



A COMPARATIVE STUDY OF CLINICAL FEATURES AND TREATMENT OUTCOMES IN PREGNANT AND NON PREGNANT FEMALE HAVING BRONCHIAL ASTHMA

Respiratory Medicine

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ABSTRACT

Background: Asthma is the most common potentially serious medical condition complicating 4-8% of the pregnancies. The goals of effective asthma management in pregnancy are to maintain the best possible asthma control and prevent exacerbations. **Objectives:** To compare difference in clinical features between pregnant and non-pregnant females having bronchial asthma. To study the treatment given in pregnant and non-pregnant females having bronchial asthma. To compare the treatment outcome between pregnant and non-pregnant females having bronchial asthma. **Material and Methods:** This Prospective cohort study included 35 pregnant and 35 non-pregnant females (total 70) diagnosed with bronchial asthma attending the OPD and indoor facility of Respiratory Medicine Department in tertiary care center, over the period of 15 months. **Results:** Out of 70 females most common symptoms is dyspnea followed by Cough, Rhinitis, Fever and Chest tightness in non-pregnant and pregnant females and there was significant statistical difference found between two groups ($p=0.02$). After giving treatment in 1st follow up symptoms were well controlled in 20 (57.14%) pregnant and 29 (82.86%) non pregnant female and there was statistical difference between the two groups ($p=0.018$). After 2nd follow up, symptoms were well controlled in 20 (57.15%) pregnant and 31 (88.57%) non pregnant there was statistical difference in control of symptoms between the two groups ($p=0.010$). **Conclusion:** Management of asthma in pregnancy does not significantly differ from management in non-pregnant. Inhaled Corticosteroids remain the cornerstone of treatment in both pregnant as well as non-pregnant females.

KEYWORDS

Bronchial Asthma, Clinical Features, Treatment outcomes

INTRODUCTION

According to Global Initiative for Asthma 'Asthma is a heterogeneous disease, usually characterized by chronic airway inflammation. It is defined by the history of respiratory symptoms such as wheeze, shortness of breath, chest tightness and cough that vary over time and in intensity, together with variable expiratory airflow limitation. About 300 million people around the world suffer from asthma and its number is rising. Global prevalence of asthma ranges from 1-18% of the population in different countries. Asthma is one of the common disease pregnant women experience. According to the American College of Allergy, Asthma & Immunology, it affects an estimated 8% of women during child bearing years. Asthma control often changes during pregnancy. Exacerbations are common in pregnancy, particularly in the second trimester. The goals of effective asthma management in pregnancy are to maintain the best possible asthma control and prevent exacerbations.

METHODOLOGY

Prospective cohort study carried out in Ward and OPD of Department of Respiratory Medicine, SMIMER hospital, Surat. Study will be conducted over a period of 15 months and data analysis will be conducted over a period of 3 months. Sample size was 70. Cases of non-pregnant and pregnant females having bronchial asthma as attending the department during the study period will be selected by adhering to the inclusion and exclusion criteria.

Inclusion Criteria:

Patients giving consent for the study. Adult non-pregnant females having bronchial asthma between age group of 19-35 years. Adult females who are pregnant and Having bronchial asthma between the age of 19-35 years up to 6 months of their pregnancy. Exclusion Criteria: Patients not giving consent for the study. Patients below the age of 19 years. Patients with 'high-risk' pregnancy and having more than 6 months of pregnancy.

Data Collection:

Informed written consent is obtained from patients coming to the department of Respiratory Medicine. The study included 35 pregnant and 35 non-pregnant females diagnose with bronchial asthma attending the OPD and indoor facility of Respiratory Medicine Department. Spirometry and PEFr were measured at the time of visit. Parameters like clinical symptoms per week, night time

awakening were evaluated and patients were classified according to asthma severity in both pregnant and non-pregnant females. A comparison was done between two groups. The patients were continued/started with treatment accordingly and/or hospitalized if required. Patients were followed up after 2 and 4 weeks and symptom control, PFT and PEFr were measured on follow up. Treatment was continued or stepped up as per requirement. Data was collected using predesigned structured performa to enter respiratory system examination, spirometry findings and peak expiratory flow rate measurement and physical examination of patients. Response to treatment was during follow up measured by: Improvement in clinical symptoms, Spirometry and PEFr readings.

RESULTS

Total 70 patients included in this study among of them 35 pregnant and 35 non pregnant. The mean age group was 26.51 years.

Out of 70 females most common symptoms among pregnant and non-pregnant female is dyspnea, 68.57% of non-pregnant and 88.57% of pregnant female had dyspnoea. Cough was present in 29 (82.26%) non-pregnant and 23 (65.71%) pregnant females. Rhinitis was present in 13 (37.14%) non-pregnant and 20 (57.14%) pregnant females. Fever was present in 07 (20%) non-pregnant and 13 (37.14%) pregnant females. Chest tightness was present in 19 (54.29%) non-pregnant and 28 (80%) pregnant females and there was significant statistical difference found between two groups ($p=0.02$).

Majority of patients having 14% reversibility i.e. 23 (32.86%) females. In pregnant females 7 (20%) had reversibility of 13% and 14% in each groups. And in non pregnant females, 16 (45.71%) had 14% reversibility while 8 (22.86%) had reversibility of 13%.

In this study, 80% of non-pregnant females show mild obstruction whereas 20% show moderate obstruction. In pregnant females, 51.43% show mild obstruction while 48.57% show moderate obstruction. The difference between grade of obstruction between the two study groups was statistically significant ($p=0.011$).

Mean number of symptoms per week in non-pregnant was 2.57 and in pregnant was 3.86. The difference between mean number of symptoms per week between two groups was statistically significant ($p=0.01$).

Majority i.e. 16 (45.71%) of pregnant females had night time awakening of 7-15 in last one month and only 7(20%) of non-pregnant females had night time awakening of 7-15. More than 15 times awakening was seen in 4(11.43%) in pregnant compared to 1 (2.86%) in non-pregnant females. Mean number of night awakening of non-pregnant was 5.23 with 4.36 SD and in pregnant participants was 7.34 with 5.09 SD. The difference between both the groups was statistically significant ($p=0.032$).

Wheeze was the most common auscultatory finding in pregnant females found in 77.14% followed by crepitation heard in 37.14% of the patients.

Out of them 12 had RR of 22/min followed by 10 patients having rate of 20/min whereas in 13 non-pregnant females had RR of 18/min followed by 20/min in 10 patients.

Mean SPO2 of non-pregnant and pregnant participants was 97.17% and 96.46% with respectively. The difference between mean SPO2 between two groups was statistically significant ($p=0.015$).

The mean PEFR% predictable of non-pregnant was 79.54% and in pregnant participants was 76.46%. The mean PEFR% variability of non-pregnant was 22.11% and of pregnant was 25.26% respectively.

The mean FEV1 among pregnant females was 76.26 with in non pregnant was 78.71. Mean FVC% in pregnant was 111 and among non-pregnant was 112.31. Mean FEV1/FVC in pregnant was 68.11 with and among non-pregnant was 69.49 with a. 15 patients had FEV1/FVC ≥ 70 in pregnant group whereas 25 females had FEV1/FVC ≥ 70 in non-pregnant group.

Among pregnant females, 17 (48.57%) had moderate persistent, 10 (28.57%) had mild persistent and 08 (22.86%) had intermittent asthma respectively compared to non-pregnant females where 07(20%) had moderate persistent, 16 (45.71%) had mild persistent and 12 (34.29%) had intermittent asthma. The difference between the two groups was statistically significant ($p=0.046$).

In pregnant females, 34.29% required SABA, 85.71% LABA, 51.43% low dose ICS, 28.57% medium dose ICS, 20% high dose ICS, 40% nebulization & 11.43% required oral steroids. 100% of pregnant females were given ICS whereas in non-pregnant females, 88.57% females required ICS. Oral steroids were given in 11.43% pregnant females and 17.14% non-pregnant females. There was a significant statistical difference between two groups in treatment of SABA/ICS.

Among indoor females Nebulization, Injectable steroids, Injectable methylxanthine, Oxygen support, NIV was required in 19(54.3%), 10 (28.6%), 11 (31.4%), 03(8.6%) and 2 (5.7%) pregnant females respectively. NIV was required in 5.71% in pregnant females and 2.86% in non-pregnant females. Oxygen support was required in 8.57% in pregnant and 5.71% non-pregnant females.

Table 7 shows parameters after 1st follow up.

Parameters	Non-Pregnant (n=35)	Pregnant (n=35)	Total (n=70)	p-value
• Symptom control				
• Partially controlled	06(17.14%)	15(42.86%)	21 (30%)	0.018
• Well-controlled	29(82.86%)	20(57.14%)	49 (70%)	
• Asthma severity grade				
Intermittent	12(34.29%)	7 (20%)	19(27.14%)	0.028
• Mild persistent	18(51.43%)	13(37.14%)	31(44.29%)	
• Moderate persistent	5(14.29%)	15(42.86%)	20(28.57%)	
Change in FEV1	79.39 $\pm$ 7.18	75.83 $\pm$ 7.35	77.60 $\pm$ 7.43	0.045
• PEFR% Variability	22.43 $\pm$ 7.74	25.35 $\pm$ 7.75	23.90 $\pm$ 7.83	0.117

Above table shows that after 1st follow-up, symptoms were well controlled in 57.14% pregnant and 29(82.86%) non pregnant females; partially controlled in 15(42.86%) pregnant and 06 non-pregnant and there was statistical difference between the groups. 15 (42.86%) pregnant females had moderate persistent asthma after 1st follow up as compared to 5(14.29%) in non-pregnant. There was significant change in FEV1 between two groups after 1st follow up ($p=0.04$).

Table 8 shows parameters after 2nd follow-up.

Parameters	Non-Pregnant (n=35)	Pregnant (n=35)	Total (n=70)	p-value
• Symptom control				
• Not controlled	00(0.0)	02(5.71%)	02(2.85)	0.010
• Partially Controlled	04(11.43%)	13(37.14%)	17(24.29%)	
• Well-controlled	31(88.57%)	20(57.15%)	51(72.86%)	
• Asthma severity grade				
• Intermittent	11(31.43%)	06(17.14%)	17(24.29%)	0.027
• Mild persistent	20(57.14%)	14 (40%)	34(48.57%)	
• Moderate Persistent	03(8.57%)	13(37.14%)	16(22.86%)	
Severe	01(2.86%)	02(5.71%)	03(4.28%)	
Change in FEV1	79.00 $\pm$ 8.53	72.34 $\pm$ 14.46	75.67 $\pm$ 12.25	0.022
• PEFR% Variability	22.43 $\pm$ 8.49	29.09 $\pm$ 14.30	25.76 $\pm$ 12.15	0.021

Above table shows that after 2nd follow-up, symptoms were well controlled in 20(57.15%) pregnant and 31(88.57%) non pregnant; partially controlled in 13(37.14%) pregnant and 04(11.43%) non-pregnant; uncontrolled in 5.71% pregnant females; there was statistical difference in control of symptoms between the two groups ($p=0.010$). 13 (37.14%) pregnant females had moderate persistent asthma after 2nd follow up as compared to 3 (8.57%) in non-pregnant. 2 patients in pregnant group progressed to severe asthma.

There was significant change in FEV1 and PEFR variability between two groups after 2nd follow up. ($p=0.02$ & $p=0.021$ respectively).

DISCUSSION

Asthma is an important chronic disorder of the airways with significant morbidity and mortality. In the present study, the mean age of non-pregnant and pregnant participants was 26.51 years and 26.34 years respectively. In the study done by Cydulka RK et al - *Acute asthma among pregnant women presenting to emergency department* the mean age of pregnant and non-pregnant was 26 $\pm$ 5 years and 29 $\pm$ 7 years respectively.

Dyspnoea was the most common clinical feature/symptom experienced by pregnant females present in 88.57% followed by chest tightness in 80%. Dyspnoea and chest tightness were present in 68.57% and 54.29% non-pregnant females respectively. Thus symptoms were more aggravated in pregnant females as compared to non-pregnant.

In the present study, the mean Respiratory Rate of non-pregnant and pregnant participants was 19.8/min and 20.6/min respectively. The difference between mean RR was statistically not significant. In a study done by Cydulka RK et al^[iii] the Mean RR among pregnant and non-pregnant women with asthma was 25 and 24 respectively. In the present study, the mean SPO2 of non-pregnant and pregnant participants was 97.17% and 96.46% respectively. The difference between mean SPO2 was statistically significant. In a study done by Cydulka RK et al^[iii] Mean SpO2 was the same (97) among pregnant and non-pregnant women.

In the present study, the mean PEFR% predictable of non-pregnant and pregnant participants was 79.5% and 76.5% respectively. The difference between mean PEFR% predictable was statistically not significant.

Our findings are in the agreement with a study done by *Cydulka RK et al*, Mean PEFR predictable (%) among pregnant and non-pregnant women with asthma was 51 and 53 respectively and the difference is not statistically significant. In the present study, The mean PEFR% variability of non-pregnant and pregnant participants was 22.11 % and 25.2% respectively. The difference between mean PEFR% variability was statistically not significant ($p > 0.05$). Our findings are in the agreement with a study done by *Cydulka RK et al*, Mean PEFR variability (%) among pregnant and non-pregnant women with asthma was 21 and 53 respectively and the difference is not statistically significant.

In present study, 48.57% pregnant and 20% non-pregnant females had moderate grade of obstruction and 51.43% pregnant females and 20% non-pregnant females had mild grade of obstruction.

In the present study, the mean FEV1, FVC, and FEV1/FVC ratio was not significantly different between pregnant and non-pregnant women. In contrast to the present study, Batool S et al demonstrated a significant decrease in FEV1, FVC ($P = 0.002$), FEV1/FVC ratio between the pregnant women and control group.

In present study, among pregnant females, 48.57% had moderate persistent, 28.57% had mild persistent and 22.86% had intermittent asthma. Among non-pregnant females, 20% had moderate persistent, 45.71% had mild persistent and 34.29% had intermittent asthma. In study conducted by *Jennifer W McCallister*, 52.1% pregnant females had moderate persistent asthma and 31.1% had mild persistent asthma and 16.8% had severe asthma which was similar to our study. While among non-pregnant, 18.7% had mild persistent, 61% had moderate persistent and 20% had severe asthma. The difference between two studies is due to less sample size in our study and non-consideration of severe asthma on initial presentation.

In the present study, 11.4% of participants of the non-pregnant group and 31.4% of the pregnant group needed hospitalization. Pregnant women need more frequent hospitalization as compared to non-pregnant. In a review of eight prospective cohorts by *Murphy V E et al*, the median percentage of women hospitalized for asthma during pregnancy was 5.8% (2.4–8.2% interquartile range).

The drug treatment of asthma in pregnancy is similar to the treatment of asthma in non-pregnant women, with a short-acting symptom reliever medication and long-term daily medication to address the underlying inflammation. In the present study, the use of nebulization was not significantly differed between the pregnant and non-pregnant groups either in OPD or during hospitalization. Similar findings are shown by *McCallister JW et al* where the use of nebulization with a bronchodilator in the emergency department between pregnant and non-pregnant was not significantly different.

In the present study use of injectable steroids in pregnant and non-pregnant females during hospitalization was 28.58% vs 11.43%. In the study done by *McCallister JW et al* the use of systemic corticosteroids was significantly high among non-pregnant as compared to pregnant women.

In the present study, symptoms were significantly well-controlled among non-pregnant as compared to pregnant at second-week follow-up. Severity grade significantly gets milder in non-pregnant as compared to pregnant at two-week follow-up. In a study done by *Cydulka et al*, relapse was not significantly different between pregnant and non-pregnant women at two weeks follow up. The course of asthma in pregnancy is unpredictable, *Schatz M et al* suggest that about 1/3rd have an exacerbation, 1/3rd improve and rest of 1/3rd show no change in symptom. *Schatz M et al* suggest that about 1/3rd have an exacerbation, 1/3rd improve and rest of 1/3rd show no change in symptom.

CONCLUSION

Bronchial asthma is a major non-communicable obstructive air way disease resulting in significant morbidity and its prevalence is increasing worldwide. Asthma is a common medical problem during pregnancy. Exacerbations in asthma can increase the risk of poor maternal and fetal outcomes during pregnancy. Symptoms may aggravate in pregnancy as compared to the non-pregnant state.³

Management of asthma in pregnancy does not significantly differ from

management in non-pregnant. Although there is a general concern about use of any medication in pregnancy, the advantages of actively treating the asthma in pregnancy markedly outweigh any potential risks of usual medications. Inhaled Corticosteroids remain the cornerstone of treatment in both pregnant as well as non-pregnant females.

The goals of effective asthma management are to maintain best possible control and prevent exacerbations.

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