

Prevalence of Asthma in Elderly versus Young in Rural and Urban Area of India

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Abstract

Setting: Department of Pulmonology, Delhi heart and Lung Institute, New Delhi

Objective: Asthma is considered as a disease of childhood but may continue in the elderly or elderly may be diagnosed as asthmatic for the first time. Asthma in elderly may differ from the young with respect to diagnosis and management on account of psychosocial, economic differences and age related changes which may further be enhanced because of comorbidities and interactions between drugs used for comorbidities.

Design: 100 patients of bronchial asthma attending the Department of Pulmonary Medicine, Delhi Heart and Lung Institute, New Delhi, India. Young and elderly asthmatics were compared with regards to Symptoms, Severity (GINA guidelines), Accessibility to treatment, Co-morbidities, Inhalational techniques, Compliance and factors affecting compliance and; Outcome measures. These patients were followed up periodically for the above said parameters.

Results: Salient differences noted in elderly vs. young were: higher GINA scoring (Moderate Persistent: 30% vs 10%), baseline non-compliance (60% vs 30%), non-compliance due to cost and memory (80% vs 26.7%), incorrect technique of inhalation (69.6% vs 42.4%), comorbidities (98% vs 38%) and concomitant drug usage (68% vs 40%). There were differences in the symptoms and quality of life indicators. There was significant improvement in various parameters in both groups, especially the young if counseled properly.

Conclusion: Significant differences exist between elderly and young asthmatics.

Introduction

Asthma is considered as a disease of childhood, but it may be first diagnosed in the elderly. Late-onset asthma may occur at any age, even in eighth and ninth decades of life. When it does occur, moderate to severe symptoms are more likely [1]. Some studies of older persons who have asthma have shown that as a group, as many as 40% have their first attack after the age of 40 years [2].

Asthma in elderly population has a major impact on patient's quality of life because of significant impairment in health status, symptoms of depression, and significant limitation of daily activity. The factors which increase the gravity of situation include under diagnosis in elderly, because of poor access to medical facilities, physiological processes of aging, psychosocial and economic problems, associated co-morbidities and drug interactions between prescribed medications. Once diagnosed, it is under treated because of inadequate prescription by the treating physician, poor inhalational technique, adverse effects of drugs and drug interactions. There may also be problem in compliance in taking treatment because of forgetfulness due to old age, cost constraints, physical and mental infirmity [2] and multiplicity of drugs.

No doubt, the grade of drug compliance is strongly influenced by national traits in India. Acc to WHO 2003 report several studies have suggested that patients from low-income, ethnic-minority groups (primarily African American) in developed countries may have lower rates of adherence to asthma therapy. Many studies have speculated about the possible determinants of this situation in the USA and Australia referring to difficulties in access to health care resources because of social, economic and geographical barriers [3].

Asthma may differ in the younger and elderly population from the very beginning to the final outcome. Study was conducted to make comparisons of the following parameters in asthma in elderly (≥ 65 yrs) and younger (<40 yrs) patients.

1. Symptoms
2. Severity (GINA guidelines)
3. Accessibility to treatment
4. Co-morbidities
5. Treatment methods especially inhalational techniques
6. Treatment compliance and factors affecting compliance
7. Outcome measures like quality of life, asthma exacerbations etc.

Materials and Methods

The present study was conducted on 100 patients of bronchial asthma attending the Department of Pulmonary Medicine, Delhi Heart and Lung Institute, New Delhi, India.

Diagnostic criteria for asthma

Histories suggestive of asthma like attacks of cough, wheezing, or exercise induced dyspnoea or nocturnal cough or wheezing and evidence of bronchial reversibility on spirometry.

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Received August 31, 2011; **Accepted** October 16, 2011; **Published** October 19, 2011

Citation: Pritpal K, Sean D, Kiran S, Ajay K, Karan M, et al. (2011) Prevalence of Asthma in Elderly versus Young in Rural and Urban Area of India. J Pulmonar Respirat Med 1:102. doi:[10.4172/2161-105X.1000102](https://doi.org/10.4172/2161-105X.1000102)

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Patients were divided into 2 groups:-

Group A: 50 patients ≥ 65 yrs old

Group B: 50 patients < 40 yrs

A detailed personal history of the patient including age, sex, anthropometric measurements, occupation, detailed clinical history including history of cough, wheezing, history of past illness including history of atopy, history of emergency admissions/hospitalizations, type of medications used, routes of administration and correctness of inhalational technique if on inhalational medications. The details of treating physicians, compliance and causes for non compliance for medications, adverse effects of asthma medications, any concomitant drug usage, and presence of any confidante and frequency of contact with him/her, associated co-morbid conditions and quality of life indicators were taken into account. Patients were followed up at 15th day 1st, 2nd and 3rd month. At each follow up, questionnaire based improvements or deteriorations, type of medications, routes of drug delivery, techniques of usage of devices and compliance were noted. PEFR (Peak Expiratory Flow Rate) testing was also done at each visit. Ethical clearance was obtained.

Results

Table 1: Both groups were comparable with regards to gender, rural urban background and marital status, except that death of spouse was significantly higher in elderly. Symptoms were significantly more predominant in elderly and history of atopy was significantly more in young.

Table 2: As per GINA guidelines, moderate persistent and both moderate and severe persistent asthma was significantly higher in elderly. Significantly more young received care from pulmonologist and were prescribed inhalational therapy.

Table 3: Baseline compliance and confidence and correct usage of inhalational devices were significantly higher in young. Statistically significant higher non compliance was present in elderly who was due to cost and poor memory. Elderly had significantly higher number of comorbidities, especially hypertension, visual impairment, depressive symptoms and osteoarthritis resulting in significantly higher number of concomitant drug usage. Elderly also had poorer contact with the confidante and impaired quality of life, fatigue and impaired social functioning.

Table 4: Lung function, compliance, confident and correct usage of device improved with each follow up in both elderly and young but for the fall in compliance in the elderly at 2nd follow up.

Discussion

Despite the fact that perception of symptoms is poor in elderly, in our study, elderly had more symptoms which may be because of higher comorbidities and poor control of asthma due to severe disease, memory and cost constraints[4-7].

Although atopy was significantly higher in younger asthmatics, but avoidance of potential allergens in both elderly and young asthmatics should be advised [8,4].

Although asthma in elderly may be a continuum of young age, but in present study 84% patients had onset after age of 40 years. So diagnosis of asthma in elderly without history of asthma in early childhood should be kept in mind. Similar [8] or contradictory [9] findings have been observed in previous studies.

Elderly patients had more severe disease than young; this is

similar to study by Barr [2]. Elderly patients were having higher GINA gradation (moderate persistent asthma and both moderate and severe persistent asthma taken together ($p=0.025$)). This can be explained with delay in diagnosis because of poor perception at early stage, poor access to care, delay in starting and inadequate treatment, poor inhalational technique, poor compliance because of cost and memory and absence of confidante because of death of spouse in elderly. Despite having higher symptoms, elderly attributed their symptoms to comorbidities rather than asthma. Moreover, elderly may be placed in higher gradation of GINA guidelines because of low base line lung functions because of natural decline with age.

Severity of asthma may reflect poor family support and loneliness of patients especially in elderly whose spouse is not alive. I. Baiardini et al. [10] concluded that older age is associated with a greater patient perception of a low degree of support from family and friends.

Psycho social and financial factors also gain more importance, especially in case of widowed females in Indian setting who are mostly financially dependent.

	Elderly(n=50)	Young(n=50)	P value
Sex			
Males	26	34	NS
Females	24	16	NS
Background			
Rural	24	31	NS
Urban	26	19	NS
Marital status			
Married	32	38	NS
Unmarried	0	11	
Spouse dead	18	1	0.0001
Symptoms			
Daily cough	19	7	0.006
Wheezing	18	5	0.002
History of atopy	29	42	0.004
Age at onset			
<40years	8	50	0.0001
>40years	42	0	0.0001

Table 1:

	Elderly	Young
GINA Guidelines		
Intermittent	16(32%)	23(46%)
Mild Persistent	15(30%)	20(40%)
Moderate Persistent	15(30%)	5(10%)
Severe Persistent	4(8%)	2(4%)
Treating Physician		
Pulmonologist	16(32%)	27(54%)
General Physician	21(42%)	15(30%)
Alternate System of Medication	4(8%)	3(6%)
Quack	9(18%)	5(10%)
Inhalational Therapy		
Pulmonologist	16(32%)	27(52%)
General Physician	7(14%)	6(36%)
Alternate System of Medication	0	0
Quack	0	0
Type of Device		
DPI	17(73.9%)	26(78.8%)
MDI	2(8.7%)	2(6.1%)
MDIS	4(17.4%)	5(15.1%)

Table 2: As Per GINA GUIDELINES.

	Group-A(Elderly)	Group-B(Young)	P value
Baseline Compliance	20(40%)	35(70%)	0.0003
Reasons for non compliance			
Cost	6(20%)	4(26.7%)	NS
Cost & Poor Memory	7(23.3%)	0	0.001
Poor Memory	11(36.7%)	0	0.001
Relief of Symptoms	6(20%)	11(73.3%)	NS
Baseline use of Inhalational therapy	23(46%)	33(66%)	0.044
Technique of Inhalation			
Confident and Demonstrate Correctly	7(30.4%)	19(57.6%)	0.045
Confident but does not Demonstrate Correctly	14(60.9%)	12(36.4%)	NS
Neither Confident Nor Demonstrate Correctly	2(8.7%)	2(6%)	NS
Number of comorbidities			
0	1(2%)	31(62%)	0.0001
1	12(24%)	11(22%)	NS
2	9(18%)	5(10%)	NS
3	11(22%)	2(4%)	0.007
≥ 4	17(34%)	1(2%)	0.0001
Type			
Gastro Esophageal Reflux Disease	33(66%)	18(36%)	0.0027
Hypertension	28(56%)	5(10%)	0.0001
Visual Impairment	27(54%)	4(8%)	0.0001
Depressive Symptoms	26(52%)	4(8%)	0.0001
Osteoarthritis	20(40%)	0	0.0001
Hearing Impairment	2(4%)	0	NS
Benign Hypertrophy Prostate	6(12%)	0	0.027
Senile Dementia	5(10%)	0	NS
Diabetes Mellitus	3(6%)	2(4%)	NS
Other drug use			
0	16(32%)	30(60%)	0.039
1	7(14%)	10(20%)	NS
2	5(10%)	5(10%)	NS
3	8(16%)	4(8%)	NS
≥ 4	14(28%)	1(2%)	0.001
Presence of confidante	40(80%)	48(96%)	0.01
Frequency of contact with confidante			
Daily	17(34%)	40(80%)	0.002
Weekly	9(18%)	6(12%)	NS
< monthly	4(8%)	1(2%)	NS
Monthly	10(20%)	1(2%)	0.007
No Contact	10(20%)	2(4%)	0.021
Impaired Quality of Life	27(54%)	7(14%)	0.001
Depressive Symptoms	26(52%)	4(8%)	0.001
Fatigue	33(66%)	18(36%)	0.003
Impaired Social Functioning	24(48%)	13(26%)	0.023

Table 3: Baseline Compliance and Confidence and Correct usage of Inhalational Devices.

Elderly had poorer lung function values which were similar to findings of Quadrelli [6] who also showed that worst FEV₁ was lower in older patients.

In consistence to study by Diette [4], in our study also, significantly more young received care from pulmonologist than elderly. In India, there is unequal distribution of health care providers. Most of the pulmonologists are stationed in specialized centers which were easily accessible to young, but elderly were constrained to get treatment from locally available general physicians, alternate system of medication or quacks. Pulmonologists are more likely to be prescribing inhalational medications and educate about disease and treatment.

Receipt of inhalation therapy through care by pulmonologist than by Quack, general physician or alternate system of medication was

found to be statistically significant in elderly ($p = 0.001$) and young in consistence with study by Sin [11]. However, young received inhalational therapy more frequently than elderly and result was found to be statistically significant ($p=0.04$).

Lack of familiarity of evidenced based medicine about asthma in general physicians, alternate system of medication and quacks, who are not keeping themselves updated regarding latest trends in medical care may partly explain this disparity. Although various asthma consensus guidelines have been promulgated widely over past decade, there remains a substantial gap between recommended and actual practices regarding inhaled steroid therapy, particularly among primary care physicians. Our findings are consistent with the prevailing paradigm that information dissemination by itself is ineffectual in modifying

practice patterns; more research is needed to identify various physician, patient and structural barriers present within current health care system.

Physician concerns about safety of inhaled steroid therapy in elderly are plausible explanations for significant age related underutilization of inhaled steroids [12].

In our study it was seen that baseline use of inhalational therapy was only 46% amongst elderly and 66% amongst young. Reasons for prescription of oral medications in rest of the patients may be that either treating physician had not prescribed inhalational drugs or patient had refused for the same because of cost or myths on inhalational medications prevalent in India. When all these 44 patients were followed up during a course of 3 months, it was seen that inspite of the prescription of inhalational therapy, 8 patients could not sustain themselves on the inhaled medications because of cost constraints and therefore, they were to be shifted again to oral medications which were supplied to them free of cost. This emphasizes need for availability of inhalational medications free of cost in a resource poor setting like ours. It has been proved worldwide that inhalational steroids and treatment of asthma is economical because of lesser emergency room visits, cost of hospitalizations, better quality of life, fewer loss of working days and lesser side effects.

It has also been found that the patients are more comfortable in using DPI and DPI's can be understood better and quickly by patients than MDI's. It may also depend upon physicians preferences.

As far as inhalational methods are concerned, it has been seen that a failure to instruct patients about different inhalers and how to use them and to reinforce these instructions decreases compliance and inhaler efficacy [13].

In our study, it was seen that young asthmatics were more confident and correctly used inhalational therapy than elderly ($p=0.045$). Similar results were seen by Pereira [12]. These results could be explained by the fact that young are better able to understand instructions and memorize steps efficiently than elderly. Elderly are less confident, have poor memory because of ageing, poor effort and poor coordination of various steps as well. This necessitates importance of repeated demonstrations by treating physician for use of inhalational device at every visit for efficient drug delivery especially in elderly. Information dissemination must include verbal instructions, demonstrations and practice sessions and these must be checked periodically to ensure that

patient's skills have not been eroded. The latter include reduced patient suffering and increased cost efficacy.

Presence of comorbidities is relevant with respect to presentation, recognition and management of older patients with asthma. There may be poor perception of symptoms of asthma itself because patient may under rate symptoms and attribute his symptoms to be because of aging or associated co morbid conditions. It is not uncommon, even for physician to be in a diagnostic dilemma for the same because hallmark symptoms of asthma, including shortness of breath, wheeze and cough are non specific and mimicked by other disease such as CHF, COPD, chronic aspiration, GERD and trachea-bronchial tumour. High prevalence of comorbidities in our study is consistent with other studies [1,4,5,7].

GERD was present in 66% elderly and 36% young ($p=0.003$). GERD is known to trigger exacerbation of asthma. Asthma can also lead on to GERD because of aerophagia, hyperinflation of lungs and drugs which are used for treatment of asthma can cause relaxation of lower esophageal sphincter [14]. Acid peptic disease in patients of asthma having ≥ 4 comorbidities was more. In our study, medications used for comorbid conditions may be causing gastritis and APD. In patients of asthma, adequate control of GERD/APD is of paramount importance to have adequate control of asthma.

Hypertension was present in 56% elderly and 10% young ($p=0.0001$). Hypertension with resultant cardiomegaly/ischaemic disease can lead on to cardiac stress and cardiac asthma. In elderly patients with hypertension and cardiac disease, patients can have breathlessness and rhonchi on auscultation. Similarly, a patient of asthma can also have problems of breathlessness. So, in an elderly patient, diagnosis of asthma may be overlooked. It will be judicious clinical practice to rule out asthma in elderly with hypertension and cardiac disease [8].

In elderly, significantly higher visual impairment can be because of presbyopic changes and other senile changes in eye. Visual impairment can be a cause for social, psychological and financial problems in elderly asthmatics. If patients with asthma are having severe visual impairment, then it may become difficult for them to read name of medications or to recognize medications properly, thus patient may not be able to recognize reliever and controller medications. In patients with severe visual impairment, this problem can be overcome by assigning different colors to different asthma medications [8]. It will

		Base Line	15 th Day1	15 th day	1 st Month	2 nd Month	3 rd Month
Symptoms Decrease	Elderly		45(90%)		50(100%)	38(76%)	47(94%)
Increase	Elderly		2(4%)		0	2 (4%)	0
Same	Elderly		3(6%)		0	10(20%)	3 (6%)
Decrease	Young		48(96%)		50(100%)	44(88%)	48(96%)
Increase	Young		1(2%)		0	0	0
Same	Young		1(2%)		0	6(12%)	2(4%)
Compliance	Elderly	20(40%)	34(68%)		24(48%)	27(54%)	44(88%)
	Young	35(70%)	43(86%)		45(90%)	45(90%)	48(96%)
Technique of Inhalation	Elderly	7(30.4%)	22(44%)		31(62%)	39(78%)	43(86%)
	Young	19(57.6%)	32(64%)		46(92%)	47(94%)	49(98%)
Mean PEFR	Elderly	75.25%	76.7%		77.92%	79.2%	81.13%
	Young	84.38%	86.09%		87.71%	88.76%	89.74%
Adverse effects	Elderly	19(38%)	2(4%)		1(2%)	0	3(6%)
	Young	18(36%)	2(4%)		1(2%)	0	0
Emergency Admissions	Elderly	5(10%)	1(2%)		0	3(6%)	0
	Young	3(6%)	0		0	0	0

Table 4: Follow up profile.

be worthwhile to assign different standardized colors to reliever and controller medications globally so that illiterate and patients having visual impairment can easily differentiate these. Patient may have to be assisted by another member of family or health care worker for proper drug delivery.

Significantly higher depressive symptoms in elderly may be because of asthma itself, loneliness and inability to earn or socio psychological problems faced by them. Presence of various comorbidities can also aggravate the depressive symptoms.

Osteoarthritis, hearing impairment, senile dementia and BHP are problems related to normal physiological processes of aging, but gain more importance in elderly asthmatics because of increased number of other drugs to be used for these problems or multiplicity of drugs can pose problems like forgetfulness on the part of patient preventing him/her from taking appropriate medication regimens. This can also cause a vicious circle by not only aggravating asthma, but also affecting depressive symptoms, social functioning and various quality of life parameters.

It has been postulated number of times that GERD in many patients may be due to excess medications they are already taking. These include drugs like anticholinergics, smooth muscle relaxants (β adrenergic agents, aminophylline, nitrates, calcium channel blockers and phosphodiesterase inhibitors) etc [14]. This was confirmed from our study, where it was seen that all (100%) the patients who were already on ≥ 4 drugs use, complained of GERD ($p=0.009$ amongst elderly and $p=0.001$ amongst young).

As seen by Pereira [13], in our study also more of young were compliant in taking their medication than elderly. Amongst 30 non compliant patients amongst elderly, cost was reason in 6 patients, memory in 11 patients ($p = 0.001$) and both cost and memory in 7 patients ($p = 0.001$). Although poor drugs compliance is more common in developing countries, but several studies have suggested that patients from low-income, ethnic-minority groups (primarily African American) in developed countries may have lower rates of adherence to asthma therapy [3]. However there were differences between actual presence of senile dementia and poor memory for taking medications, with only 5/11 (45.54%) patients having senile dementia and rest all having poor compliance due to forget fullness because of high total number of medications they were taking in a single day because of associated comorbidities. In our study, relief of symptoms was an important reason for leaving medication in young but not in elderly. Reason may be that in young, without any comorbid conditions, symptoms which were only due to asthma disappeared on taking medications but in case of elderly, symptoms may persist not because of asthma but because of other comorbid conditions.

Non significant differences in adverse effects of asthma medications in elderly and young were observed. Adverse effects encountered were not significant enough to warrant stoppage of treatment.

80% elderly and 96% young had one or other confidante. Importance of confidante lies in the fact that if patient can share his/her problems with someone, he/she may have a better quality of life with even improvement in disease parameters like symptomatic profile and compliance. There is substantial evidence that peer support among patients can improve adherence to therapy while reducing the amount of time devoted by health professionals to the care of patients with chronic conditions [3]. More of young had more contact frequency with confidante than elderly. Patients who were not having any confidante had more severe disease with more of non compliance and poor quality of life in our study. Results were found to be statistically

significant with respect to daily ($p=0.002$), monthly ($p=0.007$) and no contact ($p=0.0021$) in elderly and young. Similar results were obtained by Adams [1]. Elderly are more likely to have less confidante because they may be more likely to have lost spouse in old age and may not be able to mix with people because of physical, financial and psychological problems.

In our study, statistically significant differences in quality of life amongst elderly and young may be because of various factors, being due to asthma itself or presence of associated comorbid conditions, psychosocial and financial factors and poor family support etc. This is similar to study by Enright [6]. Statistically significant differences in elderly and young with regards to depressive symptoms, fatigue, emotional well being and impairment of social functioning were similar to other studies [2,15].

Non significant differences in emergency hospitalizations in previous one year were also similar to previous studies [1,4].

It is seen that continued treatment with inhaled medications is important because there is growing evidence that persistence of airway inflammation predisposes to airway remodeling resulting in airway fibrosis and irreversible airflow obstruction. Because this risk increases with duration of asthma and age, adequate treatment with anti inflammatory medications (inhaled steroids) is particularly important in elderly asthmatics. Moreover, although patients reach clinical stability during hospitalization, their airway remains inflamed chronically, predisposing them to suffer relapses if controller medications are not used.

During first follow up at 15th day, all patients had already been put on inhalational medications. Both groups showed improvement in symptoms, compliance, technique of inhalation and PEFR. There was fall in emergency admission rate. Patients were advised inhaled medications rather than oral medications resulting in fall in adverse effects which was visible on first follow up.

During 2nd follow up visit at 1st month, all elderly and young improved symptomatically with improvements in lung functions. Compliance fell from a previous of 68% amongst elderly to 48% and rose from 86% to 90% amongst young necessitating requirement of continued follow ups, especially in elderly. Non compliance was attributed to cost of medications because rest of variables like memory, need for medication despite relief etc. can be improved upon by counseling and other appropriate measures, but cost of drugs is a variable which is difficult to improve upon. Technique of inhalation also improved in both groups stressing need of demonstration of device usage at follow up visits for better drug delivery. Adverse effect profile also fell down further. There was no admission at follow up at 1st month.

During follow up at 2nd month, symptomatic profile, compliance, drug delivery techniques and mean PEFR further improved. Adverse effect profile fell down with no patient complaining of adverse effect due to inhalational medications. However, at this point, it was realized that patients who were non compliant due to cost, could not be further sustained upon inhalational medications despite repeated motivations. 7 patients amongst elderly and 1 amongst young were put on only oral medications which were supplied free of cost to them and thus at follow up at 3rd month, these patients were not on inhalational medications any more. Also, 3 elderly were admitted for worsening of disease, while there was no admission amongst young.

During follow up at 3rd month, symptomatic improvement was seen in 94% elderly and 96% young. Compliance further improved

however, adverse effect profile deteriorated with 6% complaining of adverse effects amongst elderly and none amongst young, thus showing that oral medications are associated with a poorer adverse effect profile, where as inhalational medications are found to be much safer. Technique of inhalation was checked amongst all elderly and young, irrespective of the fact that whether they were on inhalational medication or not and it was found that it further improved with improvements in mean PEFr as well.

Thus, after follow ups and monitoring of various parameters amongst elderly and young asthmatics, it is concluded that both groups need continued monitoring, motivation and repeated checking by physician for appropriate delivery of drugs, compliance and symptomatic improvements.

The study also shows that in elderly, various factors like physical, physiological and economic and comorbidities are likely to lead to under-diagnosis at an initial stage and then under-treatment at a further stage. They are more likely to become non compliant even after diagnosis with poor inhalational techniques, necessitating important role of treating physician in prescribing, demonstrating, motivating and repeatedly checking device use at every follow up visit, especially in elderly.

Summary and Conclusion

It can be concluded that there is significant difference between elderly and young asthmatics, right from presentation to final outcomes. This includes differences in symptomatic profile, history of atopy, severity of disease, baseline lung function tests and management parameters including treating physician, routes of drug delivery, compliance with medications and confidence and technique of taking inhalational medications. There are also differences in psycho social profile, presence of living spouse, family support and quality of life indicators. If patient can share his/her problems with someone, he/she may have a better quality of life with even improvement in disease parameters like symptomatic profile and compliance. Elderly are more likely to have less confidence because they may be more likely to have lost spouse in old age and may not be able to mix with people because of physical, financial and psychological problems. Patients who were not having any confidante had more severe disease with more of non compliance and poor quality of life in our study. Elderly are likely to have significant comorbid conditions and higher number of drug usage, which can have significant effect on diagnosis, treatment and goals of asthma management. Also elderly are facing denial, social isolation, cognitive impairments and poor economical and psychological parameters. Elderly attribute their symptoms to be because of aging or associated co-morbidities. Thus there is under-diagnosis at first stage. Once diagnosed, it is undertreated because of underuse of inhalational devices and poor inhalational techniques.

Therefore, on the part of physician, it is necessary that he be aware of various drugs available and their safety, inhalational techniques and their proper usage. Treating physicians have to make a note of differences in diagnosis, treatment, psychosocial and financial factors especially of co-morbidities and drugs used for co-morbidities which can have an important impact on asthma management. Information dissemination must include verbal instructions, demonstrations and practice sessions and these must be checked periodically. There must be continued motivations by physician for improving compliance especially in elderly. Since patients managed by pulmonologist fared better as compared to primary care physicians, quacks and alternate system of medication, so the latter group need to be made aware asthma guidelines and use them properly.

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