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Allergy history as a predictor of early onset adenoids/adenotonsillar hypertrophy among Nigerian children

Abiodun Daud Olusesi^{*}, Nseobong Blessing Undie, Job Enema Amodu

Department of Ear, Nose & Throat, National Hospital Abuja, Plot 132, Central Area, Garki (Phase 2), Abuja, FCT 900001, Nigeria

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ABSTRACT

Background: Previous reports have established the association of allergy with adenoidal and tonsillar hypertrophy, and adenotonsillar hypertrophy is a well known co-morbid factor in patients with allergic rhinitis. Very little is known about the association of history of allergy with timing of first presentation in adenotonsillitis patients.

Setting: Tertiary care urban referral hospital.

Study design: Descriptive analysis of prospectively collected data.

Methods: All cases which had adenotonsillectomy carried out between September 2005 and September 2012 at National Hospital Abuja that met the selection criteria were recruited and analyzed on the basis of family history of allergy in first degree relatives, clinical history of allergic rhinitis, asthma and atopic dermatitis.

Result: Total of 434 cases were recruited. Mean age was 5 years (range 9 months–15 years, std. dev. 3.535). 56% of participants were aged 3 years and below. 22, 15, and 16% of participants aged 3 years and below had family history of allergy, allergic rhinitis and atopic dermatitis respectively compared to 6, 4 and 4% for participants aged above 3 years. The mean age at onset of symptoms is 7.59, 10.32, and 13.62 months for participants with family history of allergy, clinical allergic rhinitis and atopic dermatitis respectively and 23.890 months for participants with no history of atopy or allergy. Family history of allergy significantly predicts onset of symptoms before age 6 months (OR 7.59, 95% CI 4.74–12.12, $P < 0.0001$).

Conclusions: Family history of allergy and presence of clinical allergic or atopic dermatitis are related to early onset of symptoms in Nigerian children with adenoids/adenotonsillar hypertrophy.

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1. Introduction

Adenoids and/or tonsillar inflammation with concomitant obstructive hypertrophy is one of the oldest and most common pediatric problems [1]. Upper airway allergy, defined as IgE-mediated hypersensitivity inflammation of mucosal lining of the upper airway is documented to have co-morbid relationship with adenoids and adenotonsillar hypertrophy. It is postulated that cellular immune deficiency in allergic children could explain the enlargement of pharyngeal tonsils [2].

Whilst some earlier report indicated over 20% incidence of atopic diseases in children who had adenoidectomy [3], others observed similar incidence of allergic genesis of otitis media with effusion (OME) and adenoids in children even without history of allergic rhinitis [4].

Allergic rhinitis (AR) is seen in 10–30% of population, with greatest frequency found in children and adolescent and is as such over-represented in literature reporting the roles of allergy in adenotonsillar hypertrophy. Sih and Mion [5] reported adenoidal hypertrophy as one of the co morbidities of AR. Said et al., 2012 observed that 92.6% of cases of AR seen in Tanzania have adenoidal hypertrophy, tonsillitis, hypertrophy of inferior turbinates, nasal polyps, otitis media and sinusitis as the most common co morbidities [6]. Modrzynski and Zawisza observed that the probability of adenoid hypertrophy was statistically more significant in children with AR and/or bronchial asthma and/or atopic dermatitis compared to controls [7]. However, AR typically presents after the second year of life, and for pediatric AR, two or more seasons of pollen exposure are generally needed for sensitization [5].

The import of this, when taken with the earlier observation of Becker et al. [4] is that asthma and atopic dermatitis, aside from AR, might be independent co morbid factors in adenoids/adenotonsillar hypertrophy.

^{*} Corresponding author. Tel.: +234 803 247 2069.
E-mail address: drbiodunolusesi@gmail.com (A.D. Olusesi).

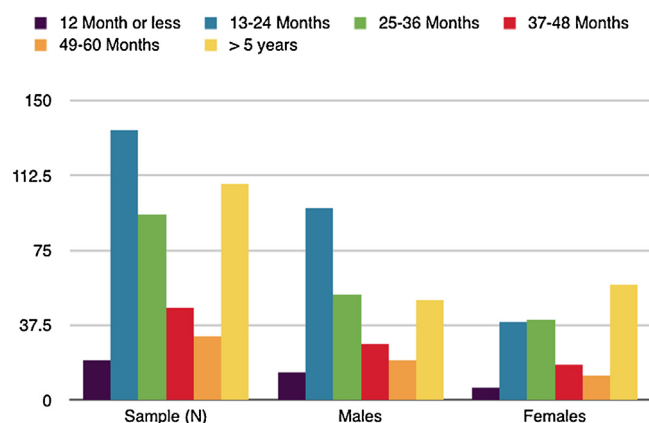


Fig. 1. Age and sex distribution of 434 Nigerian children surgically managed for adenoids/adenotonsillar hypertrophy.

Whilst most publication on the influence of allergy on adenoids/adenotonsillar hypertrophy focused on aggravation of hypertrophy and increasing incidence and association, very little is known regarding time of onset of symptoms of adenoids/adenotonsillar hypertrophy in patients with allergy.

2. Methodology

This is a descriptive analysis of prospectively-collected data obtained from cases of adenoids/adenotonsillitis surgically managed at National Hospital Abuja, a tertiary care, referral center, between September 2005 and September 2012. The selection criteria included age 1 month–15 years, clinical diagnosis of adenoids/adenotonsillar hypertrophy with indication for surgery, and willingness to participate. All cases that were conservatively managed were excluded from the study. Children with sickle cell disease, and those with craniofacial syndromes were excluded. The following were obtained from the patients on admission to the hospital for surgery and entered into the study protocol: age, sex, family history of food, drug, or other allergies – in first degree relatives, clinical features of allergic rhinitis – excessive sneezing, itchy eyes/nose/throat, and rhinorrhoea, and medical history of atopic dermatitis and/or asthma. The minimum criteria for diagnosis of allergic rhinitis in our study was excessive sneezing, plus either one or more of itchy eyes, itchy nose, itchy throat, and clear watery rhinorrhoea. Data from the theater register was compared to the study protocol and any case not featuring in both was excluded from the study. Diagnosis of adenoids was based on clinical presentation of snoring and mouth-breathing and/or struggle to breathe during sleeping combine with postnasal space radiography showing adenoidal/nasopharyngeal ratio >0.5 . Adenotonsillar hypertrophy diagnosis was based on diagnosis of adenoids plus tonsillar hypertrophy of +2 or +3 based on Brodsky scale. For the purpose of this study, early-onset adenoids/

Table 2

Distribution of number of allergy history according to age groups.

	1 Allergy history ^a	2 or More allergy history ^b	No atopy or allergy history
1 year and below	12	8	0
1+ to 2 years	75	27	18
2+ to 3 years	42	9	42
3+ to 4 years	13	5	28
4+ to 5 years	9	0	20
>5 years	40	5	64

^a Positive history of one the following symptoms: allergic rhinitis, atopic dermatitis, asthma, or family history of allergy.

^b Positive history of two or more of the these symptoms: AR, atopic dermatitis, asthma or family history of allergy.

adenotonsillitis refers to cases in which onset of symptoms was first noticed at or before the age of 6 months. Results were statistically analyzed using SPSS for Windows, Version 15.

3. Results

A total of 434 cases of adenoids/adenotonsillar hypertrophy fulfilled the study criteria. There were 263 males and 171 females (male:female ratio 1.5:1). Fig. 1 is the age and sex distribution of the participants in this study. The mean age of participants in this study was 5 years (range 9 months–15 years, std. dev. 3.535).

124 (28.5%) of study participants had positive family history of allergy (PFH), 81 (18.7%) had clinical features of allergic rhinitis (AR), while 89 (20.5%) reported atopic dermatitis (AD), and 26 (5.9%) had history of Asthma. 135 of participants had no known personal or family history of atopy (31.1%).

The mean age at onset of symptoms (MAO) for participants with PFH was 7.59 months (std. dev. 9.899), for those with clinical AR was 10.32 months (std. dev. 7.071), for those with AD is 8.73 months (std. dev. 13.623), for those with asthma was 28.15 months (std. dev. 19.19), while for those with no history of atopy or allergy, the mean age was 29.54 months (std. dev. 23.890). Table 1 shows the distribution of allergy history according to age group.

The mean age at presentation (MAP) for participants with single history of allergy was 11.74 months (std. dev. 15.76), and for those with 2 or more history of allergy was 7.5 months (std. dev. 10.21). Table 2 shows the distribution of mean age at presentation among different age groups.

120/217 (55.3%) of the single allergy history group had onset of symptoms at age 6 months and below, while 37/56 (66.1%) of the 2 or more allergy group had mean age of onset of symptoms at age 6 months and below. Only 2/26 (7.69%) of participants with history of Asthma had onset of symptoms at age 6 months and below. Table 4 shows comparison of the allergy history among adenoidectomy and adenotonsillectomy cohorts.

The odds of onset of symptoms before age 6 months is higher for participants with family history of allergy (odds ratio (OR) 7.6, 95% confidence interval (CI) 4.745–12.16, $P < 0.001$) and those with

Table 1

Distribution of allergy history according to age at presentation among 434 Nigerian children surgically managed for adenoids/adenotonsillar hypertrophy.

Age group	Total no (N)	Allergic rhinitis history N (%)	Family history of allergy N (%)	Asthma history N (%)	Atopic dermatitis history N (%)	No atopy/allergy history N (%)	No. adenoidectomy N (%)	No. adenotonsillectomy N (%)
1 year and below	20	5 (25)	14 (70)	0 (0)	5 (25)	6 (30)	14 (70)	6 (30)
1+ to 2 years	135	32 (23.7)	63 (46.7)	0 (0)	45 (33.3)	8 (5.9)	61 (45.1)	74 (54.8)
2+ to 3 years	93	25 (26.8)	19 (20.4)	2 (2.15)	18 (19.3)	29 (31.1)	12 (12.9)	81 (87.1)
3+ to 4 years	46	4 (8.7)	11 (23.9)	3 (6.5)	8 (17.4)	20 (43.4)	14 (43.8)	32 (69.5)
4+ to 5 years	32	2 (6.2)	5 (15.6)	3 (9.4)	0 (0)	20 (62.5)	5 (15.6)	27 (84.4)
>5 year	108	13 (12)	12 (11.1)	18 (16.7)	13 (12)	52 (48.1)	7 (6.5)	101 (93.5)

Note the percentage sum in each row is greater than 100% (total number, N) because of the observation of participants with multiple history of allergy.

Table 3

Odds of first symptom before age 6 months in 434 Nigerian children with adenoid/adenotonsillar hypertrophy treated with adenoidectomy/adenotonsillectomy.

	Symptoms before age 6 months	Symptoms after age 6 months
Family history of allergy	86	36
No family history of allergy	72	229
Odd ratio 7.5980, 95% CI 4.7457, z statistic 8.445, $P < 0.0001$		
Clinical allergic rhinitis	4	78
No clinical allergic rhinitis	113	237
OR 0.1076, 95% CI 0.0384–0.3011, z statistic 4.245, $P < 0.0001$		
Atopic dermatitis	62	30
No atopic dermatitis	99	240
OR 5.0101, 95% CI 3.0546–8.2174 z statistic 6.383 $P < 0.0001$		
Asthma history	2	24
No asthma history	159	247
OR 0.1295, 95% CI 0.0302–0.5553, z statistic 2.752, $P = 0.059$		

atopic dermatitis (OR 5.01, 95% CI 3.03–8.21, $P < 0.0001$) and is much less for participants with history of asthma (OR 0.1372, 95% CI 0.0320–0.5889, $P = 0.0075$) and those with clinical allergic rhinitis (OR 0.11, 95% CI 0.04–0.30, $P < 0.0001$). Table 3 shows breakdown of the data for odds calculation.

4. Discussion

Adenotonsillitis, either recurrent or chronic, is one of the commonest conditions presenting to the otolaryngologist. The risk factors for tonsillitis include young age and infections, while the risk factors for adenoids include allergy and sensitivity to different kinds of allergens [8]. However, both tonsils and adenoids are part of the Waldeyer's ring of lymphoid tissue and are influenced by allergic sensitization of the airways that affects both the mucosa and the mucosa-associated lymphoid tissue, as well as the lymphatics draining them.

There are more males in our study than females (1.5:1). This may be due to chance factor, or due to single institution based nature of the study, but may also be explained by the tendency to exceptionally care for the male child among some ethnic groups.

28.5% of participants in our study had positive history of food or drug allergy and/or asthma among first degree relatives. This is corroborated by earlier observation by Kjellman et al. (1976) that noted overrepresentation of family history of atopy in a series involving 276 adenoidectomized children 1–16 years of age [3]. Capper and Canter (2001) also noted family history of atopy, in addition to history of parental tonsillectomy, as significant

Table 4

Comparison of the distribution of allergy history in adenoidectomy cohort and adenotonsillectomy cohort among 434 Nigerian children who had adenoidectomy/adenotonsillectomy.

Parameters	Adenoidectomy cohort	Adenotonsillectomy cohort
One allergy history		
Age at onset < 6 months	35/43 (81.4%)	85/174 (48.8%)
Positive ^a FMHx of allergy	21/43 (48.8%)	66/174 (37.9%)
Clinical allergic rhinitis	11/43 (25.6%)	43/174 (24.7%)
History of asthma	0/43 (0%)	16/174 (9.1%)
History of atopic dermatitis	12/53 (27.9%)	49/174 (28.2%)
Two or more allergy history		
Age at onset < 6 months	12/15 (80%)	25/41 (60.9%)
Positive ^a FMHx of allergy	9/15 (60%)	35/41 (85.4%)
Clinical allergic rhinitis	9/15 (60%)	20/41 (48.8%)
History of asthma	0/15 (0%)	7/41 (17.1%)
History of atopic dermatitis	11/15 (73.3%)	27/41 (65.6%)
No history of atopy or allergy		
Age at onset < 6 months	3/11 (27.3%)	5/124 (4.0%)

^a FHMx = family history of food, drug or other allergies.

predictive factor for number of reported sore throats and episodes of tonsillitis in children [9].

Taken together with positive history of allergic rhinitis, atopic dermatitis, and asthma, about 73.6% of participants in our study had history of either family or personal allergy/atopy. Falade et al. (2004) reported high prevalence of atopic conditions among Nigerian children aged 6–7 years old in Ibadan [10].

We observed that participants with positive family history of allergy and those with atopic dermatitis reported earlier onset of symptoms (7.59 months and 8.73 months respectively) compared to those with allergic rhinitis and asthma. Sih and Mion (2010) noted that “as the child's immune system develops between the 1st and 4th year of life, those with an atopic predisposition begin to express allergic disease with a clear Th(2) response to allergen exposure, resulting in symptoms” [5]. Almqvist et al. (2007) observed that the presence of eczema, but not asthma or rhinitis, was an independent predictor of the onset of sensitization by age 5 years [11]. Earliest age at onset of atopic dermatitis observed in a study of Nigerian children was 6 weeks and this was found in 129/1019 (12.7%) of children in a series [12].

Our study also observed onset of symptoms at or below 6 months is seen more with those reporting more than one allergy history (66.1–55.3%). Sun et al. (2012) recently studied co-existence of allergic diseases and observed that “a patient with an allergic disease before 2.79 years old will probably have another allergic disease in 1.96–2.5 years” [13]. We believe early sensitization may explain the observation of early presentation in this group.

We are not aware of any previous study linking onset of symptoms of adenotonsillitis/adenotonsillar hypertrophy at or below age 6 months with history of allergy. Our study observed that the odds of developing symptoms by age 6 months and below is 7.6–1 for those with family history of allergy and 5.01–1 for those with atopic dermatitis. These odds are statistically significant. We also observed that this odd is much less for those with asthma and allergic rhinitis. In fact, the mean age at onset of symptom observed in this study is similar for those with Asthma and those with no family history of allergy/atopy (28.15 and 29.54 months respectively).

Our study however is not without limitations. Though strictly not a randomized/non-randomized controlled study, our study nevertheless compares the desired objective – timing of early presentation before age 6 months, with the variables – presence of history of AR, history of AD, history of Asthma, Family history of Allergy, or a combination of these. The study was based on participants who met the criteria of, and were offered adenoidectomy/adenotonsillectomy. Those with any of the variables in a sense serve as control for others without (i.e. the ‘No Atopy or Allergy’ group).

Perhaps, our study outcome might have been different if we factor in other issues like parental smoking and practice and durations of breastfeeding for participants. This limitation however does not in any way diminish the crucial observation of this study, that adenoidectomized/adenotonsillectomized children with family history of allergy and/or atopic dermatitis tends to have early onset of symptoms of adenoids/adenotonsillar hypertrophy. We believe perhaps focusing on management of role of allergy regarding these early symptoms may reduce the need for surgery in a large number of cases.

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