

The psychosocial environment associated with childhood asthma in a primary care unit. Preliminary report

El ambiente psicosocial asociado al asma infantil en una unidad de atención primaria. Informe preliminar

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Abstract

Background: Asthma is related to psychosocial factors. **Objective:** To evaluate the associations between the level of asthma control in children with psychosocial factors such as depression, state anxiety, trait anxiety and family dynamics. **Method:** Cross-sectional study in a family medicine unit in Mexico with 43 patients with asthma from 8 to 16 years of age, whose degree of asthma control, level of state anxiety and trait anxiety, level of depression and perception of family functioning by the mother were determined. **Results:** A relation was found between degree of asthma control and state anxiety ($\chi^2 = 14.098$; $p = 0.003$). Roles ($\chi^2 = 12.88$; $p = 0.045$) and communication ($\chi^2 = 14.48$; $p = 0.025$) were more affected in families with children with high levels of state anxiety than in those with lower levels of state anxiety. In families with children between 12 and 16 years of age, there was an association among the child's level of depression and the perception of family functioning by the mother ($\chi^2 = 13.3$; $p = 0.038$); however, this association was not found in families of children between 8 and 11 years of age ($\chi^2 = 7.606$; $p = 0.268$). **Conclusions:** An association was found between state anxiety and the level of asthma control. No relation was found between level of asthma control and the depression and trait anxiety variables.

Keywords: Asthma. Children. Anxiety. Depression. Family functioning. Asthma control.

Resumen

Antecedentes: El asma se relaciona con factores psicosociales. **Objetivo:** Evaluar las asociaciones entre el nivel de control del asma en niños con factores psicosociales como depresión, estado de ansiedad, ansiedad rasgo y dinámica familiar. **Método:** Estudio transversal en una unidad de medicina familiar de México con 43 pacientes con asma de 8 a 16 años de edad, a quienes se les determinó el grado de control del asma, nivel de ansiedad estado y ansiedad rasgo, nivel de depresión y percepción del funcionamiento familiar por la madre. **Resultados:** Se encontró relación entre el grado de control del asma y el estado de ansiedad $X^2 = 14,098$; $p = 0,003$. Los roles, $X^2 = 12,88$, $p = 0,045$ y la comunicación $X^2 = 14,48$, $p = 0,025$ se vieron más afectados en familias con niños con niveles altos de ansiedad estado que en aquellos con niveles más bajos de ansiedad estado. En familias con niños entre 12 y 16 años hubo asociación entre el nivel de depresión del niño y la percepción del funcionamiento familiar por parte de la madre, ($X^2 = 13.3$, $p = 0,038$), sin embargo, esta asociación no se encontró en familias de niños entre 8 y 11 años de edad, ($X^2 = 7,606$, $p = 0,268$). **Conclusiones:** Se encontró una asociación entre el estado de ansiedad y el nivel de control del asma. No se encontró relación entre el nivel de control del asma y las variables depresión y ansiedad rasgo.

Palabras clave: Asma. Niños. Ansiedad. Depresión. Funcionamiento familiar. Control del asma.

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Date of reception: 28-09-2024

Date of acceptance: 26-03-2025

DOI: 10.24875/NCTE.M26000002

Available online: 03-02-2026

Neumol Cir Torax (Eng). 2025;84(1):3-9

www.revistanct.org.mx

Introduction

The relation between pediatric asthma and mental illnesses is still underestimated both by pediatricians and by mental health experts¹. Psychosocial factors can influence the pathogeny and physiopathology of asthma and there is a high comorbidity of pediatric asthma with anxiety and mood disorders in both children and in their caregivers². The possible association among anxiety, depression, family functioning and level of asthma control in children have been continuously explored. It is also known that youngsters with asthma frequently have higher levels of anxiety and depression than control groups without asthma³.

The development of asthmatic symptoms has for decades been related to the persistence of a psychosomatic environment and it was in the 1980s when the concept of somatization started to be interpreted as “the articulation of emotional problems and psychosocial stress through physical symptoms”⁴. From this perspective, the psychosomatic family is characterized by the presence of an identified patient, a member who shows a type of symptom, whether psychosomatic or behavioral, in which the family deposits the deficiencies caused by poor organization, disintegration, chaos and rigidity. Thus, a symbolic or metaphorical significance has been attributed to the psychosomatic symptom⁵. The study of the family in children with asthma allows therapeutic goals for psychotherapy to be established, with the purpose of improving disease control and influencing significant comorbidities such as anxiety and depression.

The incidence of asthma has significantly increased in the State of Michoacán, Mexico in the last two decades. In 2008, an incidence of 254.52 per 100,000 inhabitants was estimated in the 5 to 14 years age group, while by 2012, 277.12 per 100,000 inhabitants was reported⁶. In the capital city of this state, asthma is the pediatric disease that causes more emergency room visits and an epidemiological study conducted in 2006 in this city, in which 4285 infants participated, found that 6% of children between 6 and 11 years of age and 8.5% of adolescents between 12 and 14 years of age had an asthma diagnosis, but 10% of the former group and 14% of the latter group had presented wheezing in the last year⁷. A subsequent study showed figures for the prevalence of pediatric asthma close to 10% in the decade 2000-2010 and a concentration of cases between 5 and 20 times greater in the center of the same city than in peripheral zones⁸ this being related to environmental factors. The purpose of this study was to evaluate the

associations between the level of asthma control in children with psychosocial factors such as depression, state anxiety, trait anxiety and family dynamics.

Method

Patients

Cross-sectional study with families of children between 8 and 16 years of age with a confirmed asthma diagnosis by pneumologists or allergists and who regularly attended family medicine visits to follow-up on the asthma in the period June 1 – December 20, 2018, in a primary care unit.

Instruments

For the evaluation of child depression, the Child Depression Inventory, CDI (Kovacs and Beck, 1977) was used, which is the instrument most utilized for this purpose. It is validated in the child population from 7 to 17 years and it assesses the presence and severity of the depressive disorder⁹. It is a self-report assessment consisting of 27 items each broken down into three answer options that evaluates the depression symptoms. The total score is from 0 to 54 points. The answer options for each item are: 0 for absence of symptoms, 1 for mild symptoms and 2 for serious symptoms. The total score allows the depression to be classified into < 7, absence of depression, 7-12 points, mild depression, 13-17 points, moderate depression and 18 or more points, severe depression.

State anxiety is defined as “a temporary emotional condition or state of the human organism, characterized by consciously perceived subjective feelings of tension and of apprehension, and by an increase in activity of the autonomic nervous system”. Conversely, trait anxiety “means the relatively stable individual differences in propensity to anxiety, that is, the differences among people in the tendency to respond to situations perceived as threatening with increases in the intensity of state anxiety”¹⁰.

In 1973, Spielberger et al. designed the State-Trait Inventory for Children (STAIC) to evaluate anxiety in U.S. children from elementary schools. Its Spanish version (IDARE) was translated and validated by Bauermeister et al.¹¹ The IDARE was used to establish the presence of trait anxiety and state anxiety. This is a self-report assessment subdivided into two parts. The first part measures anxiety as *state* (scale of state), with 20 propositions and three possible answers: “not at all”,

“somewhat” and “a lot” scored from 1, 2 and 3, respectively. The instructions require the subjects to indicate how they feel that at time, “right now”. The second part measures anxiety as *trait* (scale of trait). It also has 20 propositions with three possible answers: “almost never”, “sometimes” and “often” scored from 1 to 3. However, the instructions here tell the subjects to describe how they feel “overall”. In state anxiety, fear and calm are evaluated, and in trait anxiety worry, avoidance, somatization, anger and sadness are evaluated⁵. The qualification of both scales according to the score obtained is: for trait anxiety, low under 29 points, medium 29 to 41 points, and high over 41 points; and for state anxiety, low under 24 points, medium 24 to 38 points and high over 38 points¹⁰⁻¹².

To evaluate the degree of asthma control, the ACT (Asthma Control Test)¹³ was used, which allowed the disease to be classified into total control, 20-24 points well controlled, 16-19 points asthma with some degree of control, and less than 15 points poorly controlled asthma.

The FF-SIL family functioning perception test was used to evaluate family dynamics¹⁴. It is a self-administered instrument that allows the assessment of seven specific areas of family functioning. Cohesion: physical and emotional family unity when facing different situations and in decision making. Harmony: correspondence between the individual and family interests and needs in a positive emotional balance. Communication: the family members are able to convey their experiences clearly and directly. Permeability: ability of the family to give and receive experiences of other families and institutions. Affection: ability of the family members to experience and show each other positive feelings and emotions. Roles: each family member fulfills the responsibilities and duties negotiated by the core family. Adaptability: ability of the family to change power structure, and relation of roles and rules when required. The global score obtained with the instrument allowed the families to be classified as follows: 57-70 points functional, 43-56 points moderately functional, 28-42 points dysfunctional and 14-26 points severely dysfunctional. This instrument has been used in multiple studies with similar populations¹⁵⁻¹⁷.

The validation of the internal consistency of each of the instruments used in the study was previously carried out using Cronbrach’s alpha. The results were the following: FF-SIL (0.735), IDARE (0.688), CDI (0.853) and ACT: Asthma Control Test, 0.754 for children older than 11 years and 0.832 for children from 4 to 11 years of age.

Table 1. Demographic characteristics

Age	Male	Female	Total
8-11 years	13 (30.2%)	10 (23.2%)	23 (53.5%)
12-16 years	13 (30.2%)	7 (16.3%)	20 (46.5%)
Total	26 (60.5%)	17 (39.5%)	43 (100%)

Statistical analysis

The study questionnaires’ internal consistency was validated with Cronbrach’s alpha χ^2 was used to establish the existence of associations among perception of family functioning, trait anxiety, state anxiety and depression. The groups, according to levels of depression and family functioning, were compared using ANOVA and a level of significance of $p < 0.05$ was accepted for the proposed measurements.

Ethical considerations

The work protocol complied with the General Health Act with regard to Health Research of the United Mexican States and with the Declaration of Helsinki, and was approved by the institution’s local ethics and research committee with registration R-2011-1602-19.

Results

Forty-three children with an asthma diagnosis confirmed by pneumologists or allergists both clinically and by lung function tests (FEV 1 reversibility or FVC equal to or greater than 12% post B-agonist) were included in the study. The distribution by sex and age groups is shown in table 1.

Trait anxiety was found at high level in 9.3%, at medium level in 81.4% and at low level in 9.3%. No relation was found between degree of asthma control and trait anxiety ($\chi^2 = 4.321$; $p = 0.633$) (Table 2), but there was one between degree of asthma control and state anxiety ($\chi^2 = 14.098$; $p = 0.003$). Children with a lower degree of asthma control tended to have higher levels of state anxiety.

Higher levels of state anxiety were found in boys than in girls, ($\chi^2 = 5.367$; $p = 0.021$). However, no statistically significant association was found when comparing the 8-11 years of age and 12-16 years of age groups with each other, with regard to the state anxiety variable. ($\chi^2 = 1.691$; $p = 0.167$).

Table 2. Association among level of depression and perception of family functioning by the mother

Areas of family functioning	No depression (n = 6)	Mild depression (n = 7)	Moderate depression (n = 15)	Severe depression (n = 15)	F	p
Cohesion	8.66 ± 1.96	8.00 ± 1.06	7.14 ± 1.67	6.60 ± 1.40	4.058	0.013*
Roles	7.00 ± 1.54	6.03 ± 1.53	6.37 ± 1.59	7.66 ± 1.15	0.746	0.531
Harmony	8.50 ± 1.87	7.50 ± 1.55	7.25 ± 1.83	7.33 ± 0.57	4.395	0.009*
Communication	6.83 ± 0.75	6.69 ± 1.31	7.00 ± 1.06	6.00 ± 1.73	2.293	0.093
Affection	7.33 ± 1.36	6.76 ± 1.06	7.00 ± 0.83	7.33 ± 1.52	6.099	0.002*
Permeability	7.00 ± 1.26	7.30 ± 1.49	6.87 ± 1.55	7.66 ± 2.30	5.010	0.005*
Adaptability	7.00 ± 0.89	7.26 ± 1.48	7.25 ± 0.45	6.00 ± 1.00	2.706	0.058

The groups were compared with each other using ANOVA.

*Statistically significant figure ($p < 0.05$).

Family functioning had the following distribution: functional families 6 (14%), moderately functional families 24 (55.8%) and dysfunctional families 13 (30.2%). An association was found among perception of family functioning and level of trait anxiety in children between 12 and 16 years of age, but not in children between 8 and 11 years of age. In the first group, worse perception of family functioning by the mother was associated with higher levels of trait anxiety in children between 12 and 16 years ($\chi^2 = 11.944$, $p = 0.018$). This association was not found in families of children between 8 and 11 years of age ($\chi^2 = 2.971$, $p = 0.563$). The areas of family functioning: roles $\chi^2 = 12.88$, $p = 0.045$ and communication $\chi^2 = 14.48$, $p = 0.025$ were more affected in families with children with high levels of state anxiety than in those with lower levels of state anxiety.

Mild depression was found in 15 children (34.9%), moderate depression in 7 (16.2%) and severe depression in 15 (34.9%), and there was no depression in only 6 children (14%). When the association among degree of depression and age groups was analyzed, no statistical significance was found ($\chi^2 = 1.809$; $p = 0.613$), nor between depression and sex of the children ($\chi^2 = 3.163$; $p = 0.367$), nor between degree of asthma control and level of depression of the child ($\chi^2 = 6.655$; $p = 0.673$).

In the areas of cohesion, affection and harmony, families of children with depression obtained lower scores than families of children without depression, however, in the areas of permeability and adaptability, higher scores were found in some of the subgroups of families with children with asthma and depression than in families of children with asthma without depression (Table 2).

In families with children between 12 and 16 years of age, there was an association among the child's level of depression and the perception of family functioning by the mother, ($\chi^2 = 13.3$, $p = 0.038$), however this association was not found in families of children between 8 and 11 years of age, ($\chi^2 = 7.606$, $p = 0.268$).

Discussion

A statistically significant association was found between asthma and state anxiety and not with trait anxiety. Therefore, the anxiety in these children, more than a propensity to said anxiety determined by individual traits, is represented as a temporary emotional state with strong feelings of tension and apprehension related to an increase in the activity of the autonomic nervous system, and strongly related to the expression and regulation of emotions.

State anxiety was significantly greater in boys than in girls in this study. There are studies which have reported that boys are more vulnerable than girls to psychological and social difficulties. There has been an insistence on the importance of examining boys diagnosed with asthma and at risk of having psychosocial problems, and that boys diagnosed with asthma when evaluated by their parents are perceived by their parents as having a greater problem with socializing and paying attention than healthy boys, this being significant in the male gender¹⁸.

A study conducted in Australia (2008) found a greater frequency of problematic behaviors in boys with asthma than in girls, such as behaviors of opposition, aggression and anxiety, associated with a higher level of

difficulty in raising children and with families with greater dysfunctionality¹⁹.

Anxiety has been more consistently associated with asthma than depression²⁰. This study also found no statistically significant association among depression and asthma control ($\chi^2 = 3.163$; $p = 0.367$), but there was one between asthma control and state anxiety. The level of asthma control has been related to its severity, to anxiety and to depression²¹.

The perception of family functioning by the child's mother allows us to obtain an insight into complex family dynamics and seems to be a sensitive indicator to obtain information not only on the mental health state of the child and of the family, but also to establish intervention strategies when disease control is not achieved with pharmacological treatment and environmental healing measures. When caregivers recognize specific problems in family functioning and as these contribute to the poor control of the child's disease, it is easier to become agents of change, which is significantly important in the Latin American family, in which high levels of cohesion are frequently found.

A similar study conducted with families of children with asthma in the same city showed that the expression and regulation of affection and communication are affected in over half of these families of children with asthma, and communication, the use of family resources to deal with the disease and the regulation of affection are often compromised²², which can have repercussions on the lack of disease control and on the perpetual nature of the symptoms. Also, in these families, distinctive psychosomatic family characteristics are often found, such as rigidity, overprotection, conflict avoidance, and bonding through a dynamic that causes ineffective communication and limits the identification and use of psychological resources by the family to deal with the child's disease²²⁻²⁴. A better perception of family functioning is often accompanied by better asthma control and greater use of the resources that the family has to deal with the disease¹⁵.

It has been established that almost 30% of adolescents with asthma achieved control of their disease and the prevalence of anxiety and depression in them is higher than in adolescents without asthma²⁵. The level of control is also lower when the mothers have severe anxiety and a greater frequency of depression has been established in caregivers of children with asthma than in the open population²⁶. While the non-existence of a direct relation between psychological state and uncontrolled asthma with bronchial hyperreactivity has been mentioned, family functioning may be a facilitating

factor in these relationships²⁷. Also, the severity of the depression can be related to the level of asthma control²⁸. Finding high values of affection and permeability in families with children with severe depression facilitates psychotherapeutic intervention programs because these families tend to be open to external interaction to share experiences and the family members want to exchange positive emotions with each other. Among the areas of family functioning, cohesion and harmony were those that contributed most to differentiating the families of children without depression from those with children with asthma and variable levels of depression. In the families of children with depression, the family's physical and emotional unity in taking decisions in the face of problematic situations, such as the child's health, was more compromised. There were also differences between the individual interests of the family members and those of the family, which made the existence of a positive emotional climate difficult. Conversely, the most affected areas of family functioning in children with asthma and state anxiety were communication and roles. In these families, deficiencies were found in clearly conveying experiences among their members, in particular in interpreting conflictive content among each other. There are also problems in establishing the duties of the family members and in their negotiation, which are situations that can perpetuate the state of anxiety in these children.

In the areas of cohesion, affection and harmony, families of children with depression obtained lower scores than families of children without depression, however, in the areas of permeability and adaptability, higher scores were found in some of the subgroups of families with children with asthma and depression than in families of children with asthma without depression, which means that families of children with asthma without depression, unlike those with a child with asthma and depression, are more united in making decisions, their members are more open to express emotions positive and interact with each other and the interests of the members correspond with those accepted by the family. On the other hand, families of children with asthma and depression are more open to receiving advice about the sick member and are willing to make changes in the roles of their members and rules to reorganize themselves around the patient. These characteristics of the families of children with asthma and depression were used to implement family psychotherapy actions with the purpose of inducing changes in family dynamics to facilitate greater adherence to treatment and foster a climate of cooperation between both parents

and the rest of the extended family, in favor of the child's recovery.

It has been recommended that children with severe asthma be treated by a multidisciplinary team trained to deal with the psychosocial factors of the disease²⁹. Brief therapy, cognitive behavioral interventions, family support programs, including family psychotherapy, psychoeducation, and reinforcing the socialization of these children through group sports and cultural activities are approaches that have shown good outcomes both in the control of children with severe asthma and in the reduction of rescue medications and in control medication doses.

A frequency of 28% of depression symptoms among adolescents with asthma who live in urban zones has also been reported and this has been associated with functional limitation, poor disease control and significant effect on these patients' quality of life³⁰. The exacerbations in children with chronic allergic diseases have also been related to the perception of family dynamics by the mother^{17,31}. In this study the mother was the primary caregiver in all the cases and her perception of family functioning can provide valuable information on the child's physical and mental state, and on their relationship with the other family members, which is important in order to define psychotherapeutic strategies in the family. Finally, psychotherapeutic interventions in families with children with uncontrolled asthma should pay attention to the unresolved mental health needs that can feed the psychosomatic environment of the disease. Multidisciplinary management and the addition of psychotherapeutic treatment should be considered in families with children with poor asthma control.

Conclusion

An association was found among state anxiety and level of asthma control, and this was significantly greater in boys than in girls. No relation was found between trait anxiety and level of disease control, nor between level of depression and degree of asthma control. The families of children with asthma were perceived as families that are functional (6%), moderately functional (55.8%) and dysfunctional (30.2%). Depression was found in 86% of children, of which 34.9% corresponded to mild depression, 16.3% to moderate depression and 34.8% to severe depression. Both state anxiety and level of depression were related to the perception of family functioning by the mother of children between 12 and 16 years, but not with that by the mother of younger children.

Limitations. This is a study with a limited sample that has led to much larger studies still underway. Its value is mainly limited to the family medicine unit in which it was carried out and allowed to organize psychoeducational and psychotherapy actions with the families of children and adolescents with asthma and depression.

Acknowledgments

To O. Mejía for her methodological assistance and C. Gómez Alonso for his statistical support.

Funding

No funding was received for the conduct of this study or for its publication.

Conflicts of interest

The authors declare no conflicts of interest.

Ethical considerations

Protection of humans and animals. The authors declare that the procedures followed complied with the ethical standards of the responsible human experimentation committee and adhered to the World Medical Association and the Declaration of Helsinki. The procedures were approved by the institutional Ethics Committee.

Confidentiality, informed consent, and ethical approval. The authors have followed their institution's confidentiality protocols, obtained informed consent from patients, and received approval from the Ethics Committee. The SAGER guidelines were followed according to the nature of the study.

Declaration on the use of artificial intelligence. The authors declare that no generative artificial intelligence was used in the writing of this manuscript.

References

1. Peters TE, Fritz GK. Psychological considerations of the child with asthma. *Child Adolesc Psychiatr Clin N Am*. 2010;19(2):319-333. <https://doi.org/10.1016/j.chc.2010.01.006>.
2. Ritz T, Meuret AE, Trueba AF, Frtzsche A, von Leupoldt A. Psychosocial factors and behavioral medicine interventions in asthma. *J Consult Clin Psychol*. 2013;81(2):231-250. <https://doi.org/10.1037/a0030187>.
3. Olazagasti RA, Shrout PE, Yoshikawa H, Bird HR, Canino GJ. The longitudinal between parental reports of asthma and anxiety and depression symptoms among two groups of Puerto Rican youth. *J Psychosom Res* 2012;73(4):283-288. <https://doi.org/10.1016/j.jpsychores.2012.07.006>.
4. De la Fuente ER. *Psicología Médica (Medical Psychology)*. Mexico: Fondo de Cultura Económica; 2001.
5. Onnis L. *Family therapy for psychosomatic disorders*. Barcelona: Paidós; 1990.

6. Roa CFM, Toral FS, Roa CVH, Zavala HJA, Duran ALM, Herrera ABP, et al. Estimaciones sobre la tendencia del asma en México para el periodo 2008-2012 [Estimates on trends of asthma in Mexico for the period 2008-2012]. *An Med Asoc Med Hosp ABC*. 2009;54(1):16-22.
7. Rodríguez-Orozco AR, Pérez-Sánchez AG, Cardoso-Alonso SA, Beyes-Retara A. Prevalencia comparada de asma y rinitis alérgica entre niños y adolescentes michoacanos provenientes de escuelas públicas de Morelia [Compared prevalence of asthma and allergic rhinitis in Michoacan children and adolescents from public schools of Morelia]. *Rev Invest Clin*. 2007;59(1):90-92. Spanish.
8. Rodríguez-Orozco AR, Galeana-Osuna EG, Bollo-Manent M, Figueroa-Núñez B. Análisis espacial de la morbilidad por asma en la ciudad de Morelia, México, para la década 2000-2010 [Spatial analysis of asthma morbidity in the city of Morelia, Mexico, for the decade 2000-2010]. *Aten Primaria*. 2020;52(8):578-579. Spanish. <https://doi.org/10.1016/j.aprim.2020.06.009>.
9. Kovacs M. *Children's depression inventory (CDI)*. Toronto: Multi-Health System; 2003.
10. Castrillón MDA, Borrero CPE. Validación del Inventario de Ansiedad Estado-Rasgo (STAIC) en niños escolarizados entre los 8 y 15 años [Validation of the State-Trait Anxiety Inventory in school age children between 8 and 15 years]. *Acta Colom Psicol* 2005;13:79-90. Spanish.
11. Bauermeister JJ, Mero OCF, Villamil-Forastieri B, Spielberger CD. Reliability and validity of the Spanish version of the State-Trait Anxiety Inventory for Puerto Rican and Panamanian children. *J Psychol*. 1986;118.
12. Ruiz AL, Abalo JG, Madam AF, Londián MDLAV, Carbonell MM, Torres FCP. Validación del Inventario de Ansiedad Rasgo-Estado para Niños en adolescentes cubanos. *Psicología y Salud*. 2003;13(2):203-214.
13. Thomas M, Kay S, Pike J, Williams A, Rosenzweig JR, Hillyer EV, et al. The Asthma Control Test (ACT) as a predictor of GINA guideline-defined asthma control: analysis of a multinational cross-sectional survey. *Prim Care Respir J*. 2009;18(1):41-49. <https://doi.org/10.4104/pcrj.2009.00010>.
14. Louro Bernal I. *Escuela de Salud Pública; La Habana: 2004. Modelo teórico-metodológico para la evaluación de salud del grupo familiar en la atención primaria (Theoretical and methodological model for the health evaluation of the familial group in primary care)* [doctoral dissertation] [Google Scholar].
15. Duarte Ayala RE, Rodríguez-Orozco AR, Ruiz Vega H, Alejandro García JJ. Control del asma desde la atención primaria con un enfoque de género y familia [Asthma control from primary care with a gender and family focus]. *Aten Primaria*. 2020;52(8):583-584. Spanish <https://doi.org/10.1016/j.aprim.2020.06.013>.
16. Rodríguez-Orozco AR, Núñez-Tapia RM, Ramírez-Silva A, Gómez-Alonso C. No direct association among respiratory function, disease control and family functioning in a sample of Mexican children with intermittent asthma. *Iran J Allergy Asthma and Immunol*. 2013;12(2):129-135.
17. Rodríguez-Orozco AR, Kanán-Cedeño EG, Barbosa-Sánchez CE, Tejeda-Cárdenas RG, Vázquez-Romero EV, León-Gutiérrez A. The extended family and the poor asthma control in children. A look at family functioning, authority and hierarchies. *Allergol Immunopathol (Madr)*. 2012;40(1):62-65. <https://doi.org/10.1016/j.aller.2011.01.004>.
18. Lahaye M, Luminet O, Van Broeck N, Bodart E. Psychological, social and school implications of asthma: a comparison of Belgian French-speaking children having asthma with healthy children. *Acta Clin Belg*. 2012;67(1):25-29. <https://doi.org/10.2143/acb.67.1.2062622>.
19. Morawska A, Stelzer J, Burgess S. Parenting asthmatic children: identification of parenting challenges. *J Asthma*. 2008;45(6):465-472. <https://doi.org/10.1080/02770900802040050>.
20. Slattery MJ, Essex MJ. Specificity in the association of anxiety, depression, and atopic disorders in a community sample of adolescents. *J Psychiatric Res*. 2011;45(6):788-795. <https://doi.org/10.1016/j.jpsychires.2010.11.003>.
21. Trzcińska H, Przybylski G, Kozłowski B, Derdowski S. Analysis of the relation between level of asthma control and depression and anxiety. *Med Sci Monit*. 2012;18(3): CR190-194. <https://doi.org/10.12659/msm.882524>.
22. Rodríguez-Orozco AR, Kanán Cedeño EG, Vázquez Romero ME, León Gutiérrez A, Barbosa Sánchez CE, Tejeda Cárdenas RG. Perfil organizativo erfil organizativo-funcional de la familia nuclear -funcional de la familia nuclear psicósomática con un hijo asmático [Organizational and functional profile of the nuclear psychosomatic family with one asthmatic son]. *Salud Ment [revista en la Internet]*. 2008;31(1):63-68. Disponible en: http://www.scielo.org.mx/scielo.php?script=sci_arttext&pid=S0185-33252008000100009&lng=es.
23. Rodríguez-Orozco AR, Kanán-Cedeño EG, Vázquez-Romero ME, Barbosa-Sánchez CE, Tejeda-Cárdenas RG, León Gutiérrez A. Asma y disfunción familiar. Un acercamiento a la medicina psicósomática. *Alergia, Asma e Inmunología Pediátricas*. 2007;16(1):4-5.
24. Rodríguez-Orozco AR, López-Peñalosa J, Kanán-Cedeño EG, Villalón-Santillán S, Caballero-Díaz P, Medellín-Fontes MM, et al. El sistema familiar y el niño alérgico. Apuntes sobre el papel del síntoma en el funcionamiento familiar [Familial system and the allergic child. Notes about the role of the symptoms in the familial functioning]. *Rev Allerg Mex*. 2009;56(6):217-222. Spanish.
25. Licari A, Ciprandi R, Marseglia G, Ciprandi G. Anxiety and depression in adolescents with asthma and in their parents: a study in clinical practice. *Monaldi Arch Chest Dis*. 2019;89(3). doi: 10.4081/monaldi.2019.1063.
26. Szabó A, Mezei G, Kovári E, Cserhádi E. Depressive symptoms amongst asthmatic children's caregivers. *Pediatr Allergy Immunol*. 2010;21(4 Pt 2):e667-673. <https://doi.org/10.1111/j.1399-3038.2009.00896.x>.
27. Wang G, Wang L, Szczepaniak WS, Xiong ZY, Wang L, Zhou T, et al. Psychological status in uncontrolled asthma is not related to airway hyper-responsiveness. *J Asthma*. 2010;47(1):93-99. <https://doi.org/10.3109/02770900903331119>.
28. Pietras T, Panek M, Witusik A, Wujcik R, Szemraj J, Górski P, et al. Analysis of the correlation between level of anxiety, intensity of depression and bronchial asthma control. *Post Dermatol Alergol*. 2011;8(1):15-22.
29. Booster GD, Oland AA, Bender BG. Psychosocial factors in severe pediatric asthma. *Immunol Allergy Clin North Am*. 2016;36(3):449-460. <https://doi.org/10.1016/j.iac.2016.03.012>.
30. Shankar M, Fagnano M, Blaakman SW, Rhee H, Halterman JS. Depressive symptoms among urban adolescents with asthma: A focus for providers. *Acad Pediatr*. 2019;19(6):608-614. <https://doi.org/10.1016/j.acap.2018.12.004>.
31. Fariás Arguello V, Rodríguez-Orozco AR, Gaytán Morales E, Villa Barajas R, Gómez Alonso C. Funcionamiento familiar y depresión en madres e hijos con dermatitis atópica [Family functioning and depression in mothers and children with atopic dermatitis]. *Aten Primaria*. 2019;51(6):388-390. Spanish. <https://doi.org/10.1016/j.aprim.2018.04.011>.