



IMPACT OF SMOKING ON TREATMENT OUTCOME IN PATIENTS OF BRONCHIAL ASTHMA

Pulmonary Medicine

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ABSTRACT

Introduction: 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 intensity, together with variable expiratory airflow limitation.^[1] Smoking is one of the most important preventable public health problems..Asthma and cigarette smoking interact to cause more severe symptoms and accelerated decline in lung function and impaired short term therapeutic response to corticosteroids. Aims And of the study was to determine incidence of smoking in asthma patients and smoking on lung function in bronchial asthma patients and To study the outcome on follow up. **Materials And Methods:** A total of 120 bronchial asthma patients attending the outpatient and indoor (general ward and Respiratory ICU) of the Department of Pulmonary Medicine, Internal Medicine and its allied specialities, Gauhati Medical College and Hospital, Guwahati, were included in the study. Out of 120 patients, 19 patients did not come for follow-up, hence purposive sampling was done among the remaining 101 patients. **Results:** Out of 101 bronchial asthma patients, majority of the patients 62 (61.4%) were never smokers, whereas 21 (20.8%) were former smokers and 18 (17.8%) were current smokers. Out of 62 never smokers, majority 46 (74.2%) had controlled asthma while 16 (25.8%) had uncontrolled asthma; out of 21 former smokers, 11 (52.4%) had controlled asthma while 10 (47.6%) had uncontrolled asthma; and out of 18 current smokers, 9 (50%) had controlled asthma while the remaining 9 (50%) had uncontrolled asthma. Spirometry values were found lower among current smokers and former smokers as compared with never smokers. Out of 35 uncontrolled asthmatics, 13 (37.14%) required ICU admissions whereas 22 (62.86%) were admitted in ward. Out of 13 uncontrolled asthmatic smokers that were admitted in ICU, majority of cases 7 (53.85%) died while 6 (46.15%) survived. **Conclusion:** From the present study, it was found that cigarette smoking leads to worse asthma outcomes among current smokers as compared to never smokers. There is increased rates of exacerbations, hospitalizations, intensive care unit admissions and deaths among current smokers and former smokers as compared to never smokers.

KEYWORDS

ACQ- ASTHMA CONTROL QUESTIONNAIRE, ACT- ASTHMA CONTROL TEST

INTRODUCTION

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 intensity, together with variable expiratory airflow limitation.^[1] Airflow limitation may later become persistent. Smoking is surprisingly frequent in asthma patients, with a prevalence relatively close to that found in the general population.^[2,3] Cigarette smoke may affect airway function in different ways due to its toxic and proinflammatory effects.^[3,4]

Recognition of an "asthma smoking phenotype" has important implications for research designed to understand mechanisms of disease and management of this sub-group of asthma. The mechanisms of corticosteroid resistance in asthmatic smokers are as a result of alterations in airway inflammatory cell phenotypes (e.g. increased neutrophils or reduced eosinophils), changes in the glucocorticoid receptor- α to - β ratio (e.g. over expression of glucocorticoid receptor β), and increased activation of pro-inflammatory transcription factors (e.g. nuclear factor- κ B) or reduced histone deacetylase activity.^[8,9]

All patients with age more than 18 years who presented to Department of Pulmonary Medicine, Internal Medicine and its allied specialities with respiratory symptoms suggestive of Bronchial asthma.

MATERIALS AND METHOD

A total of 120 bronchial asthma patients attending the outpatient and indoor (general ward and Respiratory ICU) of the Department of Pulmonary Medicine, Internal Medicine and its allied specialities, Gauhati Medical College and Hospital, Guwahati, were included in the study. Out of 120 patients, 19 patients did not come for follow-up, hence purposive sampling was done among the remaining 101 patients.

It is a hospital based prospective study.

The study was carried out for one year from 1st August 2021 to 31st July 2022.

This is a prospective study involving 101 patients after the application of inclusion and exclusion criteria. All these 120 patients were advised for follow up after 90 days after the first visit in the hospital.. Out of 120 patients, 19 patients did not attend the hospital for follow-up. Hence, assessment could be done only among the rest 101 follow-up patients.

The bronchial asthma patients were classified into controlled and uncontrolled groups according to the Asthma Control Questionnaire (ACQ) 191. Controlled or partially controlled asthma was defined as an ACQ score < 1.5 , and uncontrolled asthma was defined as a score > 1.5 .^[10,11]

ASTHMA CONTROL QUESTIONNAIRE 121: It's a simple questionnaire to measure the adequacy of asthma control and change in asthma control which occurs either spontaneously or as a result of treatment. Scores range from 0-6 (higher is worse).

In the past 4 weeks, has the patient had
Daytime asthma symptoms more than twice/week?
Any night waking due to asthma?
SABA reliever for symptoms more than twice/week?
any activity limitation due to asthma

The ACQ score is the average of 5,6 or 7 items: all versions include five symptom questions, ACQ-6 includes SABA reliever use; ACQ-7, pre-bronchodilator FEV₁. ACQ < 0.75 indicated a high probability that asthma was well-controlled; 0.75-1.5 as a 'grey zone' and ≥ 1.5 a high probability that asthma was poorly controlled. The minimum clinical difference for all three versions is 0.5.

ASTHMA CONTROL TEST: Scores range from 5-25. Scores of 20-25 are classified as well-controlled; 16-19 as not well-controlled and 5-

15 as very poorly controlled asthma. The ACT has four symptom/reliever questions plus patient self-assessed control. The minimum clinical important difference is 3 points^[13].

RESULTS AND OBSERVATIONS

All these 120 patients were advised for follow up after 90 days after the first visit in the hospital. Their clinical status and treatment outcomes were evaluated in successive visits or admissions into the hospital. Hence, assessment could be done only among the rest 101 follow-up patients. partially controlled asthma was defined as an ACQ score <1.5, and uncontrolled asthma was defined as a score > 1.5^[13]

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Table 1: GENDER WISE DISTRIBUTION OF CASES

GENDER	NUMBER OF CASES	PERCENTAGE
MALE	43	42.5%
FEMALE	58	57.5%
TOTAL	101	100%

In the present study, out of a total of 101 patients, 43 patients (42.5%) were males and 58 patients (57.5%) were females. The male to female ratio was 1:1.4.

Table 2: AGE WISE DISTRIBUTION OF CASES

AGE GROUP IN YEARS	NUMBER OF CASES	PERCENTAGE
<35	23	22.8%
35-44	28	27.7%
45-54	28	27.7%
55-64	11	10.9%
>65	11	10.9%
TOTAL	101	100%

In this present study, out of 101 patients, 23 patients (22.8%) were found to be in the age group of <35 years, 28 patients (27.7%) were in the age group of 35-44 years, 28 patients (27.7%) were in the age group of 45-54 years, 11 patients (10.9%) were in the age group of 55-64 years and 11 patients (10.9%) were in the age group of >65 years

Table 3: SMOKING HISTORY OF FOLLOWED-UP PATIENTS

SMOKING HISTORY	NUMBER OF CASES	PERCENTAGE
NEVER SMOKER	62	61.4%
FORMER SMOKER	21	20.8%
CURRENT SMOKER	18	17.8%
TOTAL	101	100%

SMOKING HISTORY

In the present study, out of 101 follow-up patients, maximum cases, 62 patients (61.4%) were never smokers whereas 21 patients (20.8%) were former smokers and 18 patients (17.8%) patients were current smokers.

TABLE 4 TABLE SHOWING TREATMENT OUTCOME AFTER 90 DAYS OF FOLLOW-UP

OUTCOME	NUMBER OF CASES	PERCENTAGE
CONTROLLED	66	65.35%
UNCONTROLLED	35	34.65%
TOTAL	101	100%

In the present study, out of 101 patients that came for follow-up, 66 patients (65.35%) were found to have controlled asthma whereas 35 patients (34.65%) were found to have uncontrolled asthma

Table 5: SMOKING HISTORY AND TREATMENT OUTCOME

	CONTROLLED	UNCONTROLLED	TOTAL
NEVER SMOKER	46 (74.2%)	16 (25.8%)	62
FORMER SMOKER	11 (52.4%)	10 (47.6%)	21
CURRENT SMOKER	9 (50%)	9 (50%)	18
TOTAL	66	35	101

In the present study, it was found that out of 62 never smokers, 46 patients (74.2%) had controlled asthma while 16 patients (25.8%) had uncontrolled asthma; out of 21 former smokers, 11 patients (52.4%) had controlled asthma while 10 patients (47.6%) had uncontrolled asthma; and out of 18 current smokers, 9 patients (50%) had controlled asthma while the remaining 9 patients (50%) had uncontrolled asthma.

TABLE 6: DYSPNEA AMONG SMOKERS

	DYSPNEA	NO DYSPNEA	TOTAL
CURRENT SMOKERS	13 (72.2%)	5 (27.8%)	18
FORMER SMOKERS	17 (80.95%)	4 (19.05%)	21
NEVER SMOKERS	25 (40.32%)	37 (59.68%)	62
TOTAL	55	46	101

In the present study, out of 18 current smokers, 13 patients (72.2%) had history of dyspnea while 5 patients (27.8%) did not have dyspnea. Out of 21 former smokers, 17 patients (80.95%) had history of dyspnea while 4 patients (19.05%) did not have dyspnea. On the other hand, out of 62 never smokers, 25 patients (40.32%) had history of dyspnea while 37 patients (59.68%) did not have history of dyspnea.

Table 7: SMOKING STATUS AND EXACERBATION HISTORY

	EXACERBATION	NO EXACERBATION	TOTAL
CURRENT SMOKERS	13 (72.2%)	5 (27.8%)	18
FORMER SMOKERS	17 (80.95%)	4 (19.05%)	21
NEVER SMOKERS	20 (32.26%)	42 (67.74%)	62
TOTAL	50	51	101

In the present study, out of 18 current smokers, 13 patients (72.2%) had history of exacerbation while 5 patients (27.8%) did not have exacerbation. Out of 21 former smokers, 17 patients (80.95%) had history of exacerbation while 4 patients (19.05%) did not have exacerbation. On the other hand, out of 62 never smokers, 20 patients (32.26%) had history of exacerbation while 42 patients (67.74%) did not have history of exacerbation.

Table 8: SMOKING STATUS AND HOSPITALIZATION HISTORY

	HOSPITALIZATION	NO HOSPITALIZATION	TOTAL
CURRENT SMOKERS	13 (72.2%)	5 (27.8%)	18
FORMER SMOKERS	17 (80.95%)	4 (19.05%)	21
NEVER SMOKERS	20 (32.26%)	42 (67.74%)	62
TOTAL	50	51	101

In the present study, out of 18 current smokers, 13 patients (72.2%) required hospitalization while 5 patients (27.8%) did not require hospitalization. Out of 21 former smokers, 17 patients (80.95%) required hospitalization while 4 patients (19.05%) did not require hospitalization. On the other hand, out of 62 never smokers, 20 patients (32.26%) required hospitalization while 42 patients (67.74%) did not require hospitalization

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Table 9 SMOKING STATUS AND LUNG FUNCTION TEST

	NEVER SMOKER	FORMER SMOKER	CURRENT SMOKER
FVC (L)	3.8±1.1	3.9±1.1	3.5±1.2
FVC (%P)	108±17	100±22	100±22
FEV1 (L)	2.7±0.7	2.5±0.7	2.3±1.1
FEV1 (%P)	91±19	83±17	77±22
FEV1/FVC (%)	71±10	67±10	64±12

In the present study, the mean FVC (L) values among never smokers, former smokers and current smokers were found to be 3.8±1.1, 3.9±1.1 and 3.5±1.2 respectively. FVC (%P) were 108±17, 100±22 and 100±22. FEV1 (L) were 2.7±0.7, 2.5±0.7 and 2.3±1.1 respectively. FEV1 (%P) were 91±19, 83±17 and 77±22. FEV1/FVC (%) were 71±10, 67±10 and 64±12 among never smokers, former smokers and current smokers

TABLE 10: ICU ADMISSIONS AMONG UNCONTROLLED ASTHMATICS IN RELATION WITH SMOKING STATUS

	ICU	WARD	TOTAL
UNCONTROLLED ASTHMATIC CURRENT SMOKERS	9 (69.2%)	0	9
UNCONTROLLED ASTHMATIC FORMER SMOKERS	4 (30.8%)	6 (27.3%)	10
UNCONTROLLED ASTHMATIC NEVER SMOKERS	0	16 (72.7%)	16
TOTAL	13	22	35

In the present study, it was found that, out of 13 uncontrolled asthmatics that were admitted in ICU, 9 patients (69.2%) were current smokers, 4 patients (30.8%) were former smokers and none were never smokers. On the other hand, out of 22 uncontrolled asthmatics that were admitted in ward, 6 patients (27.3%) were former smokers, 16 patients (72.7%) were never smokers and none were current smokers.

Table 11: TREATMENT GINA STEPS AMONG SMOKING INDIVIDUALS AND THEIR OUTCOMES

STEPS	SMOKERS	CONTROLLED	UNCONTROLLED
GINA 1	11 (28.2%)	9 (81.8%)	2 (18.2%)
GINA 2	9 (23.1%)	5 (55.6%)	4 (44.4%)
GINA 3	11 (28.2%)	7 (63.6%)	4 (36.4%)
GINA 4	3 (7.7%)	1 (33.3%)	2 (66.7%)
GINA 5	5 (12.8%)	2 (40%)	3 (60%)

In the present study, it was found that GINA Step 1 treatment was received by a total of 11 smokers (28.2%); out of which, 9 patients (81.8%) had controlled asthma while 2 patients (18.2%) had uncontrolled asthma. GINA Step 2 treatment was received by 9 smokers (23.1%); out of which, 5 patients (55.6%) had controlled asthma while 4 patients (44.4%) had uncontrolled asthma. GINA Step 3 treatment was received by 11 smokers (28.2%), out of which, 7 patients (63.6%) had controlled asthma while 4 patients (36.4%) had uncontrolled asthma. GINA Step 4 treatment was received by 3 smokers (7.7%), out of which, 1 patient (33.3%) had controlled asthma while 2 patients (66.7%) had uncontrolled asthma. GINA Step 5 treatment was received by 5 smokers (12.8%), out of which, 2 patients (40%) had controlled asthma while 3 patients (60%) had uncontrolled asthma

Table 12: INCIDENCE OF DEATH IN ICU AMONG UNCONTROLLED ASTHMATIC SMOKERS

OUTCOME IN ICU	NUMBER	PERCENTAGE
DEATH	7	53.85%
ALIVE	6	46.15%
TOTAL	13	100%

In the present study, out of 13 uncontrolled asthmatic smokers that were admitted in ICU, 6 patients (46.15%) survived while 7 patients (53.85%) died.

DISCUSSION

In the present study, out of a total of 101 patients, 43 patients (42.5%) were males and 58 patients (57.5%) were females. The male to female

ratio was 1:1.4. In a prospective observational study done by Angelica et al (2021), out of a total of 176 patients, 72 patients (41%) were males and 104 patients (59%) were females. In the present study, the age of the study population ranged from 27 years to 72 years and the mean age was 46.3±12.06 years. Out of 101 follow-up patients, 62 patients (61.4%) were never smokers whereas 21 patients (20.8%) were former smokers and 18 patients (17.8%) patients were current smokers. Tommola et al [16] (2016) in their study showed that out of 203 patients, 96 (47.3%) were never smokers, 77 (37.9%) were former smokers and 30 (14.8%) were current smokers. In the present study, out of 18 current smokers, 13 patients (72.2%) had history of dyspnea and out of 21 former smokers, 17 patients (80.95%) had history of dyspnea. On the other hand, out of 62 never smokers, 25 patients (40.32%) had history of dyspnea. In a study by Angelica et al (2021), out of 48 current smokers, 22 patients (46%) had history of dyspnea while out of 90 never smokers, 34 patients (38%) had history of dyspnea. In the present study, out of 101 patients that came for follow-up, 66 patients (65.35%) were found to have controlled asthma whereas 35 patients (34.65%) were found to have uncontrolled asthma. Similar findings were found in a study done by Angelica et al (2021) which showed that out of 176 patients, 107 patients (61%) had controlled asthma and 69 patients (39%) had uncontrolled asthma. In the present study, out of 18 current smokers, 13 patients (72.2%) had history of exacerbation and out of 21 former smokers, 17 patients (80.95%) had history of exacerbation and out of 62 never smokers, 20 patients (32.26%) had history of exacerbation. In a study done by Marincu et al (2015), out of 126 smokers, exacerbations were found in 74 (58.73%) of patients while 26 patients (41.27%) did not have exacerbation. In the present study, it was found that out of 62 never smokers, 46 patients (74.2%) had controlled asthma while 16 patients (25.8%) had uncontrolled asthma; out of 21 former smokers, 11 patients (52.4%) had controlled asthma while 10 patients (47.6%) had uncontrolled asthma; and out of 18 current smokers, 9 patients (50%) had controlled asthma while the remaining 9 patients (50%) had uncontrolled asthma. In a study done by Angelica et al (2021), out of 90 never smokers, 66 patients (73.3%) had controlled asthma while 24 patients (26.7%) had uncontrolled asthma; out of 38 former smokers, 21 patients (55.3%) had controlled asthma while 17 patients (44.7%) had uncontrolled asthma; and out of 48 current smokers, 13 patients (27.1%) required hospitalization while 5 patients (10.4%) did not require hospitalization. Out of 21 former smokers, 17 patients (80.95%) required hospitalization and out of 62 never smokers, 20 patients (32.26%) required hospitalization. In the present study, the mean FVC (L) and FEV1/FVC values were compared and found to be less in the current and former smoker than never smokers. Similar results were found by Angelica et al (2021). Out of 13 uncontrolled asthmatics that were admitted in ICU, 9 patients (69.2%) were current smokers, 4 patients (30.8%) were former smokers and none were never smokers. On the other hand, out of 22 uncontrolled asthmatics that were admitted in ward, 6 patients (27.3%) were former smokers, 16 patients (72.7%) were never smokers and none were current smokers. Thus clinical presentation is more serious in patients with smoking history. Similar observation was found by Liu et al (2021) in their study which showed smoking association with increased ICU admissions among asthmatics.

CONCLUSION

From the present study, it was found that cigarette smoking leads to worse asthma outcomes among current smokers as compared to never smokers. There is increased rates of exacerbations, hospitalizations, intensive care unit admissions and deaths among current smokers and former smokers as compared to never smokers.

Smoking cessation is associated with improvements in asthma symptoms, bronchial hyperresponsiveness and lung function quality of life scores.

The study concluded that effective measures should be taken to quit smoking among asthma patients to prevent hazardous effect. Health care personnel, thus, should promote smoking cessation among adults and adolescents and practice healthy lifestyle in order to decrease morbidity and mortality among asthma patients.

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