked to fill in the scales in a suitable room. Moreover, maternal mental health status was evaluated via an interview. Due to the possibility of a confounding effect, participants with any current psychiatric disorders, those receiving medical treatment, and those with long-term medical conditions have been excluded from our study. The history of any psychiatric disorder was determined by self-report. Our findings would have been tainted if we had included participants who had any pre-existing psychiatric disorders because a diagnostic interview had not been conducted with them. The questionnaires have been completed by the researchers. The protocol of this study has received approval from the Nide Training and Research Hospital Ethics Committee (approval number: 2022/46 and approval date: 28.04.2022), and each participant has given their informed consent before participating in the study.

### Tools

Sociodemographic Data Form: The data form that includes questions about age, family characteristics, and clinic characteristics has been used in this study. Using this form, the child's age, type of family, father's and mother's age, occupation, educational level, and family income have been evaluated, and the form has been completed by researchers.

**Anxiety Sensitivity Index (ASI-3):** The ASI-3, developed by Taylor et al.[11], has been used to evaluate AS. This 18-item scale is divided into three six-item subscales (physical, cognitive, and social); total ASI-3 scores range from 0 to 54, with higher scores indicating higher levels of AS. This scale is a self-report scale. The ASI-3 has undergone validation and reliability testing in Turkey[12]. The total score is obtained by summing the scores obtained from all items.

**Temperament Evaluation of Memphis, Pisa, Paris, and San Diego – Auto questionnaire (TEMPS-A):** Akiskal et al.[13] have developed the TEMPS-A in order to assess affective temperament

dimensions. It addresses five temperament dimensions: depressive, cyclothymic, hyperthymic, irritable, and anxious. TEMPS-A is a dichotomous scale. Questions can be answered as yes or no. The answer "yes" is scored as 1 and "no" as 0. Subscale scores and total scores are obtained by summing the scores obtained from various questions. Vahip et al. have established the validity and reliability of the TEMPS-A for Turkish speakers[14].

SPSS has been used to perform statistical analysis on the collected data. All the analyses have been conducted with scales, total scores, and TEMPS-A subscale scores. Demographic variables have been analyzed by using descriptive statistics. The Kolmogorov-Smirnov and Shapiro-Wilk tests are used to determine the normality of the data. In order to examine the differences between the groups, the independent-sample T test and Mann-Whitney U test are used, and to examine the differences between categorical variables, the chi-square test is used. The potential predictors of FBA have been identified by using logistic regression analysis. A statistically significant two-tailed p-value of 0.05 has been considered.

## RESULTS

The study sample consisted of 36 children and their mothers, of which 18 were patients (16 boys and 2 girls) and 18 were healthy controls (18 boys). There has been no significant difference between the groups in terms of gender (p=0.146, $\chi^2$=2.118). There has been no significant difference between the groups in terms of mothers' age (28.83±5.41 years for the patient group and 29.11±4.76 years for the control group, p<0.871). The median age of patients is 24 months (IQR=72), and the median age of controls is 36 months (IQR=30). There has been no significant difference between groups in terms of age (p=0.141, U=116.000). The demographic data are demonstrated in Table 1. According to the test of normality results, age and mothers' irritable, anxious temperament scores have not been normally distributed. Moreover, depressive, cyclotomic, hyperthymic temperament and anxiety sensitivity index scores are normally distributed. When the two groups are compared in terms of mothers' temperament dimension and anxiety sensitivity, it can be seen that there is no significance between the two groups. More detailed statistics are given in Table 2.

The predictors of FBA have been assessed via the logistic regression analysis. FBA diagnosis is defined as the dependent variable (0=no diagnosis and 1=FBA), and all temperament dimensions and anxiety sensitivity are defined as independent variables. According to this analysis, mothers' anxious temperament has been a significant predictor of having epilepsy (p=0.05, odds ratio=1.299, 95% confidence interval=1–1.688). The results of the logistic regression analysis are shown in Table 3.

## DISCUSSION

In this study, we have investigated the association between FBA and mothers' temperament characteristics and anxiety sensitivity.

**Table 1.** Demographic and clinical characteristics.

| | Patient | Control | Patient | Control | U | p |
|---|---|---|---|---|---|---|
| | Median | IQR | Median | IQR | | |
| Age (months) | 24 | 72 | 36 | 30 | 116.000 | 0.141 |
| | n | % | n | % | $\chi^2$ | p |
| Sex (female/male) | 2/16 | 11.1/88.9 | 0/28 | 0/100 | 2.118 | 0.146 |

**Table 2.** The comparison of mothers' temperament dimensions and anxiety sensitivity.

| | Patient | | Control | | Statistics | p |
|---|---|---|---|---|---|---|
| | Mean | SD | Mean | SD | t | |
| Depressive temperament | 6.28 | 4.74 | 6.22 | 3.50 | -0.40 | 0.968 |
| Cyclothymic temperament | 6.83 | 4.23 | 8.78 | 3.73 | 1.462 | 0.153 |
| Hyperthymic temperament | 11.44 | 7.30 | 10.72 | 5.41 | -0.337 | 0.738 |
| Anxiety sensitivity index | 15 | 10.31 | 21.5 | 12.07 | 1.737 | 0.091 |
| | Mean rank | Sum of rank | Mean rank | Sum of rank | U | p |
| Irritable temperament | 20.5 | 369 | 16.50 | 297 | 126.000 | 0.249 |
| Anxious temperament | 20 | 360 | 17 | 306 | 135.000 | 0.391 |

**Table 3.** Logistic regression analysis about the predictor of foreign body aspiration.

| | B | SE β | Wald's χ2 | p | OR | 95%CI OR |
|---|---|---|---|---|---|---|
| Depressive temperament | -0.010 | 0.149 | 0.004 | 0.947 | 0.990 | 0.739–1.327 |
| Cyclothymic temperament | -0.260 | 0.145 | 3.206 | 0.073 | 0.771 | 0.580–1.025 |
| Hyperthymic temperament | 0.097 | 0.080 | 1.464 | 0.226 | 1.102 | 0.941–1.290 |
| Irritable temperament | 0.113 | 0.129 | 0.771 | 0.380 | 1.120 | 0.870–1.441 |
| Anxious temperament | 0.262 | 0.134 | 3.845 | 0.050 | 1.299 | 1–1.688 |
| Anxiety sensitivity index | -0.066 | 0.047 | 2.035 | 0.154 | .936 | 0.854–1.025 |
| Constant | -0.117 | 1.686 | 0.005 | 0.945 | .890 | |

The dependent variable in this analysis is foreign body aspiration diagnosis (0=no diagnosis 1=foreign body aspiration). OR: odds ratio; CI: confidence interval.

As a result, it is determined that there is no significant difference between patients and controls in terms of temperament subdimensions and anxiety sensitivity. In logistic regression analysis, anxious temperament is found as a significant predictor of FBA. To the best of our knowledge, this is the first study in the literature that examines the association between FBA and mothers' temperament characteristics and anxiety sensitivity.

There are several studies in the literature about FBA and child psychopathology. Turgut et al. proposed a potentially elevated occurrence of ADHD symptoms among children who were referred to emergency services subsequent to the inadvertent ingestion of foreign bodies[5]. Similarly, Çelenk et al. also mentioned that ADHD might be associated with the self-insertion of nasal and aural foreign bodies and suggested that clinicians should be aware of the possibility of ADHD in children, particularly those between the ages of 5 and 9 years who present with self-inserted nasal and aural foreign bodies[15]. In a more detailed study, which investigated the psychological status of children with foreign body ingestion, it has been found that there is a significant increase in SDQ scores between the two groups in total score, emotional symptoms, hyperactivity disorders, conduct problems, and prosocial behaviors[6]. Therefore, by taking these studies into consideration, it can be suggested that children with FBA would be separated from their peers who have no history of FBA in the psychological dimension. Increased emotional difficulties and increased ADHD symptoms could be risk factors for FBA. Moreover, this study has investigated maternal risk factors such as temperament and anxiety sensitivity. In another recent study that investigated the relationship between maternal affective temperament and ADHD and comorbidities, the results have shown a positive association between maternal anxious and irritable temperament and child inattention, hyperactivity-impulsivity, and oppositional defiant disorder (ODD) scores[16]. There are other studies in the literature which support the association between maternal anxious temperament and ODD behaviors[17]. In our study, we have also found that maternal anxious affective temperament significantly predicts FBA. Considering the close relationship between FBA and ADHD, our finding is consistent with the literature. Despite the lack of clarity regarding the mechanisms underlying the link between maternal anxiety or an anxious temperament and oppositional-defiant behaviors, it has been suggested that maternal anxiety might have increasing effects on these behaviors by adversely affecting parenting techniques[18]. It is determined that maternal anxious affective temperament characteristics of the mother might affect her parenting skills and thus create a risk for FBA. Also, it is known that the parenting skills are crucial in preventing FBA, so it can be said that improving parenting skills through various sources increases awareness about FBA[19]. However, we could not determine any association in terms of anxiety sensitivity. Our relatively small sample size might have interfered with founding a significant association.

This study has certain limitations. First, our sample size is relatively small. As FBA is a relatively rare condition and most cases are being treated with various different methods (e.g., Heimlich maneuver) without thoracic surgery consultation, we have had difficulty in collecting a larger sample group. This limitation could have interfered with our comparisons between two study groups. It is a cross-sectional study, so the results might lack the ability to infer causality and/or risk. Further prospective studies are required to clarify the association between maternal affective temperament and FBA. Second, a structured diagnostic evaluation has not been conducted with children, but instead self-report measuring tools have been used. This could be considered a methodological limitation that might interfere with the results.

As a result, no study has been conducted specifically on children with FBA and possible maternal temperament and anxiety sensitivity association, which would be an important factor considering the issue. We think that our study is important in terms of determining the temperament profile of children with FBA. We think that, in such a situation in which preventive measures can be life-saving, it is important to identify the risk

factors and intervene in those in the risk group. It is thought that there is a need for studies investigating maternal affective temperament and FBA association with larger sample groups in which diagnostic evaluations are also conducted.

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## AUTHORS' CONTRIBUTIONS

**MÇ:** Data curation, Project administration, Supervision, Writing – review & editing. **SBA:** Conceptualization, Investigation Methodology, Project administration, Supervision, Writing – original draft. **AE:** Data curation, Validation, Visualization. **ZC:** Data curation, Validation, Visualization. **NS:** Formal Analysis, Resources, Software. **İT:** Funding acquisition, Project administration, Resources, Software, Validation, Writing – original draft, Writing – review & editing.

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