Frequency of asthma as the cause of dyspnea in pregnancy

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Abstract

Objective: To estimate the prevalence of asthma among pregnant women with dyspnea. Methods: Pregnant women referred for prenatal care visits who had complaints of dyspnea were included. All pregnant women were evaluated by a respiratory specialist. Spirometry was performed by a single trained physician. Results: Asthma was diagnosed in 38.8% of participants. Dyspnea was diagnosed as being physiologic in 36.4% of cases, but 24.8% of cases were of probable asthma (spirometric values were within normal range but symptoms and signs were suggestive of asthma). Cough, wheezing, and post-exercise symptoms were significantly more prevalent in asthmatic and probable-asthmatic women than in women without asthma. Conclusion: Dyspnea in pregnancy can be physiologic, but when it is accompanied by other symptoms such as cough or wheezing it is likely to be caused by asthma. Because of the high prevalence of asthma during pregnancy, it seems logical to evaluate dyspnea via physical examination and response to bronchodilators.

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1. Introduction

Symptoms of dyspnea are often described as “shortness of breath,” “difficulty breathing,” and “inability to take in enough air.” The cause of dyspnea may be increased mechanical work of ventilation or airway resistance, increased ventilator drive, increased sensory, chemical, or central nervous system stimuli, pulmonary disease, thoracomuscular dysfunction, circulatory disease, or ventilator muscle fatigue [1]. Regardless of the factors involved, dyspnea sensation varies widely depending on the pathophysiologic abnormalities involved [2,3]. Dyspnea is a common symptom among pregnant women but the diagnosis of dyspnea in pregnancy is challenging [4]. Although physicians should distinguish physiologic from pathologic dyspnea, women are often reassured that symptoms are normal in pregnancy. However, there are millions of people with asthma in low-income countries [5] and it is a common disorder among pregnant women [6]; furthermore, maternal immune changes may upgrade asthma-related mechanisms during pregnancy. The general belief that “one-third improve, one-third worsen, and one-third do not change in their asthma severity during pregnancy” is not completely accurate because it does not consider the severity of asthma before pregnancy or the new cases of asthma diagnosed during pregnancy [7]. There have been numerous studies of the mutual effects of pregnancy and asthma but, particularly in low-income countries, there have been only a small number of investigations into the real prevalence of asthma during pregnancy. The aim of the present study was to estimate asthma prevalence among pregnant women with dyspnea.

2. Materials and methods

All women referred for prenatal care visits to Imam Khomeini Hospital, Tehran University of Medical Sciences, Tehran, Iran, from February to December 2008 were questioned by midwives about dyspnea symptoms. Exclusion criteria at enrollment were as follows: any pulmonary diseases other than asthma; gestational hypertension; multiple gestation; major congenital abnormalities; intrauterine fetal death; and not undergoing ultrasound for confirmation of gestational age.

The women who were included were referred to the Immunology, Asthma and Allergy Research Center for further evaluation. Demographic, social, and medical information was collected via face-to-face interview by a trained physician (KB). Past medical history of asthma based on physician diagnosis was recorded. Height and weight were measured barefoot with minimal clothing. All participants underwent physical examination by a respiratory specialist (HH), and asthma diagnosis was made based on the National Asthma Education and Prevention Program Guidelines for the Diagnosis and Management of Asthma [8]. According to the guidelines, the presence of episodic symptoms of airflow obstruction, airway hyperresponsiveness, and
airflow obstruction that was at least partially reversible— with the exclusion of alternate diagnoses— led to a diagnosis of asthma.

Because challenge tests are not recommended in pregnancy, participants were classified as probable asthmatics if they experienced symptoms and signs that were suggestive of asthma but if their spirometry did not meet the criteria for asthma diagnosis. All asthmatic and probable-asthmatic women were treated according to the Global Initiative for Asthma guidelines [9].

Spirometric measurements were conducted by a single trained physician (KB) using a Jaeger Master Screen (E. Jaeger, Wurzburg, Germany) according to the American Thoracic Society (ATS)/European Respiratory Society (ERS) Task Force guidelines [10]. The device was calibrated routinely according to the manufacturer recommendations. All women underwent spirometry (at least 4 hours after bronchodilator use) in a sitting position, with the use of nose clips, and with their feet firmly on the floor. Careful explanations were provided by the physician in charge, and the maneuver was demonstrated before the procedure to prevent problems during the test (e.g. reduced efforts owing to chest pain, abdominal discomfort, fear of breathlessness or harming the fetus, or lack of confidence) [11].

Forced expiratory volume in 1 second (FEV1) and forced vital capacity (FVC) were measured and expressed as percentage predicted, based on age, gender, height, weight, and race. The best of 3 acceptable exhalations was recorded for further analysis. The FEV1/FVC ratio was calculated by dividing the FEV1 volume by the FVC volume.

After a baseline spirometry measurement, salbutamol (2 inhalations of 200 μg) was administered through a metered-dose inhaler via a spacer device. Fifteen minutes later, all tests were repeated. Positive bronchodilator response was calculated according to ATS/ERS criteria (≥200 cc + 12% increase from baseline).

Gestational age at time of enrollment was determined from the last menstrual period if it correlated with the first ultrasound if the last menstrual period estimate varied by more than 7 days from the ultrasound gestational age estimate when the first ultrasound was performed at fewer than 20 weeks of gestation [12]. Cases with no ultrasound before 20 weeks of gestation were excluded.

SPSS version 14.0 (SPSS, Chicago, IL, USA) was used for data analysis. Descriptive values were presented as mean ± SD, or median (range) if data did not follow normal distribution. P<0.05 was considered to be statistically significant.

The study was approved by the Ethical Board of Tehran University of Medical Sciences. All study protocols were explained to participants, and informed consent was obtained.

3. Results

In total, 165 pregnant women with dyspnea were included in the study. The mean age of the women who were referred to the respiratory clinic was 28.2±5.3 years. Mean gestational age at the time of entry to the study was 25±9 weeks. The mean number of previous pregnancies was 0.9±1.3. Of all the women who were referred with dyspnea, 22.6% had a previous diagnosis of asthma, of whom 65.8% had undergone spirometric evaluation. In total, 97.4% of women with a previous diagnosis of asthma were taking asthma medication, of whom 26.7% were undertreated—with only short-acting β2 agonists—while experiencing frequent symptoms. These women, who had stopped using inhaled corticosteroids, were all concerned about the safety of such drugs during pregnancy. A total of 10% of the participants had used asthma medication before pregnancy without a definite diagnosis of asthma.

According to the past medical history of participants, 48.8% had allergic rhinitis and 42.7% reported other allergies (e.g. food allergy, urticaria, angioedema, atopic eczema, and contact dermatitis). Only 1 woman reported smoking occasionally and none of the women reported alcohol consumption. Of the participants who complained of dyspnea, 35.1% experienced it when resting, 19.4% during walking, and 45.5% while climbing steps. Cough was reported by 47.9% of women, and 75.6% experienced cough mostly at night. Wheezing was reported by 44.2% of the participants, and 76.1% experienced post-exercise symptoms (dyspnea, cough, and wheezing). There was a family history of asthma in 44.9% of cases. In total, 66.2% of women reported symptoms of gastroesophageal reflux disease.

On the basis of symptoms, spirometry, and physical examination, asthma was diagnosed in 38.8% of participants. Dyspnea was diagnosed as being physiologic in 36.4% of cases, and 24.8% of women were classified as probable asthmatics because their spirometric values were within the normal range but their symptoms and signs were indicative of asthma.

Of the cases with a previous diagnosis of asthma, 81.6% were confirmed to have definite asthma, 7.9% were probable asthmatics, and 10.5% did not have airway obstruction—at least during the study period.

The demographic characteristics of the participants are summarized in Table 1, symptoms and signs are listed in Table 2, and spirometric values are shown in Table 3.

There were significantly more previous pregnancies among asthmatic women than among probable asthmatics and healthy pregnant women, but the number of abortions was not significantly different among the 3 groups. Asthmatic and probable-asthmatic women reported significantly more wheezing and coughing, and in

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Asthmatics (n=64)</th>
<th>Probable asthmatics (n=41)</th>
<th>Healthy pregnant women (n=60)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>64 (38.8)</td>
<td>41 (24.8)</td>
<td>60 (36.4)</td>
<td></td>
</tr>
<tr>
<td>Age, y</td>
<td>28.8±5.7</td>
<td>27.1±5.2</td>
<td>28.3±5.0</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>Height, cm</td>
<td>160 (150–175)</td>
<td>162 (151–175)</td>
<td>161 (153–175)</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>Weight, kg</td>
<td>71.08±11.68</td>
<td>70.01±9.05</td>
<td>73.72±13.05</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Gestational age at enrollment, wk</td>
<td>24.1±9.3</td>
<td>25.9±9.5</td>
<td>25.4±9.6</td>
<td>0.001</td>
</tr>
<tr>
<td>Number of previous pregnancies</td>
<td>1.4±1.4</td>
<td>0.5±0.8</td>
<td>0.7±1.3</td>
<td>&lt;0.01</td>
</tr>
</tbody>
</table>

* Values are given as number (percentage), median (range), or mean ± SD.
the physical examination they showed more wheezing than did non-asthmatic women.

Asthmatic women had a significantly (P = 0.04) higher rate of allergic rhinitis than did healthy pregnant women, although the rate of other allergies was not different between the groups. Asthmatic and probable-asthmatic women experienced significantly more post-exercise symptoms than did healthy participants, and family history of asthma was significantly more common (P = 0.01) among asthmatic participants than among probable-asthmatic and healthy women.

Among asthmatic women, there was a mean significant (P = 0.01) increase of 12% (333 cc) in FEV1 after bronchodilator administration. In probable asthmatics, FEV1 increased by 5% (155 cc). Although this increase was statistically significant (P < 0.05), it was not clinically significant. Among non-asthmatic women, the change in FEV1 was not significant.

4. Discussion

It is possible that dyspnea in pregnancy is often not investigated because breathlessness during this period is common—occurring in 60%–75% of healthy normal pregnancies; this may result in the underdiagnosis of asthma at this time. The present study showed that asthma in pregnancy is a common cause of dyspnea, with 25.4% of cases of definite asthma being previously undiagnosed. The level of underdiagnosis would probably be worse if the cases of probable asthma were considered. Furthermore, safety concerns among patients and physicians about anti-inflammatory agents may also lead to under-treatment of asthma during pregnancy. Consistent with studies by Enriquez et al., there was a distinct reduction in the use of asthma medication during pregnancy in the present study. Exacerbations of asthma symptoms during pregnancy, which are associated with adverse pregnancy outcomes, may be caused by not prescribing asthma medication/not refilling medication in this period.

In contrast to a study by Enriquez et al., significantly more asthmatic women in the present study were in at least their second pregnancy; however, the number of abortions was not higher among these women. This implies that increased parity raises the risk for asthma in pregnancy.

Physiologic adaptation of the respiratory and vascular systems during pregnancy and increased awareness of physiologic hyperventilation lead to increased respiratory symptoms, particularly breathlessness, during pregnancy. Hormonal changes and alterations in the mechanics of breathing could also be regarded as possible causes. It should be noted that physiologic dyspnea often occurs at rest or while talking, and improves with activity. By contrast, the presence of dyspnea with other symptoms—such as cough and wheezing, post-exercise symptoms, and wheezing during physical examination—is consistent with asthma. Because physiologic dyspnea is diagnosed by the exclusion of other differential diagnoses and because the prevalence of asthma during pregnancy is as high as 7%, it seems logical to evaluate dyspnea by physical examination and spirometry. In fact, baseline and post-bronchodilator spirometry is the gold standard in asthma diagnosis, especially during pregnancy (because of its safety). Post-bronchodilator changes may not be as prominent during pregnancy as in non-pregnant women. In the present study, there was a significant increase in FEV1 after bronchodilator administration in asthmatics and probable asthmatics, but the increase in probable asthmatics was less than 12% (300 cc). The limited functional capacity and mobility of the diaphragm because of the growing fetus may have affected the results. Of course, the diagnosis of asthma can lead to a healthier and less risky pregnancy, in addition to less susceptibility of the fetus to asthma and allergic disease, by decreasing the adverse effects of breathlessness on the developing fetus.

The strengths of the present study included the assessment of all participants by a single respiratory physician and the fact that all respiratory tests were performed by a single trained physician, the lack of smoking history among the participants, and the specific measurement of height and weight rather than the use of questioning. Furthermore, comorbid conditions such as obesity and gastroesophageal reflux disease did not differ—leading to more homogeneity—among the groups. The limitations of the study were the small sample size, the differences in gestational age, and the relative contraindication of performing challenge tests during pregnancy.

Dyspnea, as a common symptom in pregnancy, requires investigation because untreated or undertreated asthma is associated with adverse pregnancy outcomes.

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Conflict of interest

The authors have no conflicts of interest.

References


