



PREVALENCE OF CHRONIC RESPIRATORY DISEASE AND ASSOCIATED FACTORS AMONG ADULT POPULATION IN A RURAL FIELD PRACTICE AREA OF A TERTIARY CARE CENTRE IN KOZHIKODE DISTRICT

*Dr. Krishna raj JS¹, Dr Roshni SS², Dr Shakhy vati³, Dr Swetha NirmalP⁴, Dr Aswini Navaratna Sashi⁵, Dr Akshara Krishnadas⁶, Dr Kannian Binub⁷, Nandana Prasanth⁸

- ¹. Associate Professor, Department of Community Medicine, Malabar Medical College Hospital and Research Center, Kozhikode, Kerala, India, speaktodrkishnaraj@gmail.com
- ². Assistant Professor, Department of Community Medicine, Government Medical college, Wayanad, roshnijabir90@gmail.com
- ³. Assistant Professor, Department of Community Medicine, Malabar Medical College Hospital and Research Center, Kozhikode, Kerala, India. shakhy1988@gmail.com
- ⁴. Postgraduate, Department of Community Medicine, Department of Community Medicine, Malabar Medical College Hospital and Research Center, Kozhikode, Kerala, India, swethanirmalp4492@gmail.com
- ⁵. Postgraduate, Department of Community Medicine, Department of Community Medicine, Malabar Medical College Hospital and Research Center, Kozhikode, Kerala, India, ansashi@gmail.com
- ⁶. Postgraduate, Department of Community Medicine, Department of Community Medicine, Malabar Medical College Hospital and Research Center, Kozhikode, Kerala, India, aksharavkrishna@gmail.com
- ⁷. Professor, Department of Community Medicine, Malabar Medical College Hospital and Research Centre, Kozhikode, Kerala, India, kannianbinub@gmail.com
- ⁸. Undergraduate Student MBBS, Department of Community Medicine, Malabar Medical College Hospital and Research Centre, Kozhikode, Kerala, India, nirmalanambiar2381@gmail.com

***Corresponding Author:** Dr. Krishnaraj J S, Associate Professor, Department of Community Medicine, Malabar Medical College Hospital and Research Center, Kozhikode, Kerala, India, speaktodrkishnaraj@gmail.com

Abstract:

Background: Chronic respiratory diseases (CRDs) are leading global health concerns causing nearly four million deaths annually, with India contributing about 16% of global cases. Our study aimed to estimate prevalence and associated factors of chronic respiratory diseases among adult population in the rural field practice area of a Tertiary Care Centre in Kozhikode and to assess the severity of dyspnea among the study population. **Methodology:** : A community based cross sectional study was conducted in the rural field practice area of a tertiary care centre in North Kerala among adults above 18 years who gave informed consent. The sample size calculated was 165. Participants were selected through consecutive sampling. Data collected using Chronic obstructive disease Assessment Test, the European Community Respiratory Health Survey for asthma and Medical Research Council Scale for dyspnoea. Analysis was done using SPSS version 20. Results: Out of 165 participants, 129 (78.2%)

showed symptoms of COPD and 31 (18.8%) showed symptoms of asthma. Based on MRC dyspnoea scale, 66.1% had no dyspnoea. Asthma was significantly associated socioeconomic status and COPD significantly associated with age and educational status

Conclusions: Study shows high burden of chronic respiratory diseases which requires immediate and serious public health action, focusing on widespread screening and awareness

Key-words: Chronic Respiratory disease, Chronic Obstructive pulmonary disease, Asthma, Kozhikode

Introduction:

Chronic respiratory diseases (CRD) is an umbrella term to describe diseases that affect the lungs and airways¹. CRDs are among the most common non-communicable diseases worldwide (roughly 545 million cases of CRDs in 2017, mainly due to the global ubiquity of toxic environmental, occupational, and behavioral inhalation exposures. The most prevalent chronic respiratory diseases are COPD (3.9% global prevalence) and asthma (3.6%)². Approximately half a billion people live with asthma and COPD and together these 2 conditions cause almost 4 million deaths every year. More than 1 million of these deaths occur “prematurely” – in people aged under 70 years. 90% of these premature deaths occur in low and middle-income countries (LMICs)^{2,3}.

According to the latest Global Burden of Diseases Report, 2017, India has one of the highest burden of chronic respiratory diseases which contributes to 15.69% of Global Chronic Respiratory Diseases and also has the highest number of COPD (Chronic Obstructive Pulmonary Disease) cases in the world. India also leads the world in deaths due to asthma with 43% of global asthma deaths occurring in our country⁴. However in Kerala, Trivandrum has high prevalence of COPD (10%) which is much higher than the national average. Another study done in Kollam showed that the prevalence of self reported asthma was 2.82% and that of chronic bronchitis was 6.19% while other CRDs which did not fit to either constitute 1.89%.

The prevalence of asthma, which is confused with COPD in field conditions in India, was estimated to be 2.05% in the INSEARCH study and even in this study the highest rates for rural Trivandrum were higher than national average at 4.45 %⁵. The most common risk factor of COPD worldwide is tobacco smoking. According to series of studies initiated by ICMR (INSEARCH-I) in India, smokers had 3 times more risk of developing COPD as compared to non-smokers. Further, among smokers, bidi smokers were at a higher risk of developing COPD (8.2%) than the cigarette smokers (5.9%). In addition, diet, long standing asthma, recurrent respiratory infections in early childhood and tuberculosis are also known to play a role in development of COPD among non-smokers.⁶

Briefly the risk of developing COPD is related to the total burden of inhaled particles that an individual encounters over the lifetime through above mentioned exposures and to any other factor that affect their lung growth during gestation and childhood such as low birth weight and respiratory infections⁶.

Even though Chronic respiratory disease, being one of the major non communicable disease affecting the public health, there are only very few studies done in Kerala. Through this research we can get a broad view of prevalence of chronic respiratory disease in North Kerala and enable us to estimate the risk factors thereby enhance patient's quality of life, help in proper management of symptoms and prevention of development of chronic respiratory diseases. The key objective of this study is to estimate prevalence and associated factors of chronic respiratory diseases among adult population in the rural field practice area of a Tertiary Care Centre in Kozhikode. Also to assess the severity of dyspnea among the study population

Methodology:

A community based cross sectional study was conducted from July to August 2024 in the rural field practice area of a tertiary care centre, Kozhikode. The target population includes adults aged over 18 years residing in the area who provide informed consent, excluding those who are mentally disabled.

The sample size, calculated based on a prevalence rate of 51.06% from a similar study in rural West Bengal⁶, is 165 after accounting for a 10% non-response rate. Participants were selected consecutively from households until data saturation is reached. Data collection was done by face-to-face interviews using a modified, pretested semi-structured questionnaire that captures sociodemographic details, COPD assessment via the COPD Assessment Test (CAT) scale⁷, asthma evaluation through the European Community Respiratory Health Survey (ECRHS)⁸. Clearance from Institutional Ethics Committee has been obtained to conduct proposed study. Informed consent had been obtained from participants before conducting the study.

Tools:

Modified pretested semi-structured questionnaire will be used to assess:

1. Sociodemographic details

2. COPD assessment using CAT scale (COPD Assessment Test)⁶

3. Asthma assessment tool-European Community Respiratory Health Survey (ECRHS)⁷

According to questionnaire asthma was identified in two ways:

1. If subject was ever diagnosed as asthma or had an attack of asthma or had treatment of asthma in his/her lifetime.

2. Asthma was also identified as presence of cough or breathlessness along with at least one of the following asthma specific symptoms:

1) Wheeze without cold

2) Episodes of waking up with chest-tightness first thing in the morning without cold

3) Episodes of waking up in the night with cough, wheezing and shortness of breath without cold

4. Medical Research Council Scale (MRC) for dyspnoea grading⁸

5. Questions to assess associated risk factors.

Data was entered in Microsoft Excel and analysed using SPSS version 20. Descriptive statistics in the form of frequencies, percentages, means and standard deviations were calculated. To test the association between chronic respiratory diseases and sociodemographic factors chi-square test was used and p value <0.05 was considered as statistically significant.

RESULT

The study revealed significantly high burden of chronic respiratory morbidity. The mean age of the population was 49.25 ± 16.5 years and was predominantly female (58.2%). The burden of respiratory issues was immediately apparent with 55% (90 individuals) reporting a prior diagnosis of a respiratory disease. Symptoms consistent with COPD were exceptionally prevalent, reported by 78.2% (129 participants), as assessed using the CAT scale. Furthermore, 31.19% of the participants were identified as having asthma. Despite of these high rates of symptomatic disease, the majority of the population reported low levels of functional breathlessness when assessed by MRC scale 66.1% (109 individuals) scored 0 (no dyspnoea except with strenuous exercise), though 26.7% (44 individuals) reported mild breathlessness (MRC grade 1). Statistical analysis using the Chi square and Fischer's exact tests identified several significant associations with the presence of respiratory symptoms. Asthma symptoms showed strong, significant association with lower socioeconomic status participants from the below middle class income category significantly more likely to report asthma symptoms (p value = 0.002) with odds ratio 2.95. The presence of a cattle shed or poultry in the household environment was also significantly associated with asthma (p value = 0.042).

COPD symptoms were significantly associated with factors like age, educational status and Cattle shed/poultry presence. Being more than 50 years of age was strongly and significantly associated with COPD symptoms (p value = 0.002, Odds ratio: 3.26). The presence of COPD symptoms was significantly associated with lower educational status (higher secondary and below) with p value 0.001 and presence of cattle shed/poultry (p value : 0.043). Notably, established risk factors as smoking habit and type of cooking fuel did not show a statistically significant association with either

asthma or COPD symptoms in this study. The overall findings confirm burden of CRDs in the rural field practice area emphasizing the urgent need to integrate objective diagnostic tools like spirometry into primary healthcare settings and implement target interventions for vulnerable populations.

TABLE 1: Distribution of participants based on Sociodemographic details (N=165)

VARIABLE	CATEGORY	FREQUENCY (N=165)	PERCENTAGE (%)
AGE	<18	4	2.4%
	18-38	45	27.3%
	39-58	62	37.6%
	59-78	52	31.5%
	Above 78	2	1.2%
GENDER	MALE	69	41.80%
	FEMALE	96	58.20%
OCCUPATION	UNEMPLOYED	106	64.20%
	UNSKILLED	12	7.30%
	SEMISKILLED	5	3.00%
	SKILLED	23	13.90%
	SHOP/FARM	7	4.20%
	PROFESSIONAL	12	7.30%
EDUCATION	ILLITERATE	4	2.40%
	PRIMARY SCHOOL	12	7.30%
	MIDDLE SCHOOL	21	12.70%
	HIGH SCHOOL	62	37.60%
	HIGHER SECONDARY	30	18.20%
	DIPLOMA	2	1.20%
	GRADUATE	29	17.60%
	POST GRADUATE	5	3.00%
SOCIOECONOMIC CLASS	UPPER CLASS	31	18.80%
	UPPER MIDDLE	58	35.20%
	MIDDLE CLASS	20	12.10%
	LOWER MIDDLE	30	18.20%
	LOWER CLASS	26	15.80%

Table 2 : Association table for Asthma

VARIABLE	CATEGORY	ASTHMA ABSENT (N)	ASTHMA PRESENT (N)	Chi square value/Fisher's exact test	p value	Odds ratio (CI)
Age	Less than 50 years	64 (47.80%)	16(51.60%)	0.15	0.699	0.72 (0.32-1.61)
	More than 50 years	70 (52.20%)	15(48.40%)			
Education	Higher secondary and below	78(58.20%)	20(64.50%)	0.415	0.519	0.81 (0.76-0.88)
	Higher secondary and above	56(41.80%)	11(35.50%)			
Occupation	Employed (Skilled/Professional/etc.)	82(61.20%)	23(74.20%)	1.839	0.175	0.61 (0.25-1.49)
	Unemployed	52(38.80%)	8(25.80%)			

Prevalence Of Chronic Respiratory Disease And Associated Factors Among Adult Population In A Rural Field Practice
Area Of A Tertiary Care Centre In Kozhikode District

Socioeconomic class	Above middle-class income	96(71.60%)	13(41.90%)	9.909	0.002	2.95 (1.30-6.70)
	Middle-class and Below middle class income	38(28.40%)	18(58.10%)			
Smoking Habit	YES	11(8.20%)	1(3.20%)	0.927	0.336	1.23 (1.14-1.33)
	NO	123(91.80%)	30(96.80%)			
Passive Smoking	YES	19(14.20%)	2(6.50%)	1.353	0.245	2.19 (0.48-9.98)
	NO	115(85.80%)	29(93.50%)			
Regular Physical Activity	YES	88(65.70%)	15(48.40%)	3.207	0.073	0.28 (1.26-6.51)
	NO	46(34.30%)	16(51.60%)			
Cattle Shed / Poultry Present?	YES	14(10.40%)	7(22.60%)	4.124	0.042	0.361 (0.13- 0.99)
	NO	122(89.60%)	22(77.40%)			
Adequate Ventilation	YES	127(94.80%)	29(93.50%)	0.074	0.786	1.36 (0.26 – 6.93)
	NO	7(5.20%)	2(6.50%)			

Table 3: Association table for COPD

VARIABLE	CATEGORY	COPD ABSENT	COPD PRESENT	Chi Square Value/Fisher's exact test	p VALUE	Odds Ratio (Confidence Interval)
Age	Less than 50 Years	24(66.6%)	49(37.9%)	9.386	0.002	3.26 (1.49-7.11)
	More than 50 Years	12(33.4%)	80 (62%)			
Education	Higher secondary and below	21(58.30%)	108(83.70%)	10.635	0.001	0.40 (0.65-2.52)
	Higher secondary and above	15(41.70%)	21(16.30%)			
Occupation	Employed	21(58.30%)	84(65.10%)	0.56	0.454	0.75 (0.35- 1.59)
	Unemployed	15(41.70%)	45(34.90%)			
Socioeconomic class	Above middle class income	25(69.40%)	84(65.10%)	0.235	0.628	1.21 (0.54-2.69)
	Middle class and Below middle class income	11(30.60%)	45(34.90%)			
Smoking Habit	YES	3(8.30%)	9(7.00%)	0.077	0.782	1.21 (0.31-4.73)
	NO	33(91.70%)	120(93.00%)			
Adequate Ventilation	YES	35(97.20%)	121(93.80%)	0.64	0.424	2.31 (0.28-19.7)
	NO	1(2.80%)	8(6.20%)			
Is There Any Cattle Shed/Poultry Present?	YES	1(2.80%)	20(15.50%)	4.104	0.043	0.15 (0.02-1.20)
	NO	35(97.20%)	109(84.50%)			

Discussion:

The current study, conducted in a rural field practice area of a tertiary care centre in Kozhikode, aims to assess the prevalence and associated factors of chronic respiratory diseases. The findings reveal a

significantly high burden of chronic respiratory diseases and a critical analysis of local determinants and potential public health interventions. The observed prevalence of self reported respiratory symptoms (54.5%) is marginally higher than a comparable study in rural West Bengal(51.06%)⁶. This high rate underscores a significant, and potentially under recognized, public health challenge in the surveyed area, suggesting widespread exposure to environmental or occupational respiratory irritants. Most strikingly, the prevalence of suspected COPD reached 78.2%, which is substantially higher than the 62.5% reported in primary care centre in Central Kerala¹⁰. While the cross sectional, questionnaire-based methodology may lead to an overestimation due to symptom overlap with other condition (like chronic asthma or untreated respiratory infection), the figure mandates urgent public health attention. It highlights a massive burden of chronic respiratory complaints that are often managed empirically as COPD in primary care, necessitating immediate scale-up of definitive diagnostic services like spirometry at the primary and secondary care levels. Furthermore, the 18.8% prevalence of Asthma is markedly higher than the 1.18% reported in North West India, indicating regional differences or higher sensitivity of the specific screening questionnaire used¹¹. Regardless of the methodological variations the data confirms a substantial community burden requiring targeted screening and management. The finding that lower socioeconomic status (SES) accounted for 58.1% of subjects reporting asthma symptoms is highly significant. This aligns with global epidemiological evidence and reinforces the role of social determinants of health. Individuals of lower SES often face increased exposure to indoor air pollutants (due to poor housing quality and ventilation), crowded living conditions, inadequate nutrition and reduced access to consistent prophylactic healthcare. This necessitates targeted, equity- based interventions focused on the economically vulnerable population for Asthma screening, trigger control education, and ensuring affordability of maintenance medication (inhalers). In contrast to study in rural Tamil Nadu, which found a higher risk of COPD in biomass fuel users¹², our study did not find a statistically significant association between fuel type and COPD. This non-significant result is critical and may reflect the heterogeneity of risk factors in different regions of South India. Possible reasons include the type of fuel predominantly used, localized improvements in kitchen ventilation practices (even in rural homes), or the inherent limitations of smaller sample size (N=165) to detect marginal associations. From a preventive medicine perspective, however, the global evidence on household air pollution (HAP) remains strong, and community health education on using improved cookstoves and ensuring adequate ventilation should still be prioritized.

LIMITATIONS OF THE STUDY

The primary limitation of this study stem for its cross sectional, questionnaire based design and small sample size (N= 165). The reliance on self reported symptoms introduces potential subjective bias and leads to a lack of objective physiological confirmation. Crucially, without using spirometry (the gold standard), the high prevalence rates for suspected COPD and Asthma cannot be definitively confirmed, potentially leading to an overestimation of the true burden of clinically diagnosed diseases.

RECOMMENDATIONS

Based on the findings, we recommend a critical, multi-pronged public health response: Primary care services must be immediately strengthened through the provision of spirometry at Primary Health Centre (PHC) level to achieve accurate, objective diagnosis of COPD and Asthma, moving beyond symptom-based management. To conduct public health outreach should be aggressively targeted towards the lower socioeconomic status population, which exhibits the highest burden of asthma symptoms, focusing on trigger control education, ensuring access to affordable inhaler medication, and continuous monitoring of environmental risk factors like household air pollution.

Conclusion:

This cross-sectional study confirms a significantly high burden of chronic respiratory symptoms in the rural Kozhikode field practice area, with a substantial percentage of the adult population reporting

symptoms consistent with COPD (78.2%) and asthma (18.8%). Key findings reveal strong, significant associations: asthma symptoms were highly associated with lower socioeconomic status (OR :2.95 ,p value :0.002) and COPD symptoms were strongly associated with being over 50 years of (OR 3.61,p value 0.001),in addition to a significant association with lower educational status. Although most subjects reported low dyspnoea severity, the potential magnitude of undiagnosed or misdiagnosed chronic respiratory disease demands immediate public health action. The results underscore the urgent need to integrate objective diagnostic tools like spirometry into primary healthcare setting for accurate case management and to implement targeted, equity- focused interventions to address the social and demographic risk factors driving morbidity

Acknowledgement: Dept of Community Medicine, MMC, Kerala

References:

1. AIHW Chronic Respiratory Disease [internet]. Available from: <https://www.aihw.gov.au/reports/australias-health/chronic-respiratory-conditions> .Citation on (23.10.2022)
2. Chronic respiratory diseases. WHO[internet].World Health Organisation.available from <https://www.who.int/teams/noncommunicable-diseases/ncds-management/chronic-respiratory-diseases-programme> . Citation on (10-7-2024)
3. Gianluigi Ferrante, Sandro Baldissera, Stefano Campostrini, Epidemiology of chronic respiratory diseases and associated factors in the adult Italian population, European Journal of Public Health. available from :<https://doi.org/10.1093/eurpub/ckx109>
4. COPD.WHO [internet]World Health Organisation.available from [https://www.who.int/news-room/fact-sheets/detail/chronic-obstructive-pulmonary-disease-\(copd\)](https://www.who.int/news-room/fact-sheets/detail/chronic-obstructive-pulmonary-disease-(copd)) . Citation on (12-07-2024)
5. Asthma. WHO [internet]World Health Organisation.avialable from <https://www.who.int/news-room/fact-sheets/detail/asthma> . Citation on (12-07-2024)
6. Ghosh RK, Saha D, Sarma M, Bhattacharyya P, Majumdar S, Chowdhury A, et al. Prevalence and health status of COPD in rural West Bengal. Lung India. 2022 May 1;39(3):242–6
7. CAT.COPD Assessment Test[internet]. available from <https://www.catestonline.org/patient-site-test-page-english.html> . Citation on (12-07-2024)
8. Asthma- Burney P, Jarvis D. THE EUROPEAN COMMUNITY RESPIRATORY HEALTH SURVEY II ECRHS II MAIN QUESTIONNAIRE ECRHS II-Interviewer Administered Questionnaire [Internet]. Available from: www.ecrhs.org
9. MRC Breathlessness Scale [internet]. Available from: <https://www.ukri.org/publications/mrc-breathlessness-scales-1952-and-1959/>
10. Sreelekshmi GR et al.Clinico-epidemiological profile and disease severity of chronic obstructive pulmonary disease among patients in a primary care centre at central kerala.Int J Community Med Public Health.2023 Jun;10(6):2151-2154
11. Sharma V, Gupta R, Jamwal D, Raina S, Langer B, Kumari R. Prevalence of chronic respiratory disorders in a rural area of North West India: A population-based study. J Family Med Prim Care. 2016;5(2):416.
12. Johnson P, Balakrishnan K, Ramaswamy P, Ghosh S, Sadhasivam M, Abirami O, et al. Prevalence of chronic obstructive pulmonary disease in rural women of Tamilnadu: implications for refining disease burden assessments attributable to household biomass combustion. Global Health Action. 2011;4:7226.