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Original Article

Internal Medicine Section

The Prevalence, Risk Factors and Changes in Symptoms of Self Reported Asthma, Rhinitis and Eczema Among Pregnant Women in Ogbomoso, Nigeria

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ABSTRACT

Background: Allergic disorders have become a major public health concern worldwide. No Nigerian study has examined the epidemiology of allergic diseases among women.

Aim: To document the prevalence, risk factors and the changes in the symptoms of allergic disorders during pregnancy.

Settings and Design: Cross-sectional study conducted at the booking and antenatal clinics of LAUTECH Teaching Hospital and Millennium Development Goals (MDG) Clinic of the Comprehensive Health Center, Oja Igbo, Ogbomoso, Nigeria.

Materials and Methods: Study enrolled 432 women from two public hospitals. Sociodemographic and clinical history were obtained and allergic disorders were diagnosed using ISAAC questionnaires.

Results: The prevalence of wheezing, eczema and rhinitis in pregnancy are 7.5%, 4.0% and 5.8% respectively. The prevalence of wheezing and eczema was slightly higher among the pregnant in past 12 months. Wheeze worsened in 70% (18/26), improved in 15% (2/26), and stable in 15% (2/26). Eczema worsened in 50% (7/14), improved in 7.1% (1/14) and stable in 42.9% (6/14), while allergic rhinitis worsened in 50% (11/22), improved in 22.7% (5/22) and stabilized in 27.3 % (6/22). In multivariate analysis, the risk of allergic diseases in pregnancy was increase 2 times by low income earning (CI: 1.2–2.1, p = 0.002), low level education (OR = 0.6, CI: 0.3–0.9, p = 0.011) and by family history of asthma, OR-4.3, CI–1.3–13.9, p = 0.015. Family history of asthma increase the chances of asthma by 18.7 times, CI-2.3–152.2, p = 0.006, while the odd of eczema was increased 9.1 times (CI-2.7–30.6, p<0.001) and 2.4 times (CI: 1.2–4.7, p = 0.008) by second hand home smoking and low-family income respectively. The risk of allergic rhinitis were raised 1.8 times by low family income (CI 1.1–2.8, p = 0.013) and 3.9 times by family history of rhinitis (OR = 3.9, CI 1.2–12.7, p = 0.024).

Conclusion: Prevalence of wheezing and eczema are higher in pregnancy probably due to exacerbation induced by pregnancy. Social and genetic factors are important risk factors for allergic disorders in pregnancy.

Keywords: Allergic disorders, Pregnancy, Ogbomoso

INTRODUCTION

In the 21st century, allergic disorders have risen to become public health problem of global significance affecting all ages and ethnic backgrounds [1,2]. The 'epidemic' of allergic diseases is affecting both industrialized societies and the low and middle-income countries (LMIC) of the world simultaneously [2-4]. Currently, available data indicated about 400 million people are suffering from rhinitis, while about 300 million are suffering from Asthma. The escalating burden of Asthma is expected to scale up to 400 million by 2025 [2]. Recent estimates have shown that the prevalence of allergic sensitization to the common allergen could be between 25–35% in the general population [2,3]. Also, prevalence of allergic disorders especially asthma and allergic rhinitis (AR) among women of childbearing age could be up to 18–30% in industrialized nations [5,6]. Although the prevalence of atopic dermatitis in pregnancy is still unknown, eczema could constitute up to 30–50% of all the gestational itchy dermatitis [5,7].

Challenges arising from the recent upsurge in the prevalence of allergic disorders include disproportionate increase in morbidity and mortality affecting children and young adults. Others include impairment of quality of life, psychological complications, sleep disturbance and socio-economic consequences [2,3]. Factors attributed to the recent upsurge include indoor and outdoor pollution, climatic changes and variation in environmental temperature. All these changes are contributors to certain chemical and biological changes observed in pollens that incite diseases exacerbations in urban and polluted areas of the world [2,3].

Pregnancy is a physiological, but a unique state characterized by tremendous complex hormonal and immunological alteration necessary for survival of the embryo and good clinical outcomes [8,9]. The behaviour of allergic disorders in pregnancy varied widely. This intricate complexity has been linked to a predominant anti-inflammatory and hyper steroidal hormone milieu, which decreased anti-inflammatory response of T/B lymphocytes. The hormonal changes also lead to deregulation in number and function of mast cells and consequently depressed cell-mediated immunity (CMI) [9,10]. Allergic disorders may predate, co-exist or exhibit complex and unpredictable remission and exacerbation in the course of pregnancy [10-13]. The clinical course of allergic diseases may vary from one pregnancy to the other even in the same individual [8,10-14]. The impact and outcomes of asthma and AR on pregnancy have been extensively studied elsewhere [10-14]. Data on the prevalence of allergic disorders among adults and outcomes when it co-exist with pregnancy are scanty in Africa. The risk factors that increase liability to the allergic diseases have not been sufficiently studied. Elsewhere, current thinking on upsurge of allergic disorders has been taken beyond the established " allergen theory". Consideration now includes the "aetiological theory" implicating foetal intrauterine experience, use of medications and environmental and lifestyle changes in nations [15,16]. The increasing westernisation of the lifestyle of inhabitants of the low and middle-income countries, therefore, calls for this kind of survey among the adult population.

This study is required because data on allergic disorders among adults and in pregnancy are rare in Africa. The present study,

therefore, investigated and determined the association between demographic, social, clinical and environmental risk factors and the allergic disorders among childbearing age women. The study adopted the validated English version of International Study of Asthma and Allergies in Childhood (ISAAC) protocol to examine the prevalence of asthma, eczema and AR among pregnant and non-pregnant childbearing age women. We also determined the changes in the symptoms of allergic disorders that occurred in pregnancy.

MATERIALS AND METHODS

This study was conducted at the Millennium Development Goals (MDG) Clinic of the Comprehensive Health Centre, Oja Igbo and the Obstetrics and Gynecology Department of the Ladoke Akintola University of Technology Teaching Hospital (LAUTECH), Ogbomoso. As one of the Nigeria's largest urban centres, Ogbomoso is a city situated in Oyo State of the Southwestern Nigeria. Ogbomoso was founded in 17th century, lies on latitude 8°071N – 8°161N of the equator and longitude 4°161E – 4°301E of Greenwich meridian time. From population estimates of 2006 national population census, about 1.2 million people presently reside in the City [17]. The two centres chosen are the largest and most attended government-run public health institutions in the city. Research Ethical Board of studies of the LAUTECH Teaching Hospital, Ogbomoso approved the study.

A total 432 women of childbearing age were studied between May 2012 and June 2013. Participants were 347 pregnant women and 85 age-matched non-pregnant women as a control population. Consecutive pregnant women attending routine antenatal and booking clinic were recruited as the study subjects. All the women that showed a willingness to be interviewed and signed informed written consent were included in the study. We excluded women with medical illness such as Diabetes Mellitus, pre-eclampsia, Pneumonia and chronic kidney diseases (CKD). The control participants were willing, non-pregnant, apparently healthy hospital staff, and some women that brought their children to hospital for treatment of various ailments.

With the aid of semi-structured questionnaires, the participants' demographic characteristics such as age, marital status, education level and occupation and residence, level of income, family size, and position in sibship were documented. The type of home, methods of cooking (smoky or non-smoky) and contact with pet(s) were explored. Clinical variable such as trimester of pregnancy, past and current smoking history, contact with smokers at home and work, family history of eczema, asthma and AR were documented. The semi-structured questionnaire was initially pre-tested at the Medical Outpatient Clinic using 40 patients with different medical illnesses for content and structural correction. The three allergic disorders were diagnosed using the standardized ISAAC protocol [18] for asthma, eczema and rhinitis as used by Miyake et al., for female adult population [19]. The questionnaires were mostly self-administered, but were administered by trained assistants to few rural women who could not read or write. The inclusion criteria for eczema include affirmative answer to ever presence of itchy rash which was coming and going for at least 6 months, or the presence of itchy rash at any time in the last 12 months and itchy rash at any time that affected skin folds such as the folds of the elbows, behind the knees, in front of the ankles, under the buttocks, or around the neck, ears, or eyes. For rhinitis, participants were included if problem with sneezing, runny or blocked nose were present when there was no cold or flu in the last 12 months [18,19]. Similarly, patients with wheeze were included if there have been wheezing in the chest at any time in the last 12 months. Cases of Asthma were included if participants experienced an asthmatic attack during the last 12 months [18] and or if the participants are currently using asthma medications. Participants without the stated criteria for the allergic disorders were excluded from the study. Participants were asked about their opinion on improvement or worsening or stability of symptoms (wheezing, eczema and rhinitis) in the months within which they have been pregnant. Their opinions on the changes in symptoms were documented as affirmative yes or no response.

STATISTICAL ANALYSIS

All continuous variables were analysed using student t-test statistics and expressed in means ± SD. All categorical variables were analysed using chi-square statistics and expressed in percentages. Odd ratio statistics was calculated from two by two tables. Significant variables in bivariate analysis with correlation were entered into binary logistic regression models to find the predictors of allergic disorders in pregnancy and component entities. The first model comprises of all significant variables with $p<0.05$ except family history of allergic diseases. The second model was adjusted for established risk factor for such as a specific family history of allergic diseases that were statistically significant in bivariate analysis. Results of interest were presented in tables. p-value was taken as significant if 0.05.

RESULTS

The present study enrolled 432 women, 347 (80.3%) pregnant and 85 (19.7%) non-pregnant women. About 59.0% (255) of participants were recruited from antenatal clinic of the LAUTECH Teaching Hospital, Ogbomoso and 97% were city dwellers.

[Table/Fig-1] shows the socio-demographic characteristics of the study participants according to presence / absence of allergic disorders and pregnancy. The mean age of the study participants was 26.9±5.0 years. There was no significant difference in the ages of pregnant and non-pregnant women and the ages of women with and without allergic disorders. The participants were significantly married, petty traders and low-income earners, $p<0.001$. No significant difference in the occurrence of allergic disorders across the trimesters. The overall prevalence of cigarette smoking among all women was 1.6%. The prevalence of current smoking was (1.2%) the same for pregnant and non-pregnant women. The prevalence of current smoking was slightly higher (1.4% vs. 1.1% and 2.4% vs 1.5%) among women with allergic disorders and non-pregnant women. The women with allergic disorders also had significant exposure to cigarette smoke at home ($p=0.042$) compared to non-allergic women.

[Table/Fig-2] shows the prevalence of allergic disorders among pregnant and non-pregnant women. The prevalence of wheezing ever in the past among all women was 9.3%. The prevalence of wheezing in the past 12 months was higher among the pregnant compared to the non-pregnant. However, Doctor-diagnosed asthma and current asthma medications were 3.6 and 8.3 time's significantly commoner among non-pregnant women compared to the pregnant, OR =3.6, CI 3.1-4.1, $p=0.029$ and OR=8.3, CI 1.5-18.2, $p=0.040$ respectively.

Similarly, all women had itchy rash ever prevalence of 4.6%. The prevalence of eczema in the past 12 months was higher among pregnant women compared to the non-pregnant. Among all the women, prevalence of rhinitis ever when there was no cold (AR) was 11.8%. The non-pregnant participants had more rhinitis compared to the pregnant. Rhinitis was present 3.8 times ever in the past (OR=3.8, CI 3.3- 4.4, $p<0.001$), 2.7 times last 12 months (OR=2.7, CI 2.1-3.6, $p=0.007$) and 3.0 times when no cold (OR=3.0 CI 2.4-3.6.$p=0.003$) among the non-pregnant participants compared to the pregnant participants.

Of all the combinations of allergic disorders among women, the combinations of wheezing and AR 13.4% (58/432, $p=0.047$) was the significant and commonest. This was followed by wheezing and eczema 10% (43/432); the triad was only present in 0.9% (4/432) of all women. The odds of family history of eczema and rhinitis were reduced by 0.4 among pregnant compared to the non pregnant women (OR=0.4, CI 0.2-0.9, $p=0.03$ and OR=0.4 CI 0.2 – 1.0 respectively) [Table/Fig-2].

Symptoms	Total (%)	Allergic Disorders present	Allergic Disorders Absent	p-value	Pregnant (%)	Non-Pregnant (%)	p-value
Mean age	26.9±5.0	26.7±4.6	27.1±5.1	0.626	26.9±5.1	27.3±4.6	0.560
Marital status							
Single	85 (19.7)	26 (35.1)	59 (35.1)	<0.001	38 (11.0)	47(53.3)	<0.001
Married	347 (80.3)	48 (64.9)	299 (83.5)		309(89.0)	38(44.7)	
Education							
Below primary	10(22.3)	3(4.1)	7(2.0)	0.299	6 (1.7)	4(4.7)	<0.001
Primary	39(9.0)	6(8.1)	33(9.2)		36 (10.4)	3(3.5)	
Secondary	163(37.7)	22(29.7)	141(39.4)		151(43.5)	12(14.1)	
Tertiary	220(50.9)	43(58.1)	177(49.4)		154 (44.4)	66(77.6)	
Occupation							
Civil servants	88(20.4)	21(28.4)	67(18.7)	0.001	51 (14.7)	37(43.5)	<0.001
Trading	195(45.1)	21(28.4)	174(48.6)		179 (51.6)	16(18.8)	
Artisan	54 (12.5)	9(12.2	45 (12.6)		49 (14.1)	5 (5.9)	
Students	70 (16.2)	21(28.4)	49 (13.7)		47 (13.5)	23 (27.1)	
Unemployed	25 (5.8)	2(2.7)	23 (6.4)		21 (6.1)	4 (4.7)	
Resident							
Village dwellers	13 (3.0)	2 (2.7)	11(3.1)	0.865	9 (2.6)	4(4.7)	0.307
City dwellers	419 (97.0)	72 (97.3)	347 (96.9)		338 (97.4)	81 (95.3)	
Trimester N=339							
First	149 (42.9)	21 (38.9)	128 (43.7)	0.739	149 (42.9)	--	--
Second	161 (46.4)	26 (48.1)	135 (46.1)		161 (46.4)	--	
Third	37 (10.7)	7 (13.0)	30 (10.2)		37 (10.7)		
Smoking							
Never	425 (98.4)	73 (98.6)	352 (98.3)	0.923	342 (98.6)	83 (97.6)	
Ever a Smoker	7 (1.6)	1 (1.4)	6 (1.7)		5 (1.5)	2 (2.4)	
Current smoker	5 (1.2)	1 (1.4)	4 (1.1)		4 (1.2)	1 (1.2)	0.557
Old smoker	2 (0.5)	0 (0.0)	2 (0.6)		1 (0.3)	1 (1.2)	
Smoker at home	25 (5.8)	8 (10.8)	17 (4.7)	0.042	21 (6.1)	4 (4.7)	0.634
Smoker at work	10 (2.3)	2 (2.7)	8(2.2)	0.087	9 (2.1)	1 (1.2)	0.651
Level of income							
Below $ 100	168 (38.9)	20 (27.0)	148 (41.3)	<0.001	152 (43.8)	16 (18.8)	<0.001
At least $ 100	38 (8.8)	2 (2.7)	36 (10.1)		28 (8.1)	10 (11.8)	
$100 - 300	123 (28.5)	17 (23.0)	106 (29.6)		109 (31.4)	14 (16.5)	
>$300	103 (23.8)	68 (18.9)	35 (47.3)		58 (16.6)	45 (52.9)	

[Table/Fig-1]: The socio demographic characteristics of the study population in relation to gravidity and presence or absence of Allergic conditions
% - percentage

Symptoms	Total (%)	Pregnant (%)	Non (%) Pregnant	Odd ratio 95%(CI)	p-value
Asthma and related symptoms					
Wheezing ever in the past	40 (9.3)	31 (8.9)	9(10.6)	1.2(0.8- 1.9)	0.637
Wheezing in the past 12 months	32 (7.4)	26 (7.5)	6(7.1)	1.1(0.5-1.7)	0.891
Doctor diagnosed Asthma	11 (2.5)	6 (1.7)	5 (5.9)	3.6(3.1-4.1)	0.029
Asthma in the last 12months	6 (1.4)	4(1.2)	2 (2.4)	2.1(1.2-3.7)	0.397
Current Asthma medication	3(0.7)	1 (0.3)	2 (2.4)	8.3(1.5-18.2)	0.040
Eczema					
Itchy rash ever in the past	20 (4.6)	14(4.0)	6 (7.1)	1.8(0.8-3.1)	0.234
Itchy Rash in skin folds (last 12 months)	17(3.9)	14(4.0)	3 (3.5)	1.1(0.3-2.5)	0.830
Itchy rash last 6months	19 (4.4)	15(4.3)	4 (4.7)	1.1(0.4-2.6)	0.887
Allergic Rhinitis					
Rhinitis ever in the past	51(11.8)	29(8.4)	22(25.9)	3.8(3.3- 4.4)	<0.001
Rhinitis when no cold	35(8.1)	22(6.3)	13(15.3)	2.7(2.1- 3.6)	0.007
Rhinitis last 12 months	33(7.6)	20(5.8)	13(15.3)	3.0(2.4- 3.6)	0.003
Combination of Allergic Conditions					
Wheezing and Eczema	43(10.0)	35(9.4)	8(9.4)	1.1(0.7- 1.8)	0.852
Wheezing and rhinitis	58(13.4)	41(11.8)	17(20.0)	0.5(0.4- 0.7)	0.047
Wheezing, Eczema, and Rhinitis	4(0.9)	2(0.6)	2(2.4)	0.2(0.2- 0.3)	0.125
Family history of Allergic conditions					
Family history of Asthma	29(6.7)	21(6.1)	8(9.4)	0.6 (0.3 – 1.5)	0.27
Family history of Eczema	22 (5.1)	14(4.0)	8(9.4)	0.4 (0.2 – 1.0)	0.05
Family history of Rhinitis	28(6.5)	18(5.2)	10(11.8)	0.4 (0.2- 0.9)	0.03

[Table/Fig-2]: The prevalence of Asthma, Eczema, and Allergic Rhinitis in relation to gravidity
%-percentage

Allergic Conditions	Improved (%)	Worsened (%)	Remain same (%)
Wheezing	4 (15.0)	18 (70.0)	4 (15.0)
Eczema	1(7.1)	7 (50.0)	6 (42.9)
Rhinitis	5(22.7)	11(50.0)	6 (27.3)

[Table/Fig-3]: Recent variation in Wheezing, Eczema, and Rhinitis in Pregnancy
% - percentage

Recent changes in wheezing, eczema, and rhinitis in pregnancy was sought after. The prevalence of wheezing past 12 months in pregnancy was 7.5%. Worsening of allergy symptoms was commoner compared to another possibility. Women with asthma had wheezing worsened in 70% (18/26), improved in 15% (2/26) and stable in another 15% (2/26). Prevalence of eczema in pregnancy was 4.0%. Eczema worsened in 50% (7/14), improved

Variables	Total (%)	Asthma			Eczema			Allergic Rhinitis		
		Present (%)	Absent (%)	p-value	Present (%)	Absent (%)	p-value	Present (%)	Absent (%)	p-value
Personal smoking	7 (1.6)	0(0.0)	7(1.7)	0.67	0(0.0)	7(1.7)	0.56	0(0.0)	7(1.8)	0.33
Smoker at home	25 (5.8)	1(9.1)	24(5.7)	0.63	5(25.0)	20(4.9)	<0.001	6(11.8)	19(5.0)	0.05
Smoker at work	10 (2.3)	0(0.0)	10(2.4)	<0.001	1(5.0)	9(2.2)	0.70	1(2.0)	9(2.4)	0.02
No of children in family n=406										
Less than 4	222(54.7)	8(72.7)	214(54.2)	0.22	10(50.0)	212(54.9)	0.67	27(56.2)	195(54.5)	0.82
Greater than 4	184(45.3)	3(27.3)	181(45.8)		10(50.0)	174(45.1)		21(43.8)	163(45.5)	
Younger sibling n=392										
Less than 2	235(59.9	6(60.0)	229(59.9)	0.99	10(58.8)	225(60.0)	0.92	26(59.1)	209(60.1)	0.90
Greater than 2	157(40.1)	4(40.0)	153(40.1)		7(41.2)	150(40.0)		18(40.9)	139(39.9)	
Older sibling, n=402										
Less than 2	235(58.5)	9(81.8)	226(57.8)	0.11	14(70.0)	221(57.9)	0.28	31(67.4)	204(57.3)	0.19
Greater than 2	167(41.5)	2(18.2)	165(42.2)		6(30.0)	161(42.1)		15(32.6)	152(42.7)	
Housing										
Self contain House	194(46.5)	2(25.0)	192(46.9)	0.22	7(36.8)	187(47.0)	0.39	15(31.9)	179(48.4)	0.03
Economy House	223(53.5)	6(75.0)	217(53.1)		12(63.2)	211(53.0)		32(68.1)	191(51.6)	
Family income										
Low income	168(39.0)	2(18.2)	166(39.5)	0.15	2(10.0)	166(39.0)	0.007	11(21.6)	157(41.3)	0.007
Normal/ high income	263(61.0)	9(81.8)	254(60.5)		18(90.0)	245(59.6)		40(78.4)	223(58.7)	
Family history of Allergic Diseases										
Asthma	29(6.7)	4(36.4)	25(5.9)	<0.001	0(0.0)	29(6.7)	0.22	10(19.6)	19(5.0)	<0.001
Eczema	22(5.1)	1(9.1)	21(5.0)	0.54	0(0.0)	22(5.3)	0.29	8(15.7)	14(3.7)	<0.001
Rhinitis	51(11.8)	10(34.5)	41(10.2)	<0.001	8(36.4)	43(10.5)	<0.001	15(53.6)	36(8.9)	<0.001
Living condition n=327										
Over crowding	220(67.3)	3(60.0)	217(67.4)	0.73	10(71.4)	210(67.1)	0.74	19(70.4)	201(67.0)	0.72
No overcrowding	107(32.7)	2(40.0)	105(32.6)		4(28.6)	103(32.9)		8(29.6)	99(33.0)	
Cooking type n=430										
Smoky cooking	365(84.9)	5(50.0)	360(85.7)	0.002	14(73.7)	351(85.4)	0.16	37(75.5)	328(86.1)	0.05
Non smoky cooking	65(15.1)	5(50.0)	60(14.3)		5(26.3)	60(14.6)		12(24.5)	53(13.9)	
Contact with Pet n=425										
Sustain contact	112(26.3)	2(22.2)	110(26.4)	0.78	2(10.5)	110(27.0)	0.11	8(16.3)	104(27.6)	0.09
No contact	314 (73.7)	7(77.8)	307(73.6)		17(89.5)	297(73.0)		41(83.7)	273(72.4)	

[Table/Fig-4]: The association between Demographic / Environmental factors and Doctor- diagnosed Asthma, Eczema and Allergic Rhinitis

Allergic Conditions	Model 1 (Unadjusted)				Model 2 (Adjusted)			
	B	Odd Ratio	95(CI) of odds Ratio	p-value	B	Odd Ratio	95(CI) of odds Ratio	p-value
Allergic disorders in pregnancy								
Smoker at home	1.3	3.5	1.2 – 10.4	0.024	1.0	2.7	0.9 – 8.7	0.074
Low family income	0.7	2.1	1.3 – 3.2	0.001	0.7	2.0	1.2 – 3.1	0.002
Education	-0.5	0.6	0.3 – 0.9	0.027	-0.6	0.6	0.3 – 0.9	0.011
Family history of Asthma					1.5	4.3	1.3 – 13.9	0.015
Asthma past 12 months								
Smoky cooking	-0.5	0.6	0.1 – 4.1	0.606				
Family income	1.0	2.7	0.6 – 12.1	0.181				
Smoker at work	-15.5	0.0	0.0 - 0.0	0.999				
Occupation	-0.2	0.8	0.3 – 1.7	0.539				
Family history of Asthma					2.9	18.7	2.3 – 152.2	0.006
Eczema past 12 months								
Smoker at home	2.2	9.5	2.8 - 31.3	<0.001	2.2	9.1	2.7 – 30.6	<0.001
Family income	0.9	2.4	1.3 – 4.8	0.005	0.9	2.4	1.2 - 4.7	0.008
occupation	0.2	1.2	0.9 – 1.7	0.184				
Allergic Rhinitis								
Family income	0.5	1.8	1.1 – 2.9	0.012	0.6	1.8	1.1 - 2.8	0.013
Occupation	-0.022	1.0	0.8 – 1.3	0.872				
Smoker at work	0.8	2.2	0.3 – 18.6	0.479				
Family history of rhinitis					1.3	3.9	1.2 – 12.7	0.024

[Table/Fig-5]: Multivariate Binary Logistic Regression of predictors of Allergic disorders in Pregnancy and components: Asthma, Eczema, and Allergic Rhinitis among women of childbearing age.
CI- Confidence Interval

in 7.1% (1/14) and stable in 42.9% (6/14). The prevalence of AR in pregnancy was 6.3%. Allergic rhinitis observed to be worsened in 50% (11/22), improve 22.7% (5/22) and remain same in 27.3 % (6/22) [Table/Fig-3].

[Table/Fig-4] shows factors associated with asthma, AR and eczema. Asthma was associated significantly with secondary exposure to cigarette smoke at the work (p<0.001), practice of smoky cooking p=0.02 and family history of asthma and rhinitis (p<0.001). Eczema was significantly associated with secondary exposure to cigarette smoke at home (p=0.01), low family income (p=0.007), and family history of AR. Allergic rhinitis was associated with the presence of smokers at work (p=0.02), living in economy home (p=0.03) and low-family income (p=0.007).

[Table/Fig-5] shows the multivariate binary logistic regression analysis of predictors of allergic disorders in pregnancy. After adjustment for family history of allergic disorders, low family income and reduce level of education increase the odd of allergic diseases in pregnancy by 2.0 (CI- 1.2–3.1, p=0.002) and 0.6 (CI- 0.3–0.9, p=0.011) respectively. As expected, family history of asthma in pregnancy increase the chance of allergic disorders significantly, (OR; 4.3, CI- 1.3–13.9, p=0.015). Similarly, women with family history of asthma appear to have a significant risk for asthma in pregnancy, while all other variables of interest became insignificant in multivariate analysis, (OR=18.7, CI-2.3 – 152.2, p=0.006). The odd of eczema were increased 9.1 times (CI-2.7 – 30.6, p<0.001) and 2.4 times (CI-1.2 - 4.7, p=0.008) by second-hand smoking at home and low family income respectively. However, the chances of AR was increased 3.9 (CI-1.2-12.7, p=0.024) and 1.8 (CI-1.1 – 2.7, p=0.013) by intrinsic family history of rhinitis and low household income respectively.

DISCUSSION

The present study reveals that the prevalence of wheezing and eczema are higher among pregnant women compare to the non-pregnant although insignificantly. We also observed pregnant women with atopic disorders are more likely to experience worsening of their symptoms compare to other possible outcomes.

Only few prevalence surveys have been conducted on allergic disorders among the adults' populations [19-23]. None of the few African studies examine the changes in the symptoms of allergic disorders in pregnancy. Among women of childbearing age, the cumulative prevalence of wheezing ever (9.3%), asthma past one year (1.4%), asthma medication (0.7%) eczema ever (4.6%), and rhinitis ever (11.8%) in the past are lower but comparable with 11.3%, 1.3%, 1.3%,13.4% and 17.6% reported among Turkish women [20]. A recent finding among adults at Bolu also showed wheezing prevalence of 12.0%, eczema of 9.6% and rhinitis prevalence of 16.5% [21]. Similar observation among Turkish University students reported current wheeze of 7.2%, flexural eczema 0.4% and perennial rhinitis of 2.5% among girls [22]. Sunyal et al., also reported wheezing and asthma prevalence of 10.7% and 3.5% respectively among Tanzania pregnant women [23]. Reports from the third National Health and Nutrition Examination Survey (NHANES III) also indicated that asthma was affecting 3.7 - 8.4% of pregnant women in United States (US) [24]. Desalu et al., however found a higher prevalence of 29.9% and 14.7% for allergic rhinitis and asthma respectively among adults male and female population in Ilorin [25]. The prevalence of allergic disorders found in this study is also lower compared to findings from ISAAC phase III survey among children 13-14-year-old in Ibadan [4] and results in a study involving ten European countries [26]. Heterogeneous prevalence of allergic disorders varies from 11.7% in Spain to 33.6% in Italy, with a weighted average of 24.4% among all the nations studied [26]. Although, established risk factors cannot sufficiently explain current global trend in allergic disorders [15], variation in environmental and social conditions [15] might be implicated as reasons for the differences. Ilorin, Ibadan and the European countries are industrialised urban centres compared Ogbomoso from where our participants are drawn. Lower prevalence of allergic disorders is also expected among adult population [20-22] because Dahl et al., found prevalence of respiratory allergic disorders correlated inversely with age, with higher prevalence found among young people [26], children and adolescent study [4,16,27].

Family history of asthma is a potent intrinsic risk factor for developing atopic disorders and asthma in pregnancy, while family history of AR is an important risk factor for rhinitis. In this sample, inheritance seems less important for eczema in pregnancy but the extrinsic risk factors. Multiple interplays of genetic factors, shared and non-shared environmental exposures were found responsible for liability to asthma in previous studies [28,29]. The prominent role of genetic liability decreases over the life span individuals and particularly in old age. According to Thomsen et al., in a large twin study, adults' ages between 20–49 years demonstrated genetic susceptibility of 61% (53-68%) to asthma, while non-shared environmental factors accounted for 39% (32-68%) variation in liability [29]. Genetic influences that dictate vulnerability to asthma and other allergic disorders calls for study attention among Africans. Although the rate of primary smoking among women (1.6%) is low in our study, passive or secondhand exposure to cigarette smoke at home and low income earning were significant association of eczema in our study. Similarly, cigarette smoking at home, family history of rhinitis and low-income earning were also factors associated with eczema among women of childbearing age in previous studies [24,25]. Schäfer et al., similarly found maternal smoking as a risk factor for atopic dermatitis [30]. Studies have found the husband as the most important source of passive smoking, women who had smoking husband are more likely to develop eczema, while public smoking has been implicated for the development of wheezing and AR [30,31]. The developing country like Nigeria needs enforcement of extant laws that forbids smoking within enclosures at home and in the public places. Although smoky cooking; using kerosene stove and firewood were not significantly associated with allergic disorders in the present study after multivariate analysis, Montnemery et al., and others [32,33] found living close to heavy traffic, which is a heavy source carbon monoxide pollution, hereditary history of eczema and self-reported rhinitis as important risk factors for allergic conditions. There is increasing need for the improvement of socio economic conditions of dwellers in the sub-Sahara Africa and emission control of air pollutant. We did not find sibship, and pets, as an important association factor for the development of any of the allergic conditions as found by Miyake et al., [19,33].

The course of asthma during pregnancy is said to vary widely in studies [8,11-14]. In the present study, the worsening of asthma and related symptoms (wheezing) in 70% (18/26) of the pregnant members is greater than 0 to 44% reported by Schartz [11]. The observed improvement in15% (4/26)% also falls within 0 to 69% as reviewed by Schatz in fourteen heterogeneous studies [11]. The stable course observed in 15% (4/22) of the participants also falls to the lower end of a broad range of 0-100% documented in Schatz review of the pregnant asthmatics [11]. Factors that may be responsible for worsening of asthma in pregnancy include mechanical changes associated with enlargement of the uterus with its reducing effect on functional capacity of the lungs, residual volume, increase in tidal volume, downregulation and desensitization of β2 – adrenoreceptors [8]. The present observation and previous reports are different from the traditional consensus of one third worsening, improvement and stable course of asthma in pregnancy [11,12]. The clinical course of asthma is grossly unpredictable, as severity varies in the same individual with successive pregnancy. The best predictor of its behaviour been asthma severity grade just before pregnancy and course of asthma in the last pregnancy [8]. Factors that may be

responsible for variations observed in this cross-sectional study and the previous retrospective and prospective analysis could be related in part to differences in objective, method of assesing variation and differences in the methods of severity classification [14].

Concerning eczema in pregnancy, prevalence widely unknown and behaviour also varies widely [8,11]. We observed a prevalence of 4% in this study among pregnant women. Nnoruka documented a prevalence of 3.0% among adults in Nigeria, while Herd et al., in Scotland observed prevalence 0.9% among adults [34]. Prevalence of eczema is inversely related to age [34,35]. Montnemery et al., found a higher prevalence of 8.2 to 17.1% among actively working adults [32], highest prevalence was recorded among non-manual workers. Although available data are very limited, the clinical fluctuation of eczema like asthma in pregnancy is complex [8,11-14]. In our study, 7.1% experienced symptom improvements, and 50.0% had a worsened exacerbation, while 42.9% had stable disease in pregnancy. Deteroriation of eczema seems commoner in studies. Cho et al., in a similar interview-based study in Korea found symptoms improvement in 4% while 61% experienced deteriorations [36]. Kemmett et al., documented deteriorations in 52%, improvement in 24% and stable disease in 24% [37]. Similar deterioration in the presence of premenstrual syndrome (PMS) was noted in 46% of women menstruating suggesting an existing relationship between pregnancy hormones and fluctuation of eczema in pregnancy [36,37]. However, the fact that psychological symptoms of PMS could increase awareness of cutaneous symptoms and failure of hormone replacement treatment suggest further studies are needed for better understanding of the role hormones. The role of non-adherence to medication use by affected patient in pregnancy because of fear its harmful effect on foetus needs to be considered in such a society like ours [30]. The impact of the use of traditional medicine that many women may prefer for safety reasons should be investigated.

Our recorded 6.3% prevalence of AR in this study is below 18.2% attributed to pregnancy by Mabry [38] and also lower than 30% overall nasal congestive symptoms observed in pregnancy [39]. Allergic rhinitis is currently seen as a component of systemic illness due to allergic provocation of both local and systemic inflammatory syndrome [39]. Up to 80% of primarily asthmatic patient could have AR as a co-morbid disease while up to 20 – 50% of patients with primary AR may have asthma. The genetic, pathophysiologic basis and clinical coexistence of AR and Asthma have been variously reported [39-42]. More importantly, upper-airway congestion in pregnancy has been suspected as an important contributing factor to inspiratory airflow limitation and nocturnal elevation of blood pressure in pre-eclampsia /eclamptic patients [42]. The course of AR usually closely follows the pattern of asthma in the present study, as shown in the previous survey [43]. Allergic rhinitis was worsened in 50% while about 25% each of our patients experienced stability and improvement of symptoms in close similarity with the course of asthma.

The strength of this study is its unbiased selection of participants from general Obstetric clinics and use of control population. Limitations of this study included the fact that it is cross-sectional and questionnaire based; diagnosis of allergic diseases and their course were made by affirmative response to questions that may increase possibilities of diagnostic imprecision. However, the questionnaire used has been extensively validated for the diagnosis of allergic conditions [18]. Similarly; IgE level, bronchial hyperresponsiveness (BHR) test and spirometry were not done for objective assessment and severity classifications of asthma. The assessed risk factors were all not exhaustive. Food, medicine and other forms of allergy were not studied. Lastly, the population surveyed may not be the representative of women (pregnant and non-pregnant) in Ogbomoso because the study was hospital based. Studies of this nature are needed for an estimate of ongoing epidemic of allergic diseases at this time for health planning, project resource allocation and upon this the fulcrum of future survey may revolve.

CONCLUSION

Conclusively, the prevalence of allergic conditions in this study is low, but comparable to the prevalence elsewhere among adult populations in the world. The implication is that Nigerian women are not altogether different from other women of different race. Genetic inheritance, low level of education, and low family income were significant predictors of allergic disorders. Allergic conditions in pregnancy demonstrated the complex but interesting variation in pregnancy that will necessitate more studies because of attendant maternal, perinatal morbidity and mortality. More research attention should be given to the issue of allergy in Africa as it is in the western nations.

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