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Research Article

**A CROSS SECTIONAL STUDY ON THE SPECTRUM OF
DIFFERENT CAUSES OF CHRONIC COUGH AND
CORRELATION OF THESE CAUSES WITH BASELINE
FACTORS**¹Dr Muhammad Shahan Raza, ¹Dr Saadia Rafique, ²Dr Momena Zia¹Mayo Hospital Lahore²Jinnah Hospital Lahore**Article Received:** May 2020**Accepted:** June 2020**Published:** July 2020**Abstract:**

Objective: The aim of this study is to examine the spectrum of reasons of chronic cough in our region and to find out the correlation of various reasons of chronic cough and different baseline factors as body mass index, age and gender and comparison with other populations.

Methodology: A sum of 236 patients who visited Mayo Hospital, Lahore from March 2018 to March 2020 were the participants of this transverse research work. We defined the chronic cough as cough from more than 8 weeks. Most common reasons of chronic cough were variant asthma, ILD (Interstitial Lung Disease), allergic rhinitis, Gastroesophageal reflux complication, BHR (Bronchial Hyper Reactivity), cough induced by ACE-inhibitor and some others. We also recorded the clinical as well as demographic data.

Results: Average age of the patients was 45.160 ± 16.50 years. The average body mass index of the patients was 26.230 ± 4.680 kg/m². Major reason of chronic cough was variant asthma in 47.0% (n: 111) patients. There was a positive correlation of the age of the patients with the Interstitial Lung Disease and cough induced by ACE-inhibitor. There was high presence of Interstitial Lung Disease & ACE-inhibitor induced cough in female patients. There was a significant association of BMI with the ACE-inhibitor induced cough.

Conclusion: Variations of epidemiology of chronic cough, variant asthma, allergic rhinitis & ACE-inhibitor cough is comparable to data present in the world whereas there is existence of the differences with the epidemiology of Interstitial Lung Disease. There is requirement of further research works in this particular field to define the local trends and to compare these trends with other populations.

KEYWORDS: Demographic, Interstitial Lung Disease, ACE-I Induced Cough, Chronic, Baseline, Bronchial Hyper Reactivity, Asthma.

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INTRODUCTION:

Cough that normally continues for at least eight weeks is known as chronic cough. About 10.0% to 20.0% population of the world is affected by cough which has chronic nature [1]. The most common reasons included post-nasal drip syndrome normally after the viral upper RTI (Respiratory Tract Infection), CVA (Cough Variant Asthma) & gastro-esophageal reflux disorder. Some other important reasons include unnecessary vasomotor responsiveness, smoking, chronic sinusitis and ACE-I [2]. Less frequent reasons may include recurring tonsillitis, cancers, chronic infections and parenchymal lung disorders [2]. In the patients with normal radiograph of chest, no definitive smoking history, usage of drugs particularly ACE-I (Angiotensin-Converting Enzyme Inhibitors), Cough Variant Asthma and GERD (Gastro-esophageal Reflux Disease) are most common detected reasons of chronic cough [1, 2].

There are different reasons of chronic cough depending upon various factors including distribution of age, sex and weight. Different research works of cough in in the group of younger age include allergic rhinitis, asthma and sinusitis whereas in the patients of older age, these include the reasons of parenchymal lung complications, tumors and medication. Some reasons including asthma are more common in female gender whereas other reasons as lung cancer are more frequent in male patients [3]. There is less data available in our region of country. This research work aimed to examine the spectrum of the reason in our region and to find out that if there was an association between the reasons of cough and baseline factors as sex, age and BMI in our population.

MATERIAL AND METHODS:

This transverse research work was carried out in Mayo Hospital, Lahore from March 2018 to March 2019 on the patients suffering from chronic cough. All these patients were referred to chest clinic of our institute because of persistent cough. 38 was the calculated sample size with the use of Open-Epi calculator with rate of incidence of chronic cough as 2.50% [4], error margin as 5.0% with 95.0% CI (Confidence Interval), and we collected the information of 236 patients. We utilized the non-probability consecutive sampling technique for sampling. We explained the aim and other advantages of this research work to the patients and we took the written consent from the patients of this research work. Ethical committee of the hospital gave the permission to conduct this research work. Patients from both genders irrespective of their weight and age having equal or more than 18 years of age and suffering from chronic cough were the

participants of this research work. Details about demography and testing results of the patients were gathered on a well-organized Performa. We conducted all the investigations in accordance with the standard methods. We defined the chronic cough as persistent cough for equal or more than 8 weeks [2]. We categorized the BMI groups according to international standards. We took the detailed history of the patients including past smoking history, diurnal variation of symptoms, infections of respiratory tract, gastro-esophageal reflux, post-nasal drip, utilizations of drugs as ACE-I, asthma history in family, other co-morbidities as DM (Diabetes Mellitus), HTN (Hypertension), IHD (Ischemic Heart Disease) and chronic diseases of liver and kidneys.

We performed the X-ray of chest & spirometry for all the patients. We recorded all the results as reported by the radiologist. We also recorded the final diagnosis after the imaging and laboratory work-up. The diagnosis of the cough variant asthma was carried out with the combination of past history and findings of spirometry. We also diagnosed the allergic rhinitis by symptomology and ENT assessment, BHR (Bronchial Hyper-Reactivity) by the past medical history of the infection of chest due to cough and we performed the high-resolution computed tomography of test for ascertaining the ILD (Interstitial Lung Disease). We used the SPSS V.23 for the statistical analysis of the collected information. We utilized the simple descriptive statistics for the calculations of frequencies, average values and percentages. We calculated the averages and SD (Standard Deviation) for the continuous variables like body mass index and age. We calculated the categorical variables in frequency and percentages as gender and various reasons of chronic cough. We used the Spearman's non-parametric correlation test for the analysis of the variation between the different reasons of chronic cough and various baseline factors as body mass index, sex and age of the patients. P value of lower than 0.050 was considered as significant statistically.

RESULTS:

In this research work, we analyzed total 236 patients. The average age of the studied population was 45.160 ± 16.5 years, whereas average body mass index of the patients was 26.230 ± 4.680 kg/m². There were total 60.20% (n: 142) females and 39.80% (n: 94) males in this research work. According to the collected data, 92.40% (n: 218) patients were non-smokers, whereas 7.60% (n: 18) patients were smokers. The characteristics of the patients are present in Table-1.

Table-I: Patient Characteristics

Characteristics		No / Mean	Percentage / SD
Age (in years)		45.16	16.50
Age Group (in years)	<20	9	3.80
	21-40	93	39.40
	41-60	88	37.30
	>60	46	19.50
Gender	Male	94	39.80
	Female	142	60.20
BMI (kg/m ²)		26.23	4.68
BMI Group	Underweight	10	4.20
	Normal	64	27.10
	Overweight	81	34.30
	Obese	38	16.10
	Very Obese	2	0.80
	Smokers	18	7.60

The most important reasons of the chronic cough observed by this research work in our population were variant asthma, Bronchial Hyper Reactivity, Interstitial Lung Disease, allergic rhinitis, GERD and ACE-inhibitor induced cough. Some other reasons are tuberculosis, smoking, malignancy of lungs and CCF (Congestive Cardiac Failure). The rate of occurrence of the reasons present in our patients are present in Table-2.

Table-II: Frequency of Causes of Cough

Causes of Cough	No	Percentage
Cough variant asthma	111	47.00
Allergic rhinitis	29	12.30
GERD	18	7.60
BHR	18	7.60
ILD	24	10.20
ACE-I induced cough	14	5.90
Others (Total)	15	16.40
Tuberculosis	9	3.80
Lung Malignancy	3	1.30
Smoker's cough	5	2.10
Heart failure	5	2.10

We determined the variations of the major reasons of chronic cough with age, sex and body mass index through correlation and these are present in Table-3. There was significant association between elder age with Interstitial Lung Disease, usage of ACE-Inhibitors and congestive cardiac failure as well as younger age with Cough Variant Asthma and allergic rhinitis.

Table-III: Correlation Between Different Causes of Cough and Patient Characteristics

Causes of Cough	Age in years r (p)	Gender r (p)	BMI r (p)
Cough variant asthma	-0.22** (0.00)	0.01 (0.83)	0.02 (0.75)
Allergic rhinitis	-0.0028	0.06 (0.32)	-0.13 (0.05)
GERD	-0.06 (0.30)	0.09 (0.15)	-0.00 (0.95)
BHR	0.01 (0.88)	-0.00(0.93)	0.07 (0.28)
ILD	0.36** (0.00)	-0.0052	0.06 (0.38)
ACE-I induced cough	0.15* (0.01)	-0.0052	0.14* (0.04)
Tuberculosis	-0.00(0.92)	-0.02(0.68)	-0.09 (0.18)
Smoker's Cough	0.03 (0.63)	0.18** (0.00)	-0.08 (0.26)
Lung malignancy	0.04 (0.51)	0.06 (0.34)	-0.10(0.13)
Heart failure	0.14* (0.02)	-0.06 (0.36)	0.00 (0.93)

GERD - Gastroesophageal Reflux Disease, **BHR** - Bronchial hyper-reactivity, **ACE-I** - ACE-Inhibitor drug

We also observed a strong association between the female gender with Interstitial Lung Disease and usage of ACE-inhibitor, as well as male sex and smoking cough. There was significant association of higher body mass index with the ACE-I cough only but not with the other reasons of the cough.

DISCUSSION:

In this current research work, the most important reason of persistent cough was cough variant asthma which was followed by Interstitial Lung Disease, allergic rhinitis, Bronchial Hyper Reactivity, GERD and cough induced by ACE-inhibitor. The most common cause of chronic cough in this current research work was Cough Variant Asthma and this cause was present with strong association with the younger age group which is similar with the literature of this field. There is no significant association of Cough Variant Asthma with body mass index and gender in this current research work even though the hypothesis stated that there is possible association between different allergic diseases as asthma and obesity [6]. But the number of the obese patients in this research work was very low to find any association. Furthermore, there is clear evidence that there is greater association of female gender with asthma as compared to men [7]. But in this current research work, we were not able to find this association. There is need of other research works on large sample size to further assess these outcomes. Another frequent reason, allergic rhinitis, had very prevalence in the patients of younger age in this current research work which is much comparable with the research works conducted in Italy and USA [8, 9]. These research works showed the high incidence in children with a decrease in the prevalence in adults. Much similar with the research works conducted in past [8, 9], there was no significant predominance of gender in this research work. There are conflicting results about the association between body mass index and allergic rhinitis. Some research works are in favor of this association [10] and some are against this association [11]. In this current research work, we did not find any relationship between body mass index and allergic rhinitis. There is need of further research works on large sample sizes to consolidate the findings of this research work.

There is strong association of Interstitial Lung Disease with the increase in age according to the results of this research work which is comparable with the research studies conducted on American populations [12]. Different from the data of other populations, we discovered the Interstitial Lung Disease more prevalent in females as compared to males in our setup [12, 13]. There is need of exploration of the reason behind the high incidence of Interstitial Lung Disease in female gender in our country Pakistan. In current research work, we did not find any association between Interstitial Lung Disease and body mass index. There is high incidence of GERD in the patients with increasing

age and individuals present with obesity [14, 15]. There is no significant association of bronchial hyper-reactivity with the sex, body mass index and age in our research work although data suggested that there is association of advancing age with the enhanced bronchial hyper-responsiveness regardless of the coexisting pulmonary complication [16]. A research work conducted in Italy on large sample size, provided the definitive evidence of relationship between body mass index and Bronchial Hyper Reactivity [17]. We discovered in this research work that female gender and high body mass index as the highest risks of cough induced by ACE-I, which is much consistent with the research work conducted in Sweden [18]. Between other reasons of cough, there is strong association of the smokers' cough with the male gender. In our country, Pakistan, there is high prevalence of smoking in male gender as compared to the females [19] and our research work showed the similar findings. We also discovered the failure of heart with high prevalence in elders which is also consistent with the data [20]. No other reasons of chronic cough showed any important occurrence pattern on the basis of body mass index, sex and age.

CONCLUSION:

This research work showed that variant asthma was the major reason of chronic cough in our population. This research work also showed that variable nature of epidemiology of variant asthma, ACE-I induced cough was much comparable with the data present in other regions of world. There was prevalence of Interstitial Lung Disease in the females of our population as contrary to other populations. There is requirement of further research works to describe the trends in this respect and to compare these trends with the trends of other populations of world. It is much vital to detect the reasons of chronic cough by basic examination as chest radiography & spirometry to proceed with proper management to decrease the burden of recurring appearance of the patients in OPDs.

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