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No Direct Association among Respiratory Function, Disease Control and Family Functioning in a Sample of Mexican Children with Intermittent Asthma

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ABSTRACT

Asthma has been linked to family disfunctioning and poor control of the disease.

This study was conducted to analyze the interactions between the level of intermittent asthma control, family functioning and respiratory function and between quality of life of asthmatic patients and their caregivers.

7 to 15 years old children with intermittent asthma were included. Asthma Control Test Questionnaire, Pediatric Asthma Quality of Life Questionnaire (PAQLQ) test, and flowmetry were applied to children and Pediatric Asthma Caregiver's Quality of Life Questionnaire (PAQCLQ) and the Family Functioning Perception Test (FF-SIL) were applied to their parents.

The most affected areas of family functioning in dysfunctional families were adaptability and permeability. A medium to high strength of association was founded between the emotional function of parents and the emotional function of children, $R^2=0.552$. The most remarkable associations were among parents' limitation of activities and parents' emotional function ($r=0.837$), parents' limitation of activities and child's emotional function ($r=0.722$), parents' emotional role and limitation of activities ($r=0.837$), parents' emotional role and emotional functioning of children with asthma ($r=0.743$) and the limitation of activities of children with asthma and the emotional function of children with asthma ($r=0.870$).

No direct associations were founded among respiratory function, disease control and family functioning in Mexican children with intermittent asthma and emotional function of parents and children were associated in both groups.

Keywords: Asthma; Asthma control; Children; Family functioning; Pediatric asthma; Quality of life; Respiratory function

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INTRODUCTION

In a study conducted in 2006 that used the International Studies of Asthma and Allergies in Children (ISAAC) methodology as a basis for collecting data on the prevalence of symptoms suggestive of asthma in children and adolescents aged between 6 and 16 years in the city of Morelia, Mexico, the prevalences of wheezing suggestive of asthma were 6% and 8.5% in children aged 6 to 11 years and 12 to 16 years respectively. However, the incidences of wheezing in the last year were 10% and 14% for children between the ages of 6 and 11 years and 12 and 16 years, respectively.¹ This led us to study some conditions that may be associated with this high asthmatic prevalence rate. Even when asthma is intermittent, the control of the disease is often poor in our medium.² This phenomenon can be attributed, in part, to high social impact problems such as poverty, poor health care coverage³ and family dysfunction.⁴

Although there are several definitions and questionnaires⁵ to access the quality of life in persons with asthma, this term has long been regarded as representing a state of social and economic welfare. However, researchers subsequently established that it needed to be adapted to encompass the perception of satisfaction and it was finally integrated to the affective area.

Two of the most widely accepted questionnaires to assess quality of life in children with asthma and their caregivers are the Pediatric Asthma Quality of Life Questionnaire (PAQLQ)⁶ and Pediatric Asthma Caregiver's Quality of Life Questionnaire (PACQLQ),⁷ respectively. These questionnaires have been validated in Spanish-speaking populations and have been used in multiple studies in populations similar to ours.^{8,3}

When assessing how a family functions, the following parameters must be considered: the interactive and systemic dynamics that occur between family members, how the family system is able to face crises, how family members allow themselves to show affection, the individual growth of its members and interactions on the basis of respect and autonomy for one another's space.⁹

There are several tests to assess how a family functions; we have chosen the Family Functioning perception test (FF-SIL)^{10,11} because it emphasizes domestic relations, stands out for its simplicity and

easy application and the health team in primary care is qualified for it.¹² On the other hand, there have been few studies on family functioning in patients with intermittent asthma, these can be used to assess psychosocial aspects related to the control of the disease in societies like ours; for example in Latin American countries.

This study was conducted to analyze the interactions between the level of intermittent asthma control, family functioning and quality of life of asthmatic patients and their caregivers. The research we conducted addressed the family from the systematic theory, which considers that the disease is linked to the family environment and the child's asthma symptoms expressed through family dysfunction.

MATERIALS AND METHODS

The study was conducted at the Family Medicine Unit No. 80 of the Mexican Social Security Institute from January, 2009 to December, 2009. We included patients of both genders, ranging from 7 to 15 years old who were diagnosed with intermittent asthma, they were not suffering from chronic diseases other than asthma and had no acute illnesses at the time of consultation for the instruments (surveys).

The sample size was calculated for a finite population starting with 2075 patients diagnosed with asthma in this Family Medicine Unit. Of all the children in this age group diagnosed with intermittent asthma, as confirmed by an allergist following the Global Initiative for Asthma (GINA) guideline's 2007 recommendations,¹³ we included 50 children and their families. Of the 53 families who met the inclusion criteria, two families chose not to participate and one family did not attend the first appointment. The protocol was previously approved by the institutional ethics and research committees and informed consent was obtained from parents of the patients.

Peak expiratory flow (PEF, assessed with TruZone peak flow meter, USA) was obtained from each patient and it was compared with the reference PEF according to gender, age and size and reversibility test was performed 20 to 30 minutes after two shots of 100 g of a suspension containing 0.1176 g of salbutamol. Reversibility was calculated using the following formula:

$$\text{PEF final} - \text{initial} \times \text{PEF} 100 / \text{PEF initial} = \% \text{ reversibility in PEF. (15\% or more was used as the}$$

criteria for reversibility according PEF).

The children were subsequently interviewed with the following instruments: Asthma Control test (ACT)¹⁰ to study the degree of asthma control, (PAQLQ)⁶ to assess the quality of life in the child with asthma, (PAQCLQ)⁷ for the parents to estimate the quality of life of caregivers for children with asthma and Family Functioning Perception Test (FF-SIL) to assess the functioning of families of children with asthma. We also collected demographic data of the study samples. ACT questionnaires and FF-SIL tests were previously validated in the study population by calculating the overall reliability with Cronbach's alpha and were reconfirmed by the method of Spearman Brown halves.

The ACT questionnaire on asthma control¹⁴ consists of five items to measure, including the degree of control the asthma patient assigns to their illness over the past four weeks. Patients were classified into three groups according to the overall score obtained from the questionnaire: totally controlled asthma (25 points), partially controlled asthma (20 to 24 points) and uncontrolled asthma for patients who scored less than 20 points.

The FF-SIL¹⁰ questionnaire is a simple instrument to measure family function and consists of 14 items. Each response is assigned a numerical value from 1 to 5, with response options of 1 = almost never, 2 = few times, 3 = one times, 4 = often and 5 = almost always.

According to the overall score obtained with this instrument, the families were classified according to their functioning as: functional families with scores from 70 to 57 points, moderately functional families with scores from 56 to 43 points, dysfunctional families with scores from 42 to 28 points and severely dysfunctional families with scores from 27 to 14 points. The areas of family functioning explored by this instruments are: cohesion (physical and emotional family union to cope with these situations and make decisions), harmony (correspondence between individual and family needs and interests), communication (clear and direct transmission of experiences), permeability (ability to receive and provide experience to other families and institutions), affection (members' ability to experience and demonstrate experiences), roles (responsibilities assigned to the member and traded within the family system) and adaptability (the family's ability to change its power structure, roles and rules regarding a situation

that requires it).

The PAQLQ and PACQLQ questionnaires were used to estimate the quality of life in asthmatic patients and their caregivers, respectively.^{6,7}

For evaluation, each response of both questionnaires, was assigned to a score from 1 to 7, with a lower score indicating a higher quality of life. The results are given as the averages of the overall score achieved for the entire quality of life.

We used Pearson's *r* estimator to assess the variability between the time of evolution and the reversibility and correlation of the limitation of activities between parents and children and the emotional functioning of parents and children. We employed the coefficient of determination (R^2) to quantify the shared variance in the association between the obtained Peak Expiratory Flow (PEF) value and the reference PEF. ANOVA was used to compare the areas of family functioning between families with different levels of functioning.

RESULTS

We studied 50 children diagnosed with intermittent asthma and their families. The average age of the children with asthma in these families was 8.6 ± 3.2 years, and 29 of the children (58%) were female. Depending on the time of disease progression, 46% of patients (23) had one or two years of evolution, 32% (16) had between 3 and 5 years of evolution and 22% (11) had from three to five years of evolution. In regards to the level of asthma control estimated by the ACT questionnaire, we concluded that 35.57% of the children had totally controlled asthma, 33.60% showed partially controlled asthma and 30.83% had uncontrolled asthma. Twenty percent (10) and 14% of patients (7) had used leukotriene receptor inhibitors or inhaled steroids, respectively, in the past year for at least three months.

A total of 64% of families were moderately functional, 10% were dysfunctional and 26% were functional with respect to the global score reached on the FFSIL test to assess family functioning. Table 1 compares the areas of family functioning explored with the FF-SIL questionnaire by using ANOVA; this table shows that there were considerable differences among groups of family functioning in each one of the areas of family functioning.

Table 1. Comparison using ANOVA of the areas of family functioning explored with the FF-SIL questionnaire among groups of family functioning.

Areas of Family Functioning	Functional Families mean±ED	Moderately Functional Families mean±ED	Dysfunctional Families mean±ED	F	P
Cohesion	8.23 ± 0.36	7.63 ± 0.20	6.40 ± 0.24	4.415	0.017
Harmony	8.08 ± 0.21	7.47 ± 0.15	5.60 ± 0.24	16.277	<0.001
Communication	8.15 ± 0.24	8.16 ± 0.17	5.60 ± 0.24	16.799	<0.001
Affection	9.08 ± 0.28	7.59 ± 0.20	6.00 ± 0.44	16.072	<0.001
Roles	7.85 ± 0.27	7.56 ± 0.27	6.00 ± 0.0	3.546	0.037
Adaptability	8.23 ± 0.16	7.91 ± 0.18	5.20 ± 0.49	19.439	<0.001
Permeability	7.85 ± 0.22	7.31 ± 0.18	5.40 ± 0.24	11.733	<0.001

ED means standard deviation

The most affected areas of family functioning in dysfunctional families were adaptability and permeability, and those families living in a functional level showed considerable higher average in the areas of affection, adaptability and cohesion than moderately dysfunctional and dysfunctional families.

To estimate the strength of the association between the child's and parents' limitation of activities, a coefficient of determination was measured ($R^2 = 0.351$), which implied a low to medium strength of association as. To estimate the strength of association between the emotional function of parents and the emotional function of children, we calculated a coefficient of determination of $R^2 = 0.552$, which implies a medium to high strength of association.

There were no statistically significant differences ($p = 0.193$) regarding the limitations of parents' physical activity once we determined the mean difference (Student's t-test) between the group of parents of children aged 7 to 9 years and the group of parents of children aged 10 to 15 years. However, the parents of children aged 7 to 9 years were more emotionally

affected than the parents of children aged 10 to 15 years after analyzing the variance between groups using a Student's t-test to compare means ($p = 0.023$).

Table 2 shows the association between the variables used to measure quality of life with the -PACQLQ- and PAQLQ. The most remarkable associations from the statistical point of view were those that resulted in high significances ($p < 0.001$). This occurred for the following pairs: parents' limitation of activities and parents' emotional function ($r = 0.837$), parents' limitation of activities and child's emotional function ($r = 0.722$), parents' emotional role and limitation of activities ($r = 0.837$), parents' emotional role and emotional functioning of children with asthma ($r = 0.743$) and the limitation of activities of children with asthma and the emotional function of children with asthma ($r = 0.870$).

The tendencies to demonstrate a favorable quality of life in the studied families were represented by the ratio of the advantages for the tendency in both children and parents, specifically $RR = 27.333$ [3.474-215.065] and $RR = 9.778$ [2.858-33.457], respectively.

Table 2. Association between quality of life of children with asthma and their parents estimated by the PAQLQ and PACQLQ questionnaires.

Topics	Parents' limitation of activities	Parents' emotional function	Children's limitation of activities	Children's emotional function
Parents' limitation of activities	-	0.837**	0.592*	0.722**
Parents' emotional function	0.837**	-	0.667*	0.743**
Children's limitation of activities	0.592*	0.667*	-	0.870**
Children's emotional function	0.722**	0.743**	0.870**	-

Pearson correlation was used to relate variables. ** $P < 0.01$ * $P < 0.05$.

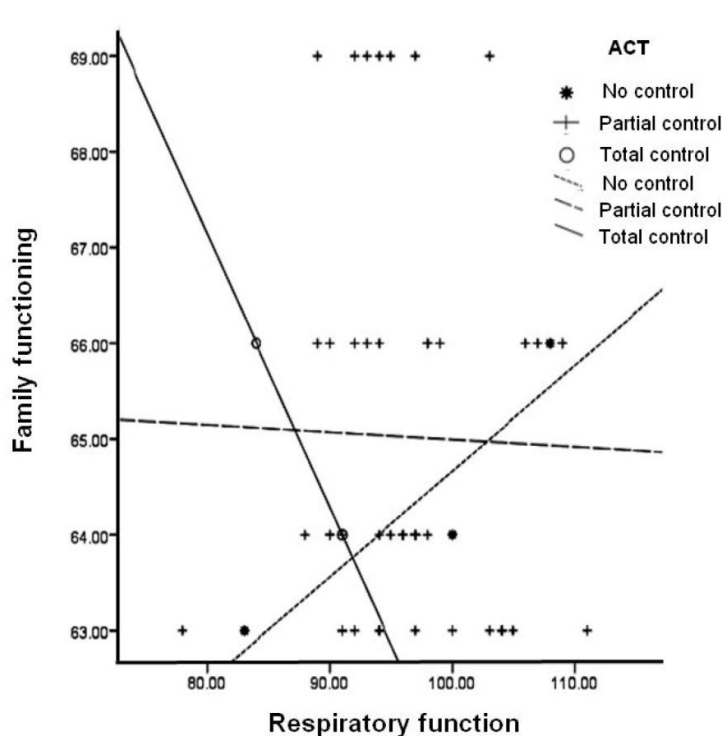


Figure 1. Plot demonstrating no associations between family functioning, respiratory function and degree of asthma control. The x-axis shows the average values obtained with the scale of perception of family functioning and the y-axis shows the proportion Reference Peek Expiratory Flow/Obtained Peek Expiratory Flow X 100. ACT (asthma control test), results were classified as total control, partial control and no control.

The linear R^2 coefficient between the reference peek expiratory flow (PEF) and the obtained PEF for patients with an obtained PEF greater than 90% was 0.779; for patients with obtained PEFs of 80-90%, this value was 0.766.

As demonstrated in Figure 1, there was no association between family functioning, respiratory function and degree of asthma control. This illustrates the predominance of patients with partial control of asthma that presented a lung function between 90-100% of its average PEF value; however, there was no association between the variables.

DISCUSSION

Most patients had a tendency to demonstrate good lung function according sex and age, which was consistent with the intermittent asthma they suffered from and the relatively short evolution time of the disease. The use of inhaled steroids and leukotriene receptor inhibitors for at least three months of the year

prior to the study by 20% and 14% of children, respectively, may have been related to improved asthma control and lung function conservation in these patients. In studies with similar populations to that reported in this study, has been reported that the simple use of salbutamol in children with intermittent asthma is associated with a very low level of asthma control in populations similar to ours².

The family is a dynamic system with various functions, including care and affection. In this study, there was a predominance of families with moderate dysfunction (64%), and few families demonstrated the functional and dysfunctional extremes. When children with different stage of asthma were included in a previous study, a wide number of alterations in many areas of family functioning were detected, and a psychosomatic profiles of behavior were identified in their families.⁴

In a recent study carry out in a Mexican city, at primary care settings, was reported that family dysfunction was more often present in families with

asthmatic patients compared to those without, OR=3.7, (95% CI, 1.05-12.95) event though 88% of the asthmatic children living in nuclear families where alliances and coalition are less frequent than those observed in extensive families¹⁵ in which hierarchies and authority represent a real problem to be solved for these families and the chronicity of allergic manifestations are favored in a psychosomatic environment.¹⁶

Families of patients with chronic diseases frequently have adjustment problems, are often rigid families that are "resistant to change" and seldom recognize the resources available to them to help deal with their problems. These problems are related to the fact that although they have found a quality of life that tends to be good for both parents and the children suffering from intermittent asthma, the impact of the child's illness on the emotional function of the child and parents is a factor that can cause an environment favoring the recurrence of psychosomatic symptoms.

We found a medium to high strength of association between the emotional function of parents and the emotional function of children with asthma. The emotional impact was greater in parents of children aged 7 to 9 years than parents of adolescents aged 10 to 15 years. Additionally, the emotional impact was greater than that found on the limitation of physical activities of parents and children whose strength of association was low to medium, and no difference was found when these variables were compared among children aged 7 to 9 years and adolescents aged 10 and 15 years. Because this study deals with cases of children with intermittent asthma, we often found little involvement in physical activity. However, it is noteworthy that the emotional impact is important even when dealing with intermittent asthma. The role of emotions in asthma has been extensively studied, and factors such as anxiety and depression may facilitate the recurrence of exacerbations.¹⁷

The biggest impact on the area of quality of life concerning emotional aspects rather than aspects determined by physical activity in an earlier age may be related to the overprotection of the child and the growing independence desired by teenagers, who often rely more on support networks of friends than on parents for recommendations and show greater tolerances to respiratory symptoms. In our environment, there is a higher prevalence of asthma

symptoms among adolescents from 12 to 16 years old than young children from 6 to 11 years of age,¹ which, together with the fact that parents attach less importance to the symptoms of adolescents, suggests that it is necessary to design participatory educational strategies for asthma in adolescents. Prevalence of asthma in adolescents has increased during the last ten years in many Latin-American cities.¹⁸⁻²⁰

Children's limitation of activities and impairment in their emotional function have been reported in adolescents with asthma¹⁸ in which depression symptoms and substance abuse appear to be in close relation with that.^{17,18}

The existence of correlations between all variables used to assess the quality of life among children with intermittent asthma and their parents means that both the family's emotional environment and its potential for integration into the community are affected when they have an asthmatic child, even if it is only intermittent asthma. This also indicates that no resources have been identified to address the crisis represented by having a child with asthma in the family.

In our environment, the young child receives more family attention than the adolescent; the latter tends to move away from the household at least in the realm of emotions and experiences new relationships with friends and other social groups where they often feel more supported. The overprotection of the child and the emotional distance of the adolescent in our families limit the possibilities for personal and emotional maturation in both school-age children and adolescents; this behavior has been observed many times in families with children suffering from chronic diseases.^{4,16,21} It was not possible to establish any significant statistical association between family function, respiratory function and degree of asthma control. Because families are a homogeneous group with respect to the level of asthma control and lung function, it is difficult to explain the differences regarding family functioning. Two possible explanations include that family functioning is not associated with the degree of asthma control and lung function in children with intermittent asthma and that varying degrees of family functioning is also associated with varying degrees of lung function and asthma control. We suggest that the study of these associations among patients with various stages of asthmatic disease could help establish the association between these variables.

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