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Systematic approach in diagnosis, management and prevention of bronchial asthma.

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ABSTRACT:

Background: Bronchial asthma is a serious public health problem throughout the world. The main feature of asthma is episodic airway obstruction. In India, as there are poor medical facilities or infrastructure, overcrowded hospitals where management to control asthma

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becomes very difficult. In this study an, attempt is made to study and implement these components of GINA, systematically in management of bronchial asthma.

Methodology: This study was conducted on 50 patients more than age 18 years with Asthma. Patients with breathlessness who showed FEV1 reversibility were enrolled in the study. Each patient on baseline visit, one month after baseline visit, and at three months after baseline visit underwent SPIROMETRY AND PEFR test. All patients assessed for asthma as per GINA guidelines and categorised as uncontrolled, partially controlled and controlled. Patients who were in category uncontrolled as per GINA, treated with oral tablet.

Results: Mean age was 37.70±9.40 years. 10(20%) patients were patients with controlled asthma, 30(60%) patients were partially controlled. 10(20%) patients were uncontrolled. Out of 10 uncontrolled patients 7(70%) patients became partially controlled and 3 patients remained as uncontrolled. At second visit, out of 10 uncontrolled patients, 7 patients (70%) become partially controlled, 2 (20%) patients become controlled and only one patient (10%) remained as uncontrolled (Chi Square test P=0.0000, Significant). Mean FEV1 was 73.94 % at baseline visit. On visit 1, it increased significantly by 4.2% from baseline visit**.** On visit 2, it increased significantly by 6.8% from baseline visit. The Mean PEFR was 241.40 L/min at baseline visit. On visit 1, it increased significantly by 6.5% from baseline visit**.** On visit 2 increased significantly by 13.5% from baseline visit. There were 13 smokers (26%) enrolled in this study,3 patients (23.1%) were controlled asthma,7 patients(53.8%) were partially controlled asthma and 3 patients (23.1%) were uncontrolled asthma. At the end of second visit 9 smokers (69.2%) were controlled, 4(30.8%) remained as partially controlled. None of smoker remained in uncontrolled group.

Conclusion: Obese patients after weight reduction, smokers after quitting smoking, patients had good control of asthma. URTI and change in weather are commonest risk factors for bronchial asthma. After following GINA guidelines in management of bronchial asthma FEV1 and PEFR showed significant improvement and good control of asthma in most of the patients. Systematic approach in Diagnosis, management and prevention as per GINA guidelines can improve morbidity, reduce exacerbation and give patients good quality of life.

Key Words: Bronchial Asthma, Spirometry, Peak expiratory flow rate (PEFR), Systematic Approach, Diagnosis, Management

INTRODUCTION:

Bronchial asthma is a serious public health problem throughout the world. WHO (World Health Organisation) estimates that 235 million people currently suffer from asthma. People of all ages in countries throughout the world are affected by this chronic airway disorder that, when uncontrolled, can place severe limits on daily life and is sometimes fatal[(1)]. The prevalence of asthma is increasing in most countries, especially among children.

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Asthma is a significant burden, not only in terms of health care costs but also of lost productivity and reduced participation in family life.

The main physiological feature of asthma is episodic airway obstruction characterised by expiratory outflow limitation and dominant pathological feature is airway inflammation[(2)]. Asthma attacks (or exacerbations) are episodic, but airway inflammation is chronically present. Despite the availability of effective medications and treatment strategies, many patients continue to report hospitalisations, missed school or work days, and suboptimal pharmacotherapy[(3)].

While early diagnosis of asthma and implementation of appropriate therapy significantly reduce the socioeconomic burdens of asthma and enhance patients' quality of life, medications continue to be the major component of the cost of asthma treatment[(4)]. The role of the health care professional is to establish each patient's current level of treatment and control, and then adjust treatment to gain and maintain control. Asthma patients should experience no or minimal symptoms (including at night), have no limitations on their activities (including physical exercise), have no (or minimal) requirement for rescue medications, have near normal lung function, and experience only very infrequent exacerbations.

In 2002, the GINA Report stated that "It is reasonable to expect that in most patients with asthma, control of the disease can, and should be achieved and maintained[(5)]." In India, where there are poor medical facilities, poor infrastructure, overcrowded hospitals or at hospitals where physicians are not available ,implementing GINA components for systematic management in diagnosis, assessment and management to control asthma becomes very difficult, and so as to achieve goals of asthma control[(6)].

In this study an, attempt is made to study and implement these components of GINA, systematically in management of bronchial asthma.

OBJECTIVES

1. To develop doctor- patient partnership and to identify and reduce exposure to risk factors.
2. To assess, treat, and monitor asthma and manage asthma exacerbations.

MATERIALS AND METHOD:

This study was conducted on 50 patients more than age 18 years with Asthma presenting to OPD or EMS in a tertiary care centre in Mumbai over period of 18 months. Patients with documented FEV1 reversibility included in study or new patients with

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breathlessness who showed FEV1 reversibility were enrolled in the study. Patients with comorbid conditions like COPD, ILD and pneumonia were excluded.

Detail history including age, sex, chief complains, duration, any precipitating factor, treatment received and occupation taken followed by detailed clinical examination and other causes of breathlessness were ruled out. FEV1 reversibility was documented. ECG and X RAY chest was done to rule out other causes. Each patient on baseline visit, one month after baseline visit, and at three months after baseline visit underwent SPIROMETRY AND PEFR test.

To develop doctor patient partnership

Each patient given written action plan, counselled about the disease, explained about dose and duration of drugs, explained about their risk factors and control measures to avoid risk factors, those who were smokers, explained about side effects of smoking and encouraged to quit smoking, those who were overweight explained about reducing weight, patient informed about when to contact doctor, signs and symptoms about impending respiratory failure, proper use of MDI and spacer taught to patient. On follow up visits after one month and at three months, FEV1 and PEFR measurements taken. At each visit patient counselled for disease.

To identify and reduce exposure to risk factor

Each patient evaluated for their risk factors and measures to control them were told and written on action plan. Smokers are encouraged to stop smoking. Obese patients encouraged to lose weight. Those having dust allergy asked to avoid exposure to dust.

To asses, treat and monitor asthma

All patients assessed for asthma as per GINA guidelines and categorised as uncontrolled, partially controlled and controlled. Patients who were in category uncontrolled as per GINA, treated with oral tablet. Predisolone30 MG Daily for 10 days and kept on maintenance therapy of 10 mg od and MDI of medium dose ICS plus LABA(Salmeterol 50 microgram plus Fluticasone propionate 250 microgram) 2 puffs twice a day, patients with partially controlled asthma treated with either medium or low dose inhaled steroid plus LABA (salmeterol 50 microgram + Fluticasone propionate 125 microgram(low dose) or 250 microgram(medium dose) And ,those who were controlled, treated with low dose ICS (Budesonide 200 microgram twice a day).

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Statistical analysis:

Data analysis done by statistical methods and using student 't' test and chi square test wherever applicable. The study findings are discussed taking in to consideration the materials, study design and results from other relevant studies were compared. Conclusions are made after completion of study.

RESULTS:

Table 1. Baseline Characteristics Profile of the Patients:

Baseline Characteristics		Number of cases (N=50)	Percentage of cases (%)
Age group (Yrs.)	≤ 30	13	26.0
	31-40	18	36.0
	41-50	14	28.0
	51-60	05	10.0
Sex	Male	22	44.0
	Female	28	56.0
Body Mass Index	< 25	32	64.0
	≥ 25	18	36.0
Smoking	Yes	13	26.0
	No	37	74.0

18 patients **(**36%) were between the age group 31-40 years. 14 patients (28%) were between age group 41-50 years. 13 patients (26%) were < 30 years. Mean age was 37.70±9.40 years ranging from 19-57 Years. 28 patients (56%) were female and 22 patients (44%) were male. 18 patients (36%) were having BMI of more than 25. 32 patients (64%) were having BMI of < 25. 13 patients (26%) patients were smokers in this study.

Fig 1. Profile of Risk Factors:

26 patients (52%) were having URTI as a commonest risk factor. 19 patients (38%) had Change in weather as a risk factor. 18 patients (36%) patients had exposure to dust as a risk factor. 36 Patients (72%) had two or more than two risk factors. 14 Patients (28%) had single risk factor.

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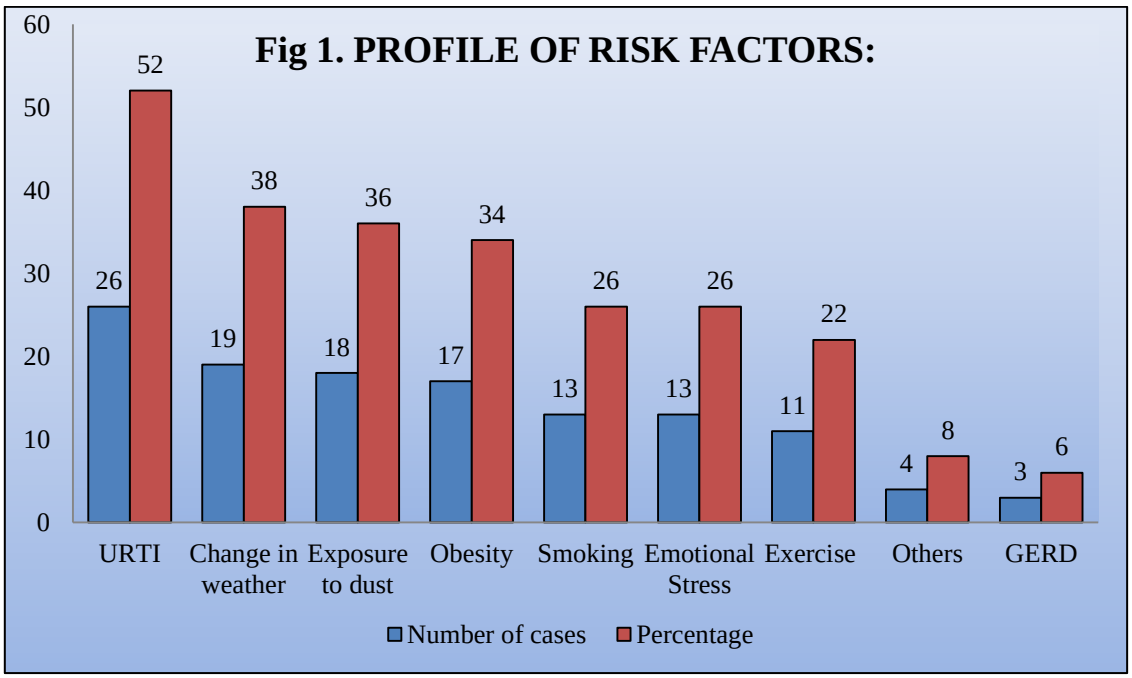
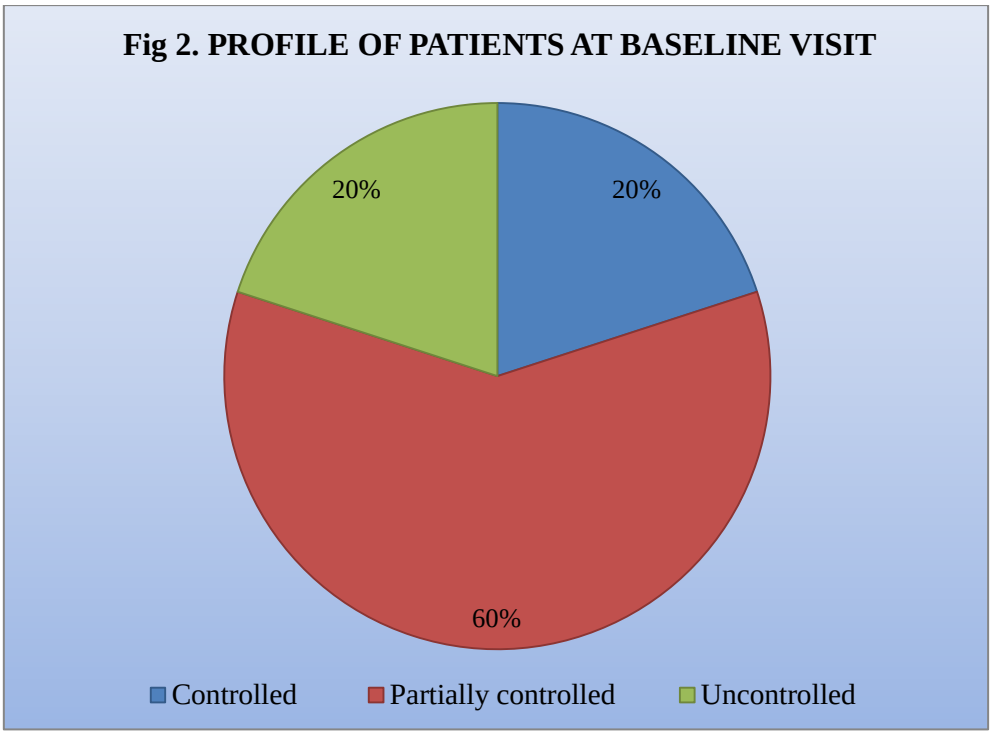


Profile of Patients at Baseline Visit:

10(20%) patients were controlled patients. 30(60%) patients were partially controlled. 10(20%) patients were uncontrolled.



Profile of Patients at First Visit:

At first visit out of 10 controlled asthma patients, 5 patients (50%) become partially controlled and 5 patients (50% remained as controlled asthma. Out of 30 partially controlled asthma patients, 25 patients (83.3%) became controlled and 5 patients (16.7%) remained as

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partially controlled asthma. Out of 10 uncontrolled patients 7(70%) patients became partially controlled and 3 patients remained as uncontrolled.

Table 2 –Profile of Patients at First Visit:

Profile of Patients		Controlled (N=10)	Partially controlled (N=30)	Uncontrolled (N=10)
At first visit	Controlled	05 (50%)	25 (83.3%)	-
	Partially controlled	05 (50%)	05 (16.7%)	07 (70%)
	Uncontrolled	-	-	03 (30%)
At second visit (at third month)	Controlled	09 (90%)	*28 (93.3%)	02 920%)
	Partially controlled	01 (10%)	02 (6.7%)	07 (70%)
	Uncontrolled	-	-	01 (10%)

At second visit, out of 10 controlled patients, 9 patients (90%) continued to have controlled asthma, whereas one patient (10%) became partially controlled. Out of 30 patients who were partially controlled, 28 patients (93.3%) became controlled and 2 patients (6.7%) remained as partially controlled. Out of 10 uncontrolled patients, 7 patients (70%) become partially controlled, 2 (20%) patients become controlled and only one patient (10%) remained as uncontrolled (Chi Square test P=0.0000, Significant).

Mean Change in FEV1 SCORE and PEFR:

Mean FEV1 was 73.94 % at baseline visit. On visit 1, mean FEV1 increased significantly by 4.2% from baseline visit**.** On visit 2, mean FEV1 increased significantly by 6.8% from baseline visit. The Mean PEFR was 241.40 L/min at baseline visit. On visit 1 Mean PEFR increased significantly by 6.5% from baseline visit**.** On visit 2 Mean of PEFR increased significantly by 13.5% from baseline visit.

Profile of Obese Patients at Second Visit:

There were 17 obese patients in this study group, 2 patients (11.76%) were controlled asthma, 13 patients (76.47%) were partially controlled asthma, and 2 patients (11.76) were uncontrolled asthma. On second visit at the end of third month, 15 patients (88.23%) out of 18 enrolled, became controlled; one patient (5.88%) remained partially controlled. One patient remained in uncontrolled asthma group (Chi square test p value 0.0000, significant).

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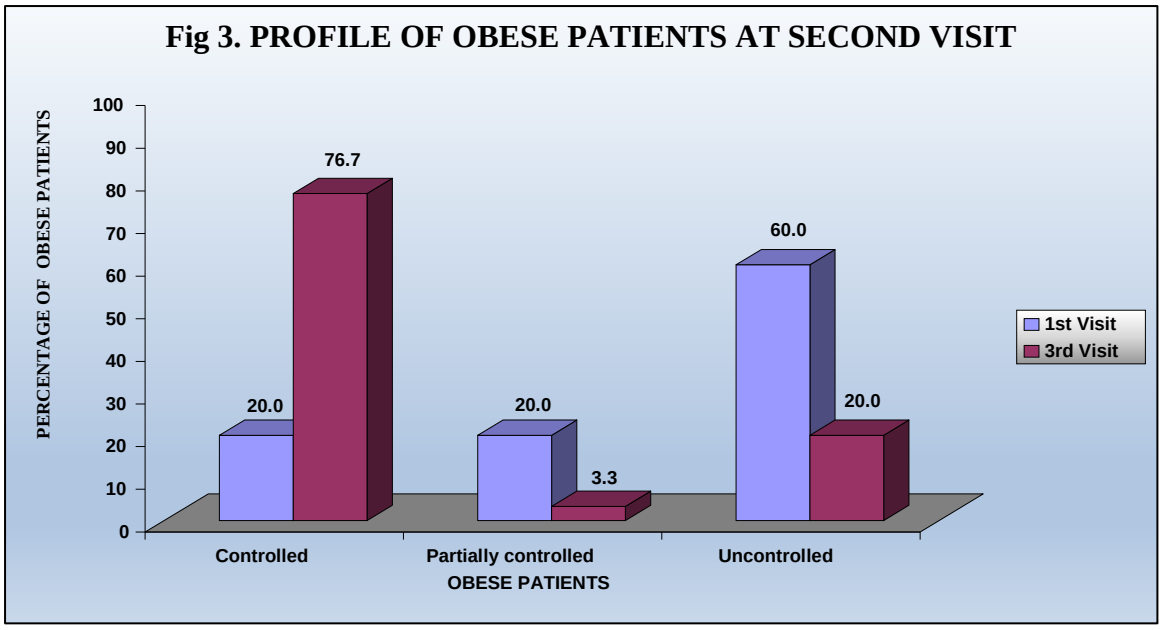

Table 3. Association between Smoking with Outcome

Cases	Baseline Visit		Second Visit	
	Smoker (N=13)	Non-Smoker (N=37)	Smoker (N=13)	Non-Smoker (N=37)
Controlled	03 (23.1%)	07 (18.9%)	09 (69.2%)	30 (81.1%)
Partially controlled	07 (53.8%)	23 (62.2%)	04 (30.8%)	06 (16.2%)
Uncontrolled	03 23.1%)	07 (18.9%)	- -	01 (2.7%)
p value	0.7471 (NS)		0.3749 (NS)	

By Chi square test P>0.05, Not Significant

There were 13 smokers (26%) enrolled in this study,3 patients (23.1%) were controlled asthma,7 patients(53.8%) were partially controlled asthma and 3 patients (23.1%) were uncontrolled asthma. At the end of second visit 9 smokers (69.2%) were controlled, 4(30.8%) remained as partially controlled. None of smoker remained in uncontrolled group.

DISCUSSION:

In this study 50 patients were enrolled after confirming diagnosis of bronchial asthma by FEV1 reversibility and these patients were managed by GINA guidelines. Out of 50 patients, 18 patients (36%) were in the age group of 31 to 40. Bronchial asthma occurs at all

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ages but predominantly in early life. This discrepancy may be due to the age range of our patients (18-60 yrs.) where children were not included. In the study done by **A Halim *et al*[(7)]** at Faridapur on "Prospective Study of Bronchial Asthma" of 30 patients, it was found that asthma was common between age groups of 30 to 49 .In another longitudinal study done on HMO (Health Worker Organisation) members in **USA[(8)]** it was found that mean age was 36.8, which was similar to our study.

In this study we found 28 patients (56%) were females and 22 patients (44%) were male. In study done by **Al-Nahdi M and Al-Quorain *et al*[(9)]** in Saudi Arabia on sex distribution in asthma, it was found that 55.9 % were females. In a longitudinal study done on HMO (Health Worker Organisation) members in **USA[(8)]** it was found that approximately two third of cases were females. Our study showed similar sex distribution. The reasons for this sex related difference are not clear but can be contributed to large size lungs in males.

We found that 17 patient (34%) were having BMI (Body Mass Index) of more than 25. Asthma is more frequently observed in obese subjects (Body Mass Index > 25 kg/m^2) and is more difficult to control[(10,11)]. How obesity promotes the development of asthma is still uncertain but it is the result of combined effects of various factors. It has been proposed that obesity could influence airway function due to its effect on lung mechanics, development of a pre inflammatory state and genetic, developmental, hormonal or neurogenic influences[(12),] 13.In study done by **Harmesh Moudgil et al** on "prevalence of obesity in asthmatics" **[(13)]** it was found that 36.4 % patients were obese with BMI more than 25.

The patients, who were obese in our study, were counselled for weight reduction, exercise and diet management. It was found that after weight reduction 88.23% patients were controlled asthma at second follow up visit with significant p value(<0.05). A similar study done in Finland by **Brita Stenius-Aarniala *et al*** on "Immediate and long-term effects of weight reduction" **[(14)]** in obese people with asthma on 19 patients underwent supervised weight reduction program over 8 weeks and it was found that all patient's bronchial asthma improved after weight reduction.

In our study 13 patients (26%) were smokers. Tobacco smoking is associated with accelerated decline of lung function in people with asthma, it increases asthma severity, it may render patients less responsive to treatment with inhaled[(15)] and systemic[(16)] glucocorticoids, and it reduces the likelihood of asthma being controlled. Exposure to tobacco smoke both prenatally and after birth is associated with measurable harmful effects including a greater risk of developing asthma like symptoms in early childhood. Infants of smoking

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mothers are 4 times more likely to develop wheezing illnesses in the first year of life[17]. In a study done at Canada by **Vozoris NT *et al*[18],** on "Smoking prevalence, behaviours, and cessation among individuals with asthma", it was found that 21% patients were smokers.

In our study 13(26%) patients were smoker out of which 3 (23.1%) were controlled, 7 patients (53.8%) were partially controlled and 3 patients (23.1%) were uncontrolled. At second visit we again reassessed and found that 9 patients (69.2%), who quitted smoking were having controlled asthma and 4 patients (30.8%) who did not quit smoking were having partially controlled asthma, denoting that smoking can adversely affect control bronchial asthma.

In a study done by **Rekha Chaudhuri *et al*[19]**, on "Effects of Smoking Cessation on Lung Function and Airway Inflammation in Smokers with Asthma", out of 32 patients who were smokers, 21 patients (65.5%) opted for smoking cessation and 11 patients opted for continuation of smoking. It was found that asthma control score was improved in patients who quitted smoking with significant improvement in FEV1 at 1 week 356 ml, at third week 390 ml, at 6-week 450 ml. In another study done by **An-Soo Jang *et al*[20]** in Korea, on "Effects of Smoking Cessation on Airflow Obstruction and Quality of Life in Asthmatic Smokers", out of 32 patients who were smokers, 10 patients (31.25%) quitted smoking and 22 patients continued smoking. it was found that, Quitters showed a greater per cent change in FEV1 (19.1±6.3 vs. 7.9±2.4%, P=0.024) and FEV1/FVC (6.5±4.14 vs. 3.5±1.5%, P=0.05) than smokers.

Multiple risk factors found in our study group like URTI, change in weather, exercise GORD etc. 26 patients (52%) had Upper respiratory tract infection as a commonest risk factor. In a study done by **Tarlo SM, Broder *et al*[21]** on "The role of symptomatic colds in asthma exacerbations: Influence of outdoor allergens and air pollutant", it was found that out of 130 asthma exacerbations 47% was associated with common cold.

Respiratory viruses may exacerbate asthma by causing epithelial damage and airway inflammation, both of which may lead to asthma symptoms. In addition to viral infections, bacterial respiratory infections, in infancy, plays a role in the development of asthma later in life. It has been shown that acute infection with C. pneumoniae is able to exacerbate asthma and even to initiate asthma in previously non-asthmatic adults[22]. In the study of **Hahn et al (1995b)[23],** four patients with C. pneumoniae respiratory tract infection developed chronic asthma, which disappeared after 4 weeks of antibiotic treatment in each case.

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Change in weather (38%) was the second common risk factor for asthma in our study. Incidence of hospitalisations or emergency department visits for asthma varies seasonally, peaking in the autumn and reaching a low point during the summer. In a study done by **Koyanagi K *et al*[(24)]** on "An analysis of factors that exacerbate asthma", based on a Japanese questionnaire; change in weather was the leading risk factor for asthma. Possible determinants of seasonal variation include exposure to allergens such as pollens, house dust mites and mould spores in younger populations and influenza or respiratory tract infections in older population. Recognising each patient's unique seasonal pattern has practical implications for patient care including the need to increase medications. In the study done by **A Halim *et al*** at Faridapur [(7)] on "Prospective Study of Bronchial Asthma of 30 patients, it was found that 20 % patients presented in Winter season. In our study 38 % of patients appreciated change in weather (i.e. from summer to winter) as second commonest risk factor for developing asthma symptoms

Exercise induced asthma was seen in 22% patients. In the study done by **A Halim *et al*[(7)]**, 3 % patient had exercise induced asthma. For those in whom exercise-induced bronchoconstriction is the only manifestation of asthma, a rapid-acting inhaled β2-agonist (short-or long-acting), taken prior to exercise or to relieve symptoms that develop after exercise, is recommended[(25)]**.**

In our study10 patients were treated with salbutamol 200 microgram before exercise along with LABA and ICS MDI as these patients had other risk factors also, only one patient treated with only salbutamol 200 microgram before exercise as he was having exercise as a single risk factor. At second visit out of 11 patients, 8 patients became controlled asthma, 2 patients became partially controlled and one remained as uncontrolled asthma. Those who were not controlled had 2 or more than 2 risk factors.

GORD was the lowest common risk factor for asthma with only 3 patients(6%). These patients were treated for GORD by proton pump inhibitor and for other risk factors. At second visit 2 patients became partially controlled and one patient remained as uncontrolled as this patient was having more than two risk factors. However, in patients with difficult-to control asthma or nocturnal asthma, the need for further evaluation or a therapeutic trial of GORD medication[(26)] should be given. In a study done by **Julian J. Leggett *et al*[(27)]** on, "Prevalence of Gastroesophageal Reflux in Difficult Asthma", out of 68 patients with difficult to control asthma 75 % had GORD associated asthma .This study suggested that

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proactive identification and treatment of GORD using high-dose proton pump inhibitors does not relate to asthma outcome.

In a study done by **Guarnaccia S, Lombardi A *et al*[(28)]** on "Application and implementation of GINA asthma guidelines by specialist and primary care physicians a longitudinal follow up study on 264 children", it was found that Mean follow-up for 264 children with complete datasets was 10 months. Guidelines were followed by 94.6% of the patients. 98.6% of children learned to manage exacerbations. This study concluded that regular specialist visits, a website, and a written management plan shared by all those involved, led to clinical improvements as well as a reduction in, and more efficient use of, asthma medication.

In another study done by Mohammad **H Boskabady *et al* [(29)]** in Iran on "Improvement in symptoms and pulmonary function of asthmatic patients due to their treatment according to the Global Strategy for Asthma Management (GINA)", twenty four asthmatic patients (usual care group) were treated as usual and 26 patients (intervention group) according to the GINA for 2 months, Asthma symptoms, frequency of symptoms/week, chest wheezing, and PFT values were significantly improved in the intervention group at the second and third visits compared to first visit ($p < 0.001$ for all measures). In the second and third visits all symptoms were significantly lower, and PFT values higher, in the intervention group.

In a study done by **Anita Kotwania, Sunil K Chhabrab *et al*[(30)]** at the Out-Patient Department (OPD) of the V. P. Chest Institute, Delhi, a tertiary care referral public hospital in India ,on Effect of patient education and standard treatment guidelines on asthma control: an intervention trial, showed that asthma education led to improvement in asthma. We would like to recommend GINA guidelines for asthma management. Patient education, written action plan and counselling regarding Bronchial asthma. In difficult to treat asthma identify and treat risk factors to help improve asthma symptoms.

CONCLUSION:

Bronchial asthma is commoner in middle age group. Obese patients after weight reduction, smokers after quitting smoking, patients had good control of asthma. URTI and change in weather are commonest risk factors for bronchial asthma. After following GINA guidelines in management of bronchial asthma FEV1 and PEFR showed significant improvement and good control of asthma in most of the patients. Systematic approach in Diagnosis, management and prevention as per GINA guidelines can improve morbidity, reduce exacerbation and give patients good quality of life.

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