

## ORIGINAL ARTICLE

# Asthma Insights and Management in India: Lessons Learnt from the Asia Pacific - Asthma Insights and Management (AP-AIM) Study

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## Abstract

**Background:** Despite a better understanding of the pathophysiology of asthma, presence of reliable diagnostic tools, availability of a wide array of effective and affordable inhaled drugs and simplified national and international asthma management guidelines, asthma remains poorly managed in India.

**Objective:** The Asia-Pacific Asthma Insight and Management (AP-AIM) study was aimed at understanding the characteristics of asthma, current management, level of asthma control and its impact on quality of life across Australia, China, Hong Kong, India, Malaysia, Singapore, South Korea, Taiwan and Thailand. This paper describes the results of asthma management issues in India in detail and provides a unique insight into asthma in India.

**Methodology:** The AP-AIM India study was conducted in eight urban cities in India, viz: Ajmer, Delhi, Kolkata, Rourkela, Chennai, Mangalore, Mumbai and Rajkot from February to July 2011. Face-to-face interviews were conducted in adult asthmatics and parents of asthmatic children between the ages of 12 and 17 years with a confirmed diagnosis or a treatment history of 1 year for asthma.

**Results:** Four hundred asthmatics (M:F::1:1.273), with a mean age of  $50 \pm 17.8$  years, from across India were studied. 91% of the asthmatics in India perceived their asthma to be under control, however, none of the asthmatics had controlled asthma by objective measures. Asthmatics in India believed that their asthma was under control if they have up to 2 emergency doctor visits a year. The quality of life of these patients was significantly affected with 93% school/work absenteeism and a loss of 50% productivity. Seventy-five percent of the asthmatics have never had a lung function test. The common triggers for asthmatics in India were dust (49%) and air pollution (49%), while only 5% reported of pollen as triggers. Eighty-nine percent of Indian asthmatics reported an average use of oral steroids 10.5 times a year. Only 36% and 50% of Indian asthmatics used controller and rescue inhalers with a majority preferring the oral route of asthma medication.

**Conclusions:** This study has clearly highlighted the fact that asthma management in India remains very poor, with a significant proportion of patients experiencing bothersome symptoms and worsened quality of life. There is a need for an urgent review of this situation and initiate active measures at local as well as national levels to improve asthma care in India.

## Editorial Viewpoint

- There is a disparity between perception of patient and objective criteria in asthma control.
- Poor control of asthma leads to work absenteeism and loss of productivity.
- Majority of Indian asthmatics continue to the oral medications rather than inhalation agents.

## Introduction

Asthma is one of the most common disease encountered in clinical practice. An estimated 300 million people suffer from asthma worldwide and an additional 100 million new cases will be added by the year 2025.<sup>1</sup> The true burden of Asthma in India is not known. Although earlier studies reported a median prevalence of 3% (more than 30 million asthmatics in India), there is growing evidence to suggest that this may be a gross underestimate.<sup>2</sup> The prevalence of childhood asthma across 16 different centres in India has been reported to range from 2.2% to 22% with a mean of around 5.5%.<sup>3</sup> Although these rates are lower than those reported from the Western world, over half of these reported asthmatic children had severe symptoms.<sup>3</sup> Asthma prevalence among children has grown by 3-fold over 2 decades in the city of Bangalore<sup>4</sup> and by 2-fold over a period of five years in the city of Pune.<sup>5</sup> Similar increases have been reported from other parts of the country.<sup>6</sup> According to the World Health Organization (WHO), India has the largest number of asthma deaths in the world, contributing to 22.3% of all global asthma deaths (WHO, 2004).

Despite a better understanding of the pathophysiology of asthma, presence of reliable diagnostic tools, availability of a wide array of effective and affordable inhaled drugs and simplified national and international asthma management guidelines, asthma remains poorly managed in clinical practice across the globe. Several studies have investigated real life asthma management practices in different parts of the world. These include, Asthma in America (AIA),<sup>7</sup> The Reality of Asthma Control in Canada (TRAC) (2004),<sup>8</sup> Asthma Insights and Realities in Europe (AIRE) (2005);<sup>9</sup> Asthma Insights and Realities in Asia Pacific (AIRAP) (2003),<sup>10</sup> Asthma Insights and

Realities in Latin America (AIRLA) (2005)<sup>7,11</sup> and the Asthma Insights and Realities in Gulf and Near East (2009).<sup>12</sup> All these studies have uniformly highlighted the fact that asthma management remains poor across most regions of the world.

More recently, Asthma Insights and Management has been studied in nine countries in the Asia Pacific region (AP-AIM study) including India, and the overall results of this study have been published recently.<sup>13</sup> The AP-AIM study was conducted in Australia, China, Hong Kong, India, Malaysia, Singapore, South Korea, Taiwan and Thailand, and was aimed at understanding the characteristics of asthma, current management, level of asthma control and its impact on quality of life. This study highlighted the fact that asthma management in the Asia Pacific region was poor in most countries apart from Australia, Singapore and Taiwan. This paper describes the results of asthma management issues in India in detail and provides a unique insight into asthma in India.

## Methods

*Study Location:* The AP-AIM India study was conducted across eight urban cities from four regions in India, viz: Ajmer and Delhi from the North Zone, Kolkata and Rourkela from the East Zone, Chennai and Mangalore from the South Zone and Mumbai and Rajkot from the West Zone, from February to July 2011. The four regions were chosen to represent for different geographical locations in India, and each region comprised of one metropolitan city and one suburban city.

*Study Population:* The study participants comprised of adults and parents of adolescent children between the ages of 12 and 17 years who reported that they or their children had a current physician-diagnosed of asthma and had received asthma medication or

experienced asthma symptoms during the previous 12 months. Patient confidentiality was maintained.

*Sampling strategy and study methodology:* At each of the above eight locations, fieldworkers visited randomly selected homes and asked for presence of subjects suffering with asthma. Eligible and willing subjects underwent a face-to-face interviewee-administered questionnaire in a language they were comfortable with. Mostly, interviews were conducted in Marathi, Hindi, Punjabi, Bengali, Tamil, Gujrati, Oriya and Kannada.

The study questionnaire was first designed by a professional survey company in New York, USA (Abt SRBI), but the final version was approved by a scientific committee comprising of nine lead pulmonologists from each country who debated and discussed the questions. Each lead pulmonologist ensured that the final questionnaire was applicable to their country, taking care that the core questionnaire was not changed, so that comparisons could be made between countries and regions. Quality of life questions were adapted to suit the local country. Once the final version of the questionnaire was approved by the scientific committee, translations and back-translations were performed by local professionals. They were not administered in the field until the lead pulmonologist from India approved the translations.

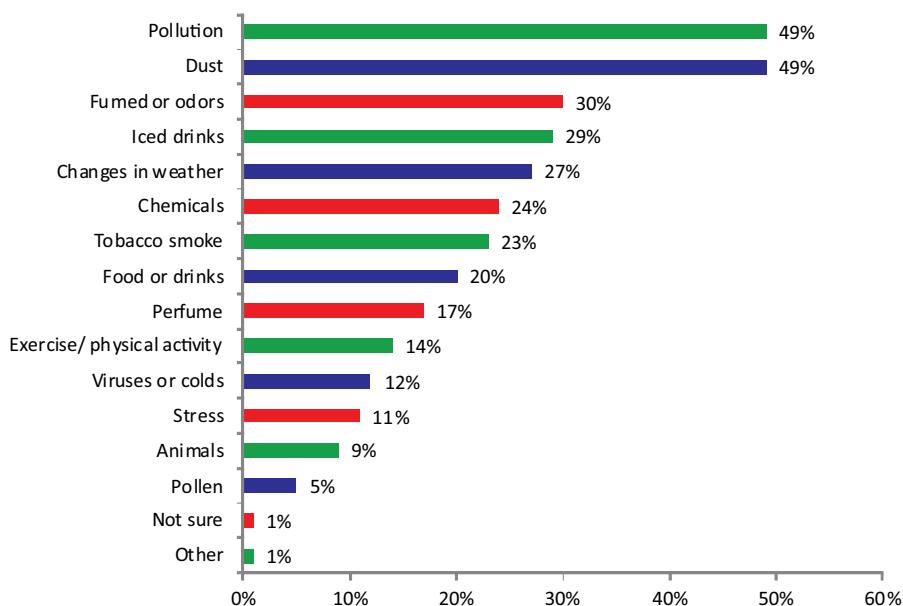
The final questionnaire had 53 questions relating to the general health status of the participant, asthma diagnosis, history and comorbidities, asthma symptoms, frequencies and patterns, asthma exacerbations, patient burden, disease management, medications and treatments and patients' attitude about asthma and asthma control. The questionnaire and its local translations were validated in each test region. The local translations were reviewed to

**Table 1: Patient demographics**

Number of study participants (n)	
North Zone	
Ajmer	40
Delhi	65
East Zone	
Kolkata	50
Roukela	40
South Zone	
Chennai	50
Mangalore	50
West Zone	
Mumbai	65
Rajkot	40
Total	400
Male: Female ratio	1:1.273
Mean age ( $\pm$ SD)	50 $\pm$ 17.8 years
Mean age ( $\pm$ SD) at first diagnosis	37 $\pm$ 17.5 years

ensure that the questions asked were relevant and meaningful to the individuals in each of the centres. The same questionnaire tool was used in all the nine sites of the Asia Pacific region.

The survey was conducted by the international public opinion research organization Abt SRBI, Inc. Advisors for the project were Roslina Abdul Manap, Watchara Boonsawat, Young Joo Cho, Philip Eng, James Chung-Man Ho, Jeng-Yuan Hsu, Jiangtao Lin, Sundeep Salvi (India) and Philip Thompson. The survey was sponsored by Merck Sharpe and Dohme (MSD), a research-based pharmaceutical company. The interviewers from Abt SRBI, Inc. were trained to conduct the survey according to pre-specified guidelines to ensure accuracy and integrity of data collected through the questionnaire which was used in the study. They were specifically trained not to influence the participant's response in any way. Data collection was completed in 8 weeks. Random quality control checks were implemented by re-interviewing 10-20% of the participants and comparing the data from the quality control interviews against the originally collected data using the SPSS software. Data pattern anomalies were also searched.

**Fig. 1: Patient-reported asthma trigger factors in India**

**Data analysis:** Data from all the centres was collated, de-identified and sent to Abt SRBI. Survey data was analyzed using the SPSS software version 17 (SPSS Inc., Chicago, IL, USA). The maximum margin of error allowed was  $\pm 4.9\%$  at the 95% confidence interval. Clean data was analyzed using simple descriptive methods and data were represented either as means  $\pm$  standard deviation (SD) or median  $\pm$  inter quartile range (IQR) wherever applicable.

## Results

### Demographics and Patient Characteristics

A total of 6,541 households were screened in India in order to obtain 400 households containing either adult asthmatics or asthmatics between the ages of 12-17 whose parents were willing to participate. A written informed consent was obtained before they were enrolled into the study. The number of asthmatic subjects from each study location was as follows – Ajmer: 40, Delhi: 65, Kolkata: 50, Roukela: 40, Chennai: 50, Mangalore: 50, Mumbai: 65 and Rajkot: 40. Fifty six percent of the study population were females and 96% were adults. The mean age of the study participants was 50  $\pm$  17.8 years

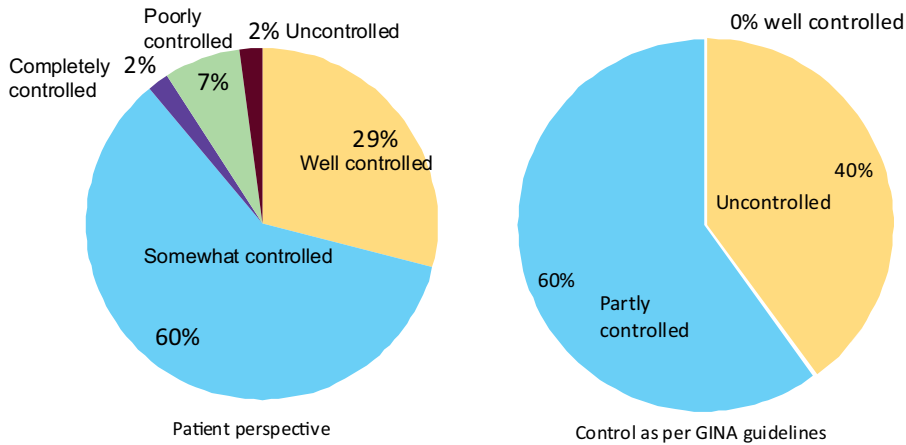
while the mean age of first asthma diagnosis was 37  $\pm$  17.5 years. On average, patients had symptoms of asthma for at least 1 year before a diagnosis of asthma was made (Table 1).

### Symptom Characteristics

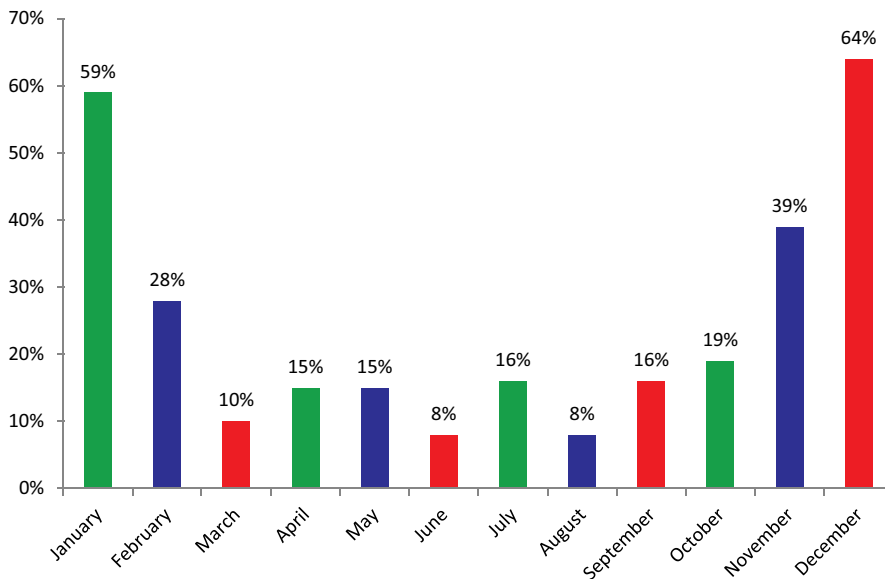
Daytime symptoms of asthma in the previous 4 weeks were reported by 73% of asthmatics, of whom 12% reported symptoms occurring every day and 19% reported symptoms most days with 10% and 12% reporting symptoms at least once or twice a week respectively. As such 56% of subjects reported symptoms at least once a week during the previous 4 weeks.

Fifteen percent of adults and adolescents with asthma reported night-time asthma symptoms either every night or on most nights during the previous 4 weeks. Four and nine percent reported night-time asthma symptoms at least once or twice a week respectively. In 28% of the asthmatics, night-time symptoms occurred at least once a week.

Two-thirds of adults and adolescents with current asthma reported that shortness of breath during the day was extremely (25%) or moderately (41%) bothersome and that being awakened at



**Fig. 2: Asthma control: Patient perception versus GINA guidelines-defined control**



**Fig. 3: Months when asthma symptoms are more frequent or severe**

night by shortness of breath was extremely (32%) or moderately (32%) troublesome. More than 3 in 5 adults and adolescents found chest tightness to be extremely (29%) or moderately (34%) upsetting, and considered being awakened at night with coughing to be extremely (30%) or moderately (31%) disturbing. Nearly three-fifths of respondents reported that coughing during the day was extremely (18%) or moderately (41%) distressing, and that coughing and wheezing during exercise were extremely (23%) or moderately (33%) bothersome. Finally, one-half of respondents stated they coughed up phlegm that was extremely (15%) or moderately (35%) upsetting while

wheezing or whistling in the chest was extremely (17%) or moderately (32%) bothersome.

#### Patient-reported Asthma Triggers

Forty nine percent of the asthmatics in the study reported that dust and air pollution were the most common asthma triggers. Fumes or odours, iced drinks and changes in weather were reported to trigger asthma in 30%, 29% and 27% of the asthmatics respectively, while chemicals, tobacco smoke and perfumes triggered asthma symptoms in 24%, 23% and 17% respectively. Every fifth asthmatic perceived food (20%) to be a trigger factor for their symptoms, while only 1 in every 20 reported pollen

as their trigger factor. Physical activity (14%), viruses and colds (12%), stress (11%) and animals (9%) were also perceived as triggers for asthma (Figure 1).

#### Asthma Control

When the asthmatic subjects were asked if they felt that their asthma was controlled, 2% reported completely controlled, 29% reported well controlled, 60% somewhat controlled, 7% poor control and only 2% reported not controlled at all.

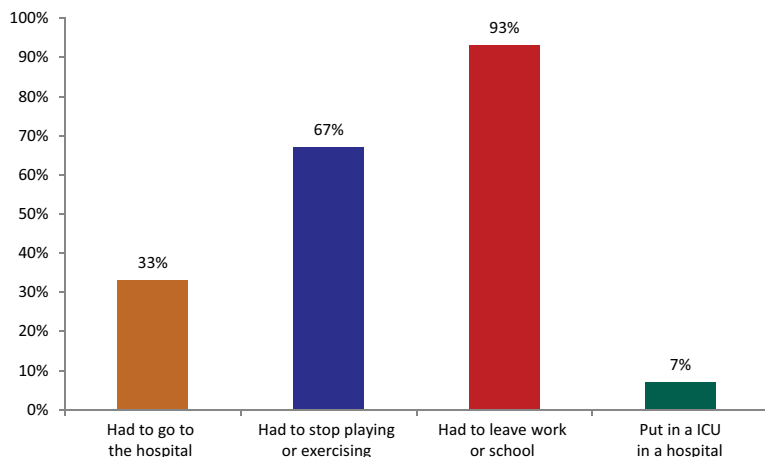
In contrast to the level of asthma control perceived by the asthmatic subjects, when they were analyzed using the objective criteria as promulgated by the GINA guidelines, none (0%) of the asthmatics had controlled asthma; 60% of the asthmatics had partly controlled asthma and 40% had uncontrolled asthma. Similarly, among those adults and adolescents who reported that their asthma was completely or well controlled in the previous 4 weeks, 38% had uncontrolled asthma and 63% had partly controlled asthma (Figure 2).

#### Exacerbations

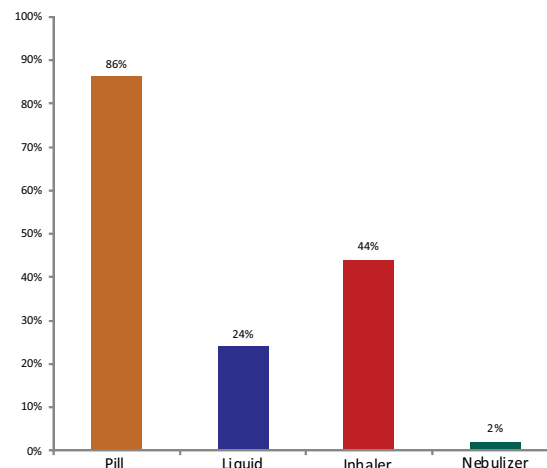
Sixty six percent of asthma study population reported asthma symptoms to be more frequent or more severe than normal during the previous 12 months with 33% reporting having less than or equal to two exacerbations per year. However, in contrast 49% reported between 3–10 exacerbations per year, and 18% reported more than 11 exacerbations in a year. More than half of the asthmatics (51%) reported that the exacerbations lasted for 1–3 days while 33% reported that they lasted for 4–10 days. On average, asthmatics in India reported 8.4 exacerbations per year, each lasting a mean of 4 days.

#### Prevalence of Monthly Symptoms

December (64%), January (59%), November (39%) and February (28%) were the most common months for patients to



**Fig. 4: Patient-reported occurrence of episodes with other serious outcomes**



**Fig. 5: Patient-reported method for taking controller medication**

be symptomatic. The rainy season from June to August seemed to be a relatively better for asthmatics (Figure 3).

**Need for Acute Treatment of Asthma**

Forty two percent of asthmatics required an unscheduled or emergency visit to their health care provider with a mean of 4.7 such visits every year. A significant number of asthmatics (18%) needed an overnight hospitalization with a mean number of 2.5 overnight hospitalizations every year.

**Impact of Asthma on Quality of Life**

The vast majority of asthmatics (93%) reported missing days from work/school as a result of asthma exacerbations in their lifetime. Two-thirds of these patients had to stop exercising/playing while 33% visited a hospital for their asthma and 7% required intensive care (Figure 4). Every third asthmatic (32%) reported that their asthma episode was so bad that they perceived a danger to their life.

**Asthma Burden**

78% of asthmatics in India

**Table 2: Patient-reported emotional burden of asthma**

Frequency	Rare	Sometimes	Often
Tired	19%	50%	27%
Fearful	34%	33%	10%
Depressed	29%	41%	12%
Frustrated	26%	39%	12%
Embarrassed	31%	30%	12%

reported missing work/school due to their asthma in the last one year. An average of 16.5 days was reported to be lost due to asthma. Productivity of patients with asthma fell from 70% on a typical day to 35% on the day with worst symptoms of asthma.

Asthma was reported to impose a heavy physical as well as emotional burden on the patients with 77% reporting increased fatigue due to asthma, 53% reporting depression/frustration, 43% reporting fear of their disease and 42% reporting embarrassment at being labelled an asthmatic (Table 2).

**Asthma Medication Use and Management**

*Rescue Medication*

Eighty three percent of the study population reported using rescue medication for their asthma, of which 50% did so by using an inhaler. Among those using reliever/rescue therapies, asthma controller medication was used by 68% of which 36.3% did so via inhalers. On average, 13.2 controller medication inhalers were used each year. Approximately half (47%) used 10–49 inhalers every year, 27% 3–9, 19% used only 1–2 inhalers per year while 6% surprisingly used more than 50 per year. Similarly, within the cohort, an average of 12.5 rescue/quick relief inhalers was used every year. Among these, 46% used 10–49

inhalers every year and 4% using more than 50 inhalers every year.

*Controller Medication*

Most of the asthmatics (81.7%) reported using controller medications. However, among these, 70.3% used tablets (predominantly theophylline), 36% used inhalers, 19.6% used liquids and 1.6% used nebulizers. A significant number of asthmatics (18.3%) did not use any controller medication at all (Figure 5). Among those who used controller medications, only 56% of these patients took the medication every day and 18% reported use 4-6 times a week while 7% used the medication as and when needed for their asthma symptoms.

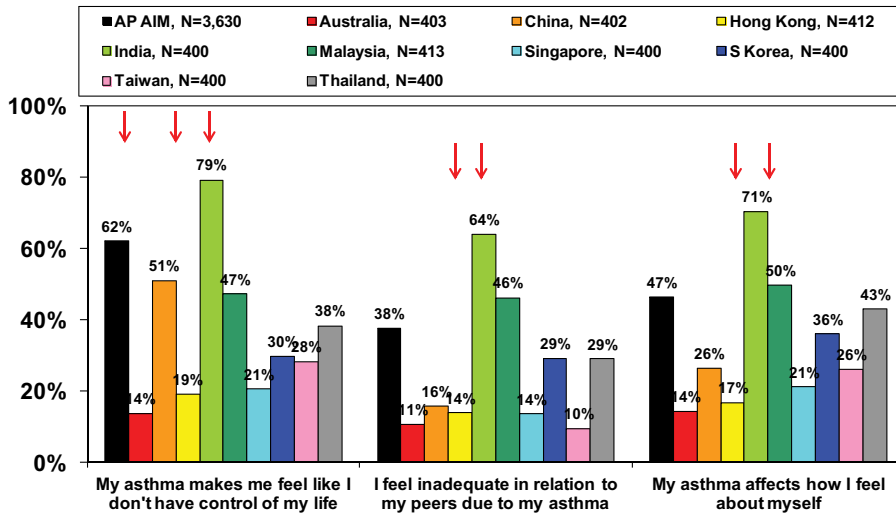
Oral steroids were used during the previous year by 89% of the patients. On average, patients reported using oral steroids 10.5 times in a year.

**Use of Lung Function Test**

22% of asthmatics reported having a lung function test performed, while 75% had never undertaken a lung function test.

**Patient Attitude Towards Asthma Management**

Nearly 40% of asthmatics in this Indian study believed that their asthma was well managed if they had one urgent visit to their doctor every year, while 60% believed that their asthma was well managed



**Fig. 6: Impact of asthma on self-perception (compared to other countries)**

even if two urgent visits to their doctor were needed per year.

Similarly, 55% of the asthmatics believed that their asthma was well managed if they had 3-4 exacerbations a year while 33% believed that their asthma was well managed if they had day-time symptoms only 3 times per week. For 34% of the study group believed that requiring quick relief, rescue medication only 3 times per week indicated good management of their asthma.

64% of patients believed that regular controller medication for asthma was not needed while 85% believed that quick relief rescue medication could be used every day. Nearly half of the patients (48%) were fearful of using oral steroids while 50% of the patients were apprehensive about using inhaled steroids.

The vast majority of patients (80%) reported that asthma made them feel that they did not have control of their lives. Seventy one percent of the patients believed that their asthmatic status affected their perception of themselves while 65.5% believe that they were inadequate when compared to their peers because of their asthma (Figure 6).

## Discussion

The Asia Pacific – Asthma

Insights and Management (AP – AIM) survey is the biggest survey in recent years to examine asthma management practices in nine Asia Pacific countries, including India. The overall results of the Asia Pacific region study have been published recently.<sup>13</sup> This report provides a more detailed assessment of asthma management practices in India and represents the first comprehensive study of its kind to be published.

The key observations of this study were that 31% of asthmatics in India reported the presence of daytime symptoms either everyday or on most days, and 15% reported night-time asthma symptoms either every night or on most nights. This was accompanied by a significant impact on quality of life, with 66% asthmatics complaining of extremely or moderately bothersome shortness of breath and 61% of asthmatics being awakened at night due to extremely or moderately troublesome cough. Disturbingly half of the asthmatics reported between 3-10 asthma exacerbations per year and one-fifth reported more than 11 per year. A large number of patients reported missing days from work/school due to asthma, one-third required a hospital visit and 7% needed intensive care. Using the Global Initiative for Asthma (GINA) guidelines there were no Indian

asthmatics who had controlled asthma and 40% of the cohort had uncontrolled asthma, despite the fact that 29% believed that their asthma was well controlled and 60% believed that it was reasonably controlled. However, when other answers were analysed 79% of asthmatics felt they did not have control over their life due to asthma and 71% said their asthma affected how they felt about themselves.

The observations in this study clearly highlight the fact that asthma control remains very poor in India. Among the nine countries that were studied from the Asia Pacific region, Indian asthmatics had the worst outcomes. These observations are indeed very worrisome and suggest an urgent need to take active measures to overcome these issues and improve asthma care in India. Asthma management remains poor in India, despite the fact that our understanding of asthma has improved significantly over the last 2-3 decades with an increase in asthma prevalence, and that there are highly effective and affordable medicines that can bring about significant relief of symptoms and improvement in quality of life.

Poor asthma management outcomes in India could be due to both physician-related as well as patient-related factors. In general, physicians in India seem to lack adequate knowledge and awareness about asthma diagnosis and treatment management.<sup>14,15</sup> A significant proportion of asthmatic patients remain undiagnosed or wrongly diagnosed in clinical practice and even those who get diagnosed, remain poorly or inadequately treated. Bhattacharya *et al*<sup>16</sup> studied prescription patterns for asthma management among general practitioners, general physicians and chest physicians from the city of Kolkata, and reported that majority of the physicians offered inadequate and inappropriate asthma treatment. Inhaled corticosteroids which form the

cornerstone of asthma management worldwide, were prescribed by only 10% of general practitioners, 29% of general physicians and 12% of chest physicians. Similar observations have been reported by Kamat<sup>17</sup> in Mumbai. We reported earlier that qualified doctors and doctors in training in a tertiary care teaching hospital in India do not have the knowledge and skill set to use a pressurized metered dose inhaler and that half of them believed that inhalers are addictive.<sup>18</sup> Communication skills form an integral part of asthma management because most patients have myths and misbeliefs associated with asthma. Singh *et al*<sup>19</sup> reported that Indian physicians lack effective communication skills when it comes to asthma management.

In this study, only 32% of asthmatics reported using controller medications administered via an inhaler. This low use of inhaled controller medications is a major cause of concern. 47% of the asthmatics who used controller medications, used between 10-49 inhalers while 27% of these used less than nine inhalers a year, indicating either overuse or underuse of inhaled corticosteroids for approximately 75% of asthmatics. Unfortunately 64% of asthmatics in India believed that regular controller medications for asthma were not required and 50% had apprehensions about the use of inhaled corticosteroids. These observations highlight the fact that asthmatic patients in India need to be educated about the need and importance of using adequate and appropriate doses of inhaled corticosteroids. Socio-cultural factors and blind beliefs/superstitions form a major hindrance in asthma control especially in rural areas. The alternative systems of a medicine which lure people as being 'easy cure for asthma' also misguide people away from taking the evidence based medications which are known to control asthma

effectively. Non-adherence to asthma medication stems from a lack of adequate insight and understanding. An earlier study reported that up to 68% of asthmatic children in India were non-adherent with their asthma medications.<sup>20</sup> Improving adherence to inhaled corticosteroid medications, the most effective treatment for asthma available today, can go a long way in improving asthma control in patients.

The primary goal of asthma management is to achieve good asthma control so that patients lead a near-normal life. Several studies have shown that when properly diagnosed and appropriately treated, asthma control can be achieved in over 75% of asthmatics.<sup>21</sup> In this study, 29% of asthmatics believed that their asthma was well controlled, 60% believed somewhat controlled, 2% believed completely controlled, 7% perceived poor control and 2% believed that their asthma was uncontrolled. However, when asthma control was assessed according to the latest GINA guidelines, none of the Indian asthmatics in this study had controlled asthma, while 60% had partly controlled asthma and 40% had uncontrolled asthma. Although a significant proportion of asthmatics in this study had significant morbidity, 60% believed that their asthma was well managed if they had 3-4 exacerbations every year. Although it is well known that patients under appreciate the level of their asthma control,<sup>22,23</sup> the wide gap between perception and reality among Indian asthmatic patients is a significant matter of concern. This could be because patients learn to tolerate their symptoms and believe that asthma will be associated with a poor quality of life and certain amount of suffering is a normal part of the disease process. There is clearly a need to change the mind set of Indian asthmatic patients and educate them that suffering is not a norm for asthma and that with proper treatment and regular

use of inhaled medications, most asthmatic patients can lead a near normal and healthy life. The other reason could be the large disparity between actual control and 'patient perceived' control of their asthma. Patients' denial of symptoms could result in late presentation and hence greater morbidity in the disease.

There are several other interesting observations made in the study. Almost half of the asthmatics in India reported that air pollution and dust were the main trigger factors, while about a quarter reported changes in weather, exposure to fumes, odours, chemicals and tobacco smoke and consumption of iced drinks as triggers for their asthma. Only a small proportion of asthmatics in India reported that pollen grains and exposure to pets were triggers. These observations are in contrast to asthma triggers reported in the western world<sup>24,25</sup> and highlight the fact that asthma triggers vary significantly across different geographical and economic regions of the world. Air pollution levels are markedly high in Indian cities and towns and several studies have shown an association between ambient as well as indoor air pollutants as major triggering factors for asthma.<sup>26,27</sup> Government intervention in this regard would be of paramount importance. The establishment of strict screening and government litigation to minimize outdoor air pollution is something that will be imperative in improving control of asthma. Creating awareness about these triggers through public education strategies will be crucial in educating our asthmatics.

In India, asthma exacerbations were reported to be more common during the winter months (November, December, January and February) and least common during the rainy season. These observations are in contrast to the beliefs of most physicians that the spring season (August-October) represents the months during

which asthma exacerbations are the highest. The reasons for this are not clear but are consonant with the observations that air pollution is a major trigger factor for asthma and that exposure to pollen is a far less critical for asthma.

In conclusion, the AP-AIM study was conducted in eight cities and towns in India and has clearly highlighted the fact that asthma management in India remains very poor, with a significant proportion of patients experiencing bothersome symptoms and worsened quality of life. None of the asthmatics in India were reported to have controlled asthma. This is despite the fact that asthma is a disease that is fairly easy to diagnose, and with the entire spectrum of highly effective inhaled medications are available at affordable cost. There is a need for an urgent review of this situation and initiate active measures at local as well as national levels to improve asthma care in India.

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