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Does Asthma Disrupts Psychological Wellbeing in Pregnancy?

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Abstract: Background: Asthma is a very prevalent disease with special characteristics during pregnancy, however little is known about its relation to the psychological wellbeing of women   in this period; We aimed to know whether depression and anxiety symptoms are more frequent in asthmatic pregnant women. (2) Methods: Family Apgar (week 20), Edinburgh (weeks 20 and 32) and STAI (week 32) tests were administered to 738 pregnant women (81 asthmatics) in the NELA birth cohort; (3) Results: There were no significant differences between asthmatic and non-asthmatic pregnant women in any of the different tests at any of the time points. The mean? scores for the different tests and timepoints between asthmatic and non-asthmatic pregnant women   were: Apgar 20, 17.9±2.2 vs. 10.0±2.2; Edinburgh 20, 6.7±4.2 vs. 6.9±4.3; Edinburgh 32, 5.9±4.4 vs. 5.6±4.3; and STAI 32, 16.7±8.4 vs. 15.8±8.3. The proportion of pregnant women out of the normal range score for any of the tests and time points was also similar in both populations. (4) Conclusions: Asthma is not associated with the psychological wellbeing among pregnant women.

Keywords: asthma; pregnancy; psychological test; family Apgar; Edinburgh Scale; STAI Inventory; NELA cohort

1. Introduction

Asthma is a chronic disease characterized by chronic inflammation of the airway, in which several cells and mediators participate. It is determined by interaction between genetic and environmental factors and cause bronchial hyperresponsiveness and variable obstruction to air flow in the airways, with total or partial reversibility either spontaneous or induced by drugs [1]. It is the most prevalent respiratory disease during the first middle of life, affecting about 10% of population [2,3].

Asthma is also the more frequent respiratory disease in pregnancy with a prevalence between 8% and 13% around the world and affects to more than 10% of women in fertility ages, most of whom are sensitized to aeroallergens [4]. Many pregnant asthmatic women suffer changes in the progression of their disease: asthma worsens in about one third of them, improves in another third and is stable in the other third [5]. Asthma is the respiratory disease that most frequently complicates pregnancy and persists as a high-risk condition despite treatment advances [6,7].

The relationship between asthma and pregnancy complications is complex due in part to the interaction with of other factors such as smoking, obesity and other comorbidities that independently impact the obstetric and fetal outcomes [8].

On the other hand, mental diseases during pregnancy are thought to be as frequent as 15%, being low socioeconomic status a risk factor [9]. Anxiety and depression are common conditions that affect a considerable part of the population in many countries [10]. Several studies show that, among pregnant women, depression ranges from 6% to 13% [11–13]. Both anxiety and depression are common not only during pregnancy but also post-partum and their symptoms can be mild or severe [14].

Mental diseases have been also recognized as common comorbidities in asthmatic patients, being anxiety, depression and panic disorders more frequent among asthmatic individuals than among the general population [9].

To the best of our knowledge, the impact of mental diseases in asthma control during pregnancy has been previously reported only by one study in an Australian cohort of pregnant women. This study suggests that maternal anxiety is associated to poorer asthma control (including increased number of exacerbations) and lower quality of life [15]. However, no study has yet compared psychological wellbeing between asthmatic and non-asthmatic pregnant women.

The aim of the present study is to know whether depression and anxiety as measured by the Family Apgar, Edinburgh and STAI tests are more frequent in asthmatic pregnant women than non-asthmatic ones.

2. Materials and Methods

The population of pregnant women in the present study participates in the "Nutrition in Early Life and Asthma" (NELA) birth cohort. The details of this cohort have been reported in detail previously [16]. Briefly, the NELA study recruited pregnant women at the 20th week of gestation when they attended to the "Virgen de la Arrixaca" University Clinical Hospital (Murcia, Spain) for their routine echography control. They were followed up during pregnancy and beyond. During gestational follow up a module on psychological wellbeing, including Family Apgar, Edinburgh Postnatal Depression Scale and/or State-Trait Anxiety Inventory (STAI), depending on the visit, was included at weeks 20 and 32.

Asthma in pregnant women was defined as a positive response to the question "Have you ever been diagnosed of asthma" which was asked in the questionnaire of the 20 weeks recruitment visit.

Family Apgar test, designed to assess family function by primary health care teams, explores satisfaction in family relationships [17] and has good validity and reliability [18]. It examines five basic functions of the family, such as: Adaptability, Partnership, Growth, Affection, and Resolve. Scores of this test are highly correlated to anxiety and depression [19] and follow a Likert scale either from 0 to 2 (10 points maximum) or from 0 to 4 (20 points maximum). For the maximum score of 20, 0 to 16 indicates dysfunctionality (from mild, 14-17; to moderate, 10-13; and severe, ≤ 9) and 17-20 a functionality [20,21].

The Edinburgh Postnatal Depression Scale has been validated in many settings and populations [22], and also for its use during pregnancy [23]. It measures depression and scores from 0 to 30 over 10 items which rate from 0 to 3 also in a Likert scale. Scores from 10 to 30 indicate depression.

The State-Trait Anxiety Inventory (STAI) has been also validated in diverse settings and populations and specifically perinatally [24]; and it assesses anxiety in two dimensions: state and trait, although it also detects depression [24]. In the present study STAI was used to assess trait. Its score (trait, 20 items) ranges from 0 to 60 and for adult women its 50th percentile is 22-23.

Apart from the results of the three psychological tests at the different time-points, other variables available in the study which were included in the analyses as covariates were: age, living area (urban, residential, countryside); civil state (married or stable partner, single, divorced or separated); education level (basic, secondary, high, university); social class (as per job classification in Domingo-Salvany et al.[25]) grouped in I-II, III, IV-V and no current job; number of previous pregnancies and abortions; current smoking (yes or no); and use of inhaled corticosteroids in 1st, 2nd or 3rd trimester (yes or no).

The results of the psychological tests were compared between asthmatic and non-asthmatic mothers by means of t-test (for the scores taken as continuous variables) and using the Chi-squared

test when tests scores were categorized into "in the normal range" vs. "out of the normal range". This analysis was not done for the STAI test as the scores are continuous and a normal range is not established. To control for variables which could modify the association of asthma with the psychological test results, multiple linear regression analyses or logistic regression analyses were performed using tests scores as dependent variables (either as continuous or as dichotomous variables), and asthma as the independent, and those variables already defined, as covariates.

All procedures included in the NELA cohort study were approved by the ethics committee of the "Virgen de la Arrixaca" University Clinical Hospital (report 9/14; 29/09/2014).

3. Results

3.1. Study population

A total of 1350 women were invited to participate in the NELA study and 738 (54%) were finally included and followed up at least until delivery and included in the present study. Among those, 81 (11.0%) had asthma as diagnosed by a doctor when they were recruited. Demographics of asthmatic and non-asthmatic gravidas are shown in Table 1.

Table 1. Socio-demographic characteristics of the studied populations: differences between asthmatics and non-asthmatics pregnant women (N and percentage in brackets unless indicated).

	Asthmatics N=81	Non-asthmatics N=657	p*
Age (mean±SD)	32.7±4.6	32.6±4.7	0.859
Living area			
Urban	55 (67.9)	479 (72.9)	
Peri-urban	13 (16.0)	94 (14.3)	
Countryside	13 (16.0)	84 (12.8)	0.611
Civil state			
Married or stable partner	81 (100)	647 (98.5)	
Single	0	8 (1.2)	
Divorced/separated	0	2 (0.3)	0.535
Education			
None, basic or primary (8 years or less)	4 (4.9)	53 (8)	
Middle or incomplete secondary (9-11 years)	11 (13.6)	78 (11.9)	
Complete middle or secondary and high (12+ years)	19 (23.5)	172 (26.2)	
University	47 (58.0)	354 (53.9)	0.677
Social class			
I-II	31 (38.3)	233 (35.5)	
III	19 (23.5)	148 (22.5)	
IV-V	18 (22.2)	126 (19.2)	
No current job	13 (16.0)	150 (22.8)	0.566
Previous abortions [median (IQR)]	0 (0-1)	1 (0-1)	0.863
Previous pregnancies [median (IQR)]	1 (0-1)	1 (0-2)	0.325
Current smoker	15 (18.5)	113 (17.2)	0.767
Inhaled corticosteroids 1st trimester	6 (8.2)	2 (0.3)	<0.001
Inhaled corticosteroids 2nd trimester	6 (8.2)	6 (1)	<0.001
Inhaled corticosteroids 3rd trimester	7 (9.6)	7 (1.2)	<0.001

SD: standard deviation; IQR: interquartile range. *p value derived from t test for continuous variables and from Chi2 test for categorical variables.

3.2. Differences in psychological tests

There were no statistical significant differences in any of the psychological scores of any of the tests performed at the different time-points, neither when scores were taken as continuus variables nor when they were categorised into "in the normal range" versus out of the normal range". In fact, quantitative scores were very similar between both groups of pregnant women, being the largest difference found (statistically non-significant) in the STAI test at week 32 (16,7±8,4 in asthmatics vs. 15,8±8,3 in non-asthmatics, p=0.378) (Tables 2 and 3).

Table 2. Psychological tests* results in asthmatic and non-asthmatic pregnant women. Scores taken as continuous variables.

	Asthmatics N=81	Non-asthmatics N=657	P
Family Apgar (week 20)	17.9 ± 2.2	18 ± 2.2	0.868
Edinburgh test (week 20)	6.7 ± 4.2	6.9 ± 4.3	0.800
Edinburgh test (week 32)	5.9 ± 4.4	5.6 ± 4.3	0.634
STAI test (week 32)	16.7 ± 8.4	15.8 ± 8.3	0.378

* See text for tests explanation

Table 3. Psychological tests* results in asthmatic and non-asthmatic pregnant women. Scores taken as in or out of the normal range.

	Asthmatics N=81	Non-asthmatics N=657	P
Family Apgar (week 20)			
Functional family[1]	65 (81.2)	529 (81)	0.959
Dysfunctional family[1]	15 (18.7)	124 (18.9)	0.959
Edinburgh test (week 20)			
No depresión[2]	61 (78.2)	490 (76.0)	0.661
Depression[2]	17 (21.8)	155 (24.0)	0.661
STAI test (week 32)			
No anxiety/depression[2]	56 (81.2)	484 (82.6)	0.767
Anxiety/depression[2]	13 (18.8)	102 (17.4)	0.767

* See text for explanation of tests. [1]Functional family 17/20; dysfunctional family 0/16. [2]No depression 0/9; depression 10/30. Note that not every row adds up to 738 due to missing values.

3.3. Multivariate analyses

Tables 4 and 5 show the factors that had an association with the scores (either as continuous or as dichotomous variables) in the simple or multiple regression or logistic regression analyses.

Table 4. Factors associated to numerical results of the psychological tests in the simple (Coeff and 95%CI) and multiple linear regression (aCoeff. and 95%CI) analyses (all variables in the table included in the multiple analysis).

	Family Apgar		Edinburgh 20		Edinburgh 32		STAI	
	Coef	aCoef	Coef	aCoef	Coef	aCoef	Coef	aCoef
Asthma	-0.04	0.13	-0.13	-0.17	0.26	0.03	0.96	0.60
	-0.55;0.46	-0.37;0.63	-1.15;0.89	-1.24;0.90	-0.8;1.34	-1.06;1.12	-1.18;3.09	-1.51;2.70
Living area								
Urban	1	1	1	1	1	1	1	1
Residential	0.09	0.07	-0.52	-0.08	-0.04	0.18	-1.96	-1.34

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	-0.36;0.55	-0.37;0.51	-1.43;0.38	-1.01;0.85	-0.99;0.91	-0.76;1.12	-3.83;0.10	-3.15;0.47
Countryside	-0.18 -0.65;0.29	-0.09 -0.54;0.36	0.44 -0.50;1.38	0.47 -0.47;1.41	0.72 -0.25;1.69	0.57 -0.39;1.52	1.78 -0.15;3.72	0.93 -0.94;2.81
Civil state								
Married or stable partner	1	1	1	1	1	1	1	1
Single	0.80 -0.71;2.31	0.84 -0.64;2.33	2.20 -0.80;5.20	1.39 -1.72;4.51	2.36 -0.84;5.57	1.47 -1.68;4.62	4.93 -1.21;11.08	3.20 -2.77;9.16
Divorced/separated	1.55 -1.47;4.57	1.93 -0.84;4.71	7.70 1.72-13.68	6.94 1.14;12.70	6.36 0.39;12.34	5.68 -0.19;11.5	25.22 13.78-36.66	23.21 12.1;34.3
Age	-0.01 -0.04;0.03	-0.05 -0.09;0.01	-0.10 -0.17;0.03	0.01 -0.07;0.09	-0.08 -0.15;0.00	0.02 -0.06;0.11	-0.22 -0.37;0.07	-0.00 -0.17;0.16
Education								
None, basic or primary (8 years or less)	1	1	1	1	1	1	1	1
Middle or incomplete secondary (9-11 years)	-0.30 -1.01;0.41	-0.42 -1.15;0.30	0.86 -0.59;2.30	0.61 -0.94;2.15	1.17 -0.35;2.69	1.09 -0.45;2.63	1.94 -1.09;4.97	1.73 -1.27;4.75
Complete middle or seconday and high (12+y)	0.45 -0.19;1.08	0.18 -0.47;0.84	-0.02 -1.30 1.26	0.35 -1.04;1.74	0.24 -1.08;1.56	0.52 -0.87;1.91	0.41 -2.27;3.09	1.10 -1.66;3.85
University	1.03 0.43;1.62	0.69 0.02;1.36	-1.76 -2.96;0.55	-1.13 -2.56;0.31	-1.30 -2.53;0.07	-0.58 -2.02;0.85	-3.30 -5.79-0.80	-1.14 -3.95;1.67
Social class								
I-II	1	1	1	1	1	1	1	1
III	-0.38 -0.79;0.41	-0.11 -0.55;0.32	0.43 -0.40;1.25	-0.46 -1.37;0.45	0.66 -0.20;2.34	0.00 -0.93;0.94	2.41 0.72;4.11	1.01 -0.79;2.81
IV-V	-0.87 -1.31;-0.43	-0.38 -0.89;0.13	1.33 0.45;2.20	-0.14 -1.23;0.94	1.41 0.49;2.34	0.32 -0.78;1.43	3.48 1.70;5.26	1.21 -0.89;3.33
No current job	-0.51 -0.93;-0.08	0.14 -0.35;0.64	1.87 1.03;2.72	0.41 -0.63;1.45	1.62 0.72;2.53	0.70 -0.36;1.76	4.48 2.68;6.28	2.21 0.18;4.25
Previous abortions	-0.14 -0.36;0.07	0.25 -0.08;0.58	-0.03 -0.46;0.39	-0.08 -0.78;0.62	-0.19 -0.64;0.27	-0.02 -0.72;0.68	-0.26 -1.16;0.63	-0.26 -1.64;1.11
Previous pregnancies	-0.19 -0.3;-0.05	-0.23 -0.46;-0.00	0.03 -0.24;0.30	-0.06 -0.54;0.43	-0.14 -0.43;0.15	-0.25 -0.74;0.24	-0.23 -1.19;0.73	-0.19 -1.16;0.77
Current smoker	-1.09 -1.50;-0.68	-0.94 -1.36;-0.51	1.98 1.16;2.81	1.71 0.81;2.62	2.30 1.43;3.18	1.82 0.91;2.73	4.72 3.00;6.45	3.48 1.72;5.24
Inhaled corticosteroids 1st trimester	-1.64	-0.70	1.00	0.42	1.34 -1.68;4.35	-0.40	5.02	3.20

-3.10;-0.19	- 2.29;0.89	- 1.97;3.98	- 2.92;3.77		-3.76; 2.97	-0.80 10.85	- 3.20;9.60
Inhaled corticosteroids 2nd trimester -1.10 -2.30;0.09	0.07 1.21;1.36	1.20 1.34;3.75	0.63 2.23;3.49	1.60 -0.87;4.07	0.76 1.97;3.49	1.19 -3.59;5.97	-1.17 - 6.36;4.01
Inhaled corticosteroids 3rd trimester -2.55 -3.65;-1.46	-2.2 -3.38;-1.02	1.18 1.08;3.43	0.38 2.11;2.88	2.88 0.60;5.16	2.26 0.25;4.76	4.48 -0.10;9.07	2.69 - 2.27;7.65

Table 5. Factors associated to functional normal score ranges in the psychological tests in the simple (OR and 95% CI) and multiple logistic regression (aOR and 95%CI) analyses (all variables in the table included in the multiple analysis).

	Family Apgar		Edinburgh week 20		Edinburgh week 32	
	OR	aOR	OR	aOR	OR	aOR
Asthma	0.98 0.54;1.78	0.89 0.44;1.82	0.88 0.50;1.55	0.82 0.42;1.62	1.10 0.58;2.09	1.14 0.58;2.26
Living area						
Urban	1	1	1	1	1	1
Residential	0.86 0.50;1.48	0.88 0.47;1.64	0.74 0.44;1.25	0.82 0.45;1.50	0.91 0.50;1.66	0.98 0.52;1.85
Countryside	0.61 0.33;1.14	0.55 0.28;1.08	1.17 0.71;1.91	1.13 0.66;1.94	1.27 0.72;2.22	1.20 0.67;2.14
Civil state						
Married or stable partner	1	1	1	1	1	1
Single	0.60 0.07;4.96	0.70 0.08;6.29	1.95 0.46;8.23	1.66 0.34;8.13	3.61 0.80;16.38	2.80 0.57;13.4
Divorced/separated	NA	NA	3.24 0.20;52.14	2.91 0.17;48.9	4.82 0.30;77.64	4.69 0.27;81.6
Age	1.01 0.97;1.05	1.05 1.00;1.11	0.99 0.95;1.02	1.04 0.99;1.09	0.97 0.93;1.01	1.01 0.96;1.07
Education						
None, basic or primary (8 years or less)	1	1	1	1	1	1
Middle or incomplete secondary (9-11 years)	1.25 0.60;2.60	1.76 0.76;4.14	0.95 0.46;1.97	0.83 0.36;1.92	1.04 0.45;2.37	1.01 0.42;2.41
Complete middle or seconday and high (12+y)	0.62 0.32;1.23	0.87 0.39;1.95	0.89 0.46;1.70	1.07 0.51;2.24	0.82 0.39;1.70	0.90 0.40;2.00
University	0.41 0.21;0.77	0.65 0.28;1.50	0.39 0.21;0.74	0.46 0.21;1.01	0.46 0.23;0.92	0.72 0.31;1.69
Social class						
I-II	1	1	1	1	1	1
III	1.45 0.86;2.46	1.23 0.66;2.30	1.33 0.82;2.16	0.82 0.46;1.48	1.78 1.02;3.15	1.61 0.86;3.01
IV-V	2.19 1.31;3.66	1.59 0.79;3.20	1.76 1.08;2.87	0.90 0.47;1.76	1.95 1.08;3.51	1.49 0.72;3.08
No current job	1.79 1.07;3.00	1.00 0.49;2.02	2.27 1.43;3.60	1.36 0.73;2.10	2.54 1.46;4.44	2.03 1.02;4.01
Previous abortions	1.15	0.80	1.06	1.00	0.93	0.99

Previous pregnancies	1.21 0.91;1.45	1.27 0.52;1.21	1.10 0.85;1.33	0.97 0.67;1.50	0.96 0.70;1.25	0.87 0.63;1.58
Current smoker	2.76 1.05;1.40	2.54 0.94;1.71	2.25 0.96;1.27	2.14 0.73;1.30	2.39 0.80;1.15	2.03 0.63;1.20
Inhaled corticosteroids 1st trimester	1.49 1.78;4.23	0.59 1.54;4.20	1.18 1.48;3.40	1.29 1.32;3.47	0.67 1.49;3.84	0.11 1.22;3.38
Inhaled corticosteroids 2nd trimester	1.48 0.30;7.49	0.67 0.04;7.76	1.33 0.23;5.91	1.32 0.18;9.33	2.40 0.08;5.48	4.43 0.01;2.04
Inhaled corticosteroids 3rd trimester	6.28 0.40;5.61	8.34 0.10;4.61	0.96 0.35;5.09	0.70 0.26;6.69	1.91 0.71;8.10	1.84 0.88;18.0
	2.14;18.46	2.08;33.5	0.26;3.50	0.15;3.30	0.59;6.20	0.44;7.75

NA: not available due to very low number of individuals.

4. Discussion

In the present study of depression and anxiety in asthmatic pregnant woman, as compared to non-asthmatic peers, the results show that those psychological conditions are equally frequent in both populations. To the best of our knowledge, the information about the relationship between psychological and allergic diseases in pregnant women is very limited. Most of the found literature focuses on this association but in the general population, not specifically in pregnancy, showing that asthma, especially when severe, is associated to depression 38.

Factors that, in the present study, have significantly affected psychological tests results are mainly socio-demographic ones, such as study level, social class and civil state. However, it should be underlined that there was no individual divorced or separated in the group of asthmatic pregnant women, rendering any result in this category of civil state meaningless. As compared to no or basic educations, pregnant women with university studies tended to have functioning families in the bivariate analyses, although the power of the association dropped when the results were adjusted (aOR;95%CI for unfunctional family in this category: 0.65, 0.28;1.50). The same trend was found for the results of the Edinburgh tests at 20 and 32 weeks of gestation (aOR;95%CI for depression/anxiety in this category at week 20: 0.46, 0.21;1.01 and at week 32: 0.72 0.31;1.69). Following the same direction, lower social classes tended to be associated to unfunctional families or to have depression or anxiety as compared to higher. As previously, the power of the association dropped when variables were adjusted. In the general population, high job control (more frequent among higher rank jobs included in social classes I and II) reduces the risk of developing depression even when correcting for socio-demographic factors and previous psychiatric diseases [26,27]. Similarly, university studies are protective factor for depression and anxiety and accumulates throughout life [28]. Thus, in this regard, pregnant women behave similarly to the general population and asthma does not seem to be a factor actuating differently to drive to family dysfunctionality and personal depression or anxiety than in the general population.

A factor that does not seem to be related to higher rates of depression or anxiety and family dysfunctionality, in our population of pregnant mothers, is previous abortions. Previous abortions have been shown to be a factor predisposing to depression in the following pregnancy in some populations [29–31]. To what extent asthma, which is not considered in the aforementioned studies, could have modified their results is difficult to say, but under the light of the results of the present study it does not seem that the consideration of that condition would have greatly modified the results. Why previous abortions in the women in our study are not associated to test scores pointing to depression or anxiety and family dysfunctionality is probably explained by the differences in the sample population, in the tests used and in the relatively low number of women with previous abortions. Anyhow, the number of abortions in asthmatic and non-asthmatic women was similar and, for the aims of this study, abortions did not modify the effect (if any) of asthma in the different psychological tests.

Older age and smoking habits were somewhat associated to scores indicating depression/anxiety and family dysfunctionality. For instance, per every additional year, the probability of a pregnant women having a score indicating family dysfunctionality increases about 5% (aOR 1.05, 1.00;1.11). Both the Edinburgh at 20 and 32 weeks and the STAI tests had similar results, which were not overtly significant from the statistics point of view but are quite close to it and showing a clear trend. Being a current smoker was clearly and consistently associated to scores out of the range of normality, doubling the probabilities of a score indicating depression or anxiety and family dysfunctionality. Smoking and older age have been shown to be associated to depression. As found by a systematic review which included 45 previous studies, depression was associated to smoking in adults, adolescents and even children 10-12 years of age[32]. Older age in our population probably means one or several previous children which might be combined with other accompanying circumstances such as economic constraints) that can make pregnant women more susceptible to depression [33]. In fact, there is positive high correlation (as expected) between older age and number of previous deliveries although asthma does not modify this correlation to any extent (data not shown).

The profile arisen here as pregnant mothers being more prone to non-normal test scores when being older, low social class, not having university studies and smokers looks quite like the one shown in the only study of the influence of asthma in the quality of life of pregnant mothers. The Preventing Atopy Dermatitis and Allergy in Children (PreventADALL) recruited 2697 pregnant women at the 18th week of gestation. Among the battery of questionnaires and tests, the researcher included the Perceived Stress Scale (PSS) which was administered between 18th and 24th weeks of gestation which was filled out by 2164. At mid pregnancy, those factors significantly different between those with low (<29) and high (≥29) PSS were: high income (higher proportion in lower PSS); previoulsy pregnant (higher proportion in higher PSS); cigarette smoking (higher proportion in higher PSS). Asthmatics, although showing higher proportion in PSS≥29, it was not statistically significant. Asthma and other allergic diseases did contribute to significant stress when they were severely symptomatic. We did not have the information about the degree of asthma control of the pregnant women in our population, and the use of inhaled corticosteroids did not show any consistent result in any of the three trimesters of pregnancy. Although using different tests to measure stress, the results by Olsson et al. from the PreventADALL cohort show a similar picture to the one of the NELA cohort.

There is still a considerable room for specifically designed studies to address this important question of how asthma and other allergic diseases and their control could affect psychological wellbeing of pregnant women and its effects on the offspring.

5. Conclusions

Using three different psychological tests at two time points in pregnancy, in a cohort of women from the general population, it does not seem that asthma is associated with depression or anxiety or family dysfunctionality. In fact, the associations, found in the present study, of tests scores out of the range with sociodemographic factors, are quite coincidental with previous studies in the general population.

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