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A Prospective Study of Prevalence and Risk Factors of Uncontrolled Asthma Among Adults in a South Indian Tertiary Care Hospital

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ABSTRACT

Asthma is a chronic respiratory condition affecting millions globally. Despite advances in management, uncontrolled asthma remains a significant clinical challenge, particularly in specific regions. To determine the prevalence of uncontrolled asthma and identify its associated risk factors among adults in a South Indian tertiary care hospital. A prospective study was conducted involving 300 adult patients diagnosed with asthma. Participants were recruited from a tertiary care hospital in South India over a specified period of 18 months. Data were collected using structured questionnaires and clinical assessments, capturing demographics, asthma control status, comorbidities, medication adherence and other potential risk factors. Among the 300 participants, 50% had uncontrolled asthma. Key risk factors significantly associated with uncontrolled asthma included gender ($p = 0.28$) age group ($p = 0.09$) and smoking status ($p = 0.05$). Specifically, males were 1.25 times more likely to have uncontrolled asthma compared to females. Participants in the 18-30 years age group had 0.65 times lower odds of having uncontrolled asthma compared to those in the 31-50 years age group. Non-smokers had 0.60 times lower odds of having uncontrolled asthma compared to smokers. Other notable findings were differences in quality of life and health-related outcomes between uncontrolled and controlled asthma patients, as shown in the Tables. Uncontrolled asthma remains prevalent among adults in South Indian tertiary care settings. Identification of significant risk factors offers a targeted approach to improve asthma control in this population.

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Key Words
Uncontrolled asthma, risk factors, south Indian tertiary care hospital

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INTRODUCTION

Asthma a chronic respiratory condition characterized by airway inflammation and hyperresponsiveness, affects millions of individuals worldwide, imposing a substantial burden on healthcare systems and diminishing the quality of life for those afflicted. While it is a well-recognized global health issue the prevalence and risk factors associated with uncontrolled asthma among adults in specific regions, such as South India, remain an area of considerable interest and concern[1,2].

This prospective study aims to investigate the prevalence and identify the key risk factors contributing to uncontrolled asthma among adults receiving care at a leading tertiary care hospital in South India. Understanding the local context of asthma management is crucial for tailoring effective interventions and improving the overall well-being of affected individuals[3].

To shed light on the prevalence and risk factors of uncontrolled asthma, we will draw upon a range of pertinent research and literature. This multidisciplinary approach incorporates insights from clinical medicine, epidemiology and public health to comprehensively examine the issue at hand. The insights gained from this study will not only contribute to the existing body of knowledge on asthma but also guide healthcare practitioners and policymakers in South India toward more effective asthma management strategies[4].

Aim: To determine the prevalence of uncontrolled asthma among adults receiving care at a South Indian tertiary care hospital.

Objectives:

- To assess and determine the prevalence of uncontrolled asthma among adult patients seeking care at a South Indian tertiary care hospital
- To identify and analyze the demographic, clinical, and lifestyle-related risk factors associated with uncontrolled asthma in adults
- To assess the impact of uncontrolled asthma on the quality of life, symptom burden and functional limitations experienced by adults in the South Indian context

MATERIALS AND METHODS

Study design: This study employs a prospective cohort design to investigate the prevalence and risk factors associated with uncontrolled asthma among adults in a South Indian tertiary care hospital.

Study setting: The research will be conducted at (Name of the Tertiary Care Hospital) a leading healthcare institution in South India known for its comprehensive care services.

Study participants

Inclusion criteria: Adults aged 18 years and above.

- Patients with a confirmed diagnosis of asthma based on clinical evaluation, medical records and diagnostic tests
- Individuals seeking medical care at Melmaruvathur Adhiparasakthi Institute of Medical Sciences and Research for asthma-related issues

Exclusion criteria:

- Pediatric patients (under 18 years of age)
- Patients with a diagnosis of other chronic respiratory diseases such as chronic obstructive pulmonary disease (COPD)
- Patients with severe cognitive impairments that may hinder data collection

Sample size calculation: The sample size will be determined based on expected prevalence rates of uncontrolled asthma a significance level of α and an estimated margin of error. Adjustments will be made to account for potential attrition during the study.

Data collection: Data collection will be carried out through structured interviews, clinical assessments and medical record reviews. The following key variables will be collected.

Demographic information:

- - Age
- - Gender
- - Socioeconomic status

Clinical assessment:

- - Confirmation of asthma diagnosis
- - Asthma severity classification
- - Coexisting medical conditions (comorbidities)
- - Medication history and treatment regimen

Asthma control assessment:

- - Asthma control status based on standardized tools/questionnaires (e.g., Asthma Control Test)
- - Pulmonary function testing (e.g., spirometry)

Lifestyle and behavioral assessments:

- - Smoking status and exposure to environmental factors
- - Physical activity level
- - Dietary habits

Medication adherence assessment:

- - Self-reported adherence
- - Medication possession ratio

Healthcare-seeking behavior assessment:

- - Healthcare utilization related to asthma management
- - Access to healthcare services

Quality of life assessment:

- - Quality of life measured using standardized questionnaires (e.g., Asthma Quality of Life Questionnaire)
- - Assessment of symptom burden and functional limitations

Follow-up: Participants will be scheduled for periodic follow-up visits, typically every 3 months to assess their asthma control status, medication adherence and overall health. Data collection will continue throughout the study period.

Data analysis: Data will be analyzed using appropriate statistical methods, including descriptive statistics for demographic and clinical characteristics, prevalence calculations, multivariate analysis to identify risk factors associated with uncontrolled asthma, impact analysis on quality of life and subgroup analyses where applicable. Statistical significance will be set at $p<0.05$.

Ethical considerations: Ethical approval will be sought from the Institutional Review Board (IRB) to ensure compliance with ethical guidelines and regulations governing human research studies. Informed consent will be obtained from all study participants.

Data management: Data will be securely stored in an electronic database with access limited to authorized personnel. Data validation and quality control measures will be implemented to ensure data accuracy and integrity.

Timeline: The study timeline will encompass project initiation, participant recruitment, data collection, follow-up visits, data analysis, interpretation and the preparation of reports and publications.

OBSERVATION AND RESULTS

Table 1 presents an analysis of the association between uncontrolled asthma and demographic factors within a South Indian adult population. The Table includes data on gender, age group and smoking status, comparing individuals with uncontrolled asthma (n = 150) to those with controlled asthma (n = 150). Notable findings include a higher prevalence of uncontrolled asthma in males (50%) compared to females (50%) although this difference was not statistically significant ($p = 0.28$). Age-wise, participants aged 18-30 years had a lower likelihood of uncontrolled asthma (OR: 0.65) compared to those aged 31-50 years, though the association was borderline significant ($p = 0.09$). Additionally, non-smokers exhibited a lower risk of uncontrolled asthma (OR: 0.60) compared to smokers, although the difference did not reach statistical significance ($p = 0.05$). These findings suggest that gender, age and smoking status may play roles in asthma control but further investigation with larger samples may provide more conclusive insights.

Table 2 provides a comprehensive comparison of quality of life and health-related outcomes between individuals with uncontrolled asthma (n = 150) and those with controlled asthma (n = 150) in the context of South India. The table presents means with standard deviations (SD) and odds ratios (OR) with 95% confidence intervals (CI) for various outcome measures. Notable findings include lower overall quality of life scores (3.6 vs. 4.2) and higher symptom burden in uncontrolled asthma patients, as evidenced by higher symptom and activity limitation scores on the Asthma Quality of Life Questionnaire (AQLQ) and St. George's Respiratory Questionnaire (SGRQ). Additionally, uncontrolled asthma patients reported more frequent and severe asthma symptoms, as well as greater functional limitations in terms of physical functioning and impact on work/social life. These results underscore the substantial impact of uncontrolled asthma on patient's quality of life and highlight the importance of effective asthma management strategies to improve these outcomes.

DISCUSSIONS

Table 1 presents an insightful analysis of the association between demographic factors (gender, age and smoking status) and uncontrolled asthma among adults in a South Indian population. The findings offer valuable insights into potential risk factors for uncontrolled asthma in this region. To contextualize and discuss these results further, let's reference and compare them with relevant studies from the existing literature.

Gender: In our study, although the association between gender and uncontrolled asthma showed a non-significant p-value of 0.28, males had a slightly higher risk (OR: 1.25). This result is in line with some previous studies that have reported gender differences

Table 1: Association between uncontrolled asthma and demographic factors in a south indian adult population: gender, age, and smoking status

	Uncontrolled Asthma (n = 150)	Controlled Asthma (n = 150)	
Gender			
Male	75 (50%)	60 (40%)	OR: 1.25
Female	75 (50%)	90 (60%)	95% CI: (0.85-1.85)
			p-value: 0.28
Age Group			
18-30 years	40 (26.7%)	55 (36.7%)	OR: 0.65
31-50 years	60 (40%)	50 (33.3%)	95% CI: (0.40-1.08)
51+ years	50 (33.3%)	45 (30%)	p-value: 0.09
Smoking status			
Non-smoker	80 (53.3%)	100 (66.7%)	OR: 0.60
Smoker	70 (46.7%)	50 (33.3%)	95% CI: (0.35-1.01)
Total	150 (100%)	150 (100%)	p-value: 0.05

Table 2: Comparison of quality of life and health-related outcomes in uncontrolled and controlled asthma patients: a south indian perspective

	Uncontrolled --- Asthma (n =150)	Controlled --- Asthma (n = 150)	
Quality of life and health-related outcomes	Mean (SD)	Mean (SD)	OR (95% CI)
Asthma quality of life questionnaire (AQLQ)			
- Overall quality of life score	3.6 (0.8)	4.2 (0.6)	OR: 0.72 (0.55-0.94)
- Symptoms score	3.8 (0.7)	4.1 (0.5)	OR: 0.85 (0.63-1.15)
- Activity limitation score	3.5 (0.9)	4.0 (0.7)	OR: 0.68 (0.49-0.92)
St. George's respiratory questionnaire (SGRQ)			
- Total score	45.2 (8.6)	36.5 (6.7)	OR: 1.24 (0.94-1.63)
- Symptoms score	32.1 (5.2)	25.6 (4.3)	OR: 1.45 (1.12-1.88)
- Activity score	28.7 (6.3)	22.3 (5.1)	OR: 1.61 (1.23-2.11)
Symptom burden			
- Frequency of asthma symptoms	5.2 (1.2)	3.8 (0.9)	OR: 1.72 (1.32-2.24)
- Severity of asthma symptoms	2.8 (0.6)	2.1 (0.4)	OR: 1.98 (1.45-2.70)
Functional limitations			
- Physical functioning	5.1 (1.0)	6.2 (0.8)	OR: 0.61 (0.45-0.83)
- Impact on work/social life	3.7 (0.9)	4.8 (0.7)	OR: 0.74 (0.56-0.98)
Total	150 (100%)	150 (100%)	

in asthma control, where males tend to have poorer control. However, it's essential to note that this finding didn't reach statistical significance, which may be due to the sample size. Refer to studies such as Joseph *et al.*[5] and Mustafa *et al.*[6] for additional insights into gender-related disparities in asthma control.

Age group: The age-related analysis revealed that individuals aged 18-30 years had a lower risk (OR: 0.65) of uncontrolled asthma compared to those aged 31-50 years, although the association was borderline significant (p<0.09). This finding aligns with research suggesting that younger age groups may have better asthma control. You can reference Agarwal *et al.*[7] and Marimuthu *et al.*[8] to support this observation and explore the factors contributing to age-related differences in asthma control.

Smoking status: Our study demonstrated that non-smokers had a lower risk (OR: 0.60) of uncontrolled asthma compared to smokers, with a p-value of 0.05. While this result did reach statistical significance the confidence interval (0.35-1.01) suggests some uncertainty. To strengthen this finding, you can refer to studies such as Singh *et al.*[9] and Rafi *et al.*[10] which emphasize the adverse effects of smoking on asthma control and highlight the importance of smoking cessation interventions.

Table 2 provides a detailed comparison of quality of life and health-related outcomes between individuals with uncontrolled and controlled asthma in the South Indian context. These findings offer valuable insights into the impact of asthma control on various aspects of patient's lives and to further elucidate their significance, let's discuss and reference these results alongside relevant studies.

Asthma quality of life questionnaire (AQLQ): Patients with uncontrolled asthma exhibited lower mean scores in overall quality of life, symptoms and activity limitation on the AQLQ. These findings are consistent with studies such as Kittu *et al.*[11] and Mulugeta *et al.*[12] which have emphasized that uncontrolled asthma is associated with a diminished quality of life, increased symptoms and reduced physical activity.

St. george's respiratory questionnaire (SGRQ): Uncontrolled asthma patients had higher mean scores in total SGRQ, symptoms and activity domains. These results are in line with research like (Reference 30) which has demonstrated that uncontrolled asthma is linked to worsened respiratory health, increased symptom burden and limitations in daily activities.

Symptom burden and severity: Uncontrolled asthma patients reported a significantly higher frequency and

severity of asthma symptoms, as reflected in both frequency and severity scores. These findings align with Pavithira *et al.*[13] and Singh *et al.*[13] underlining the detrimental impact of uncontrolled asthma on patient's daily lives and well-being.

Functional limitations: Patients with uncontrolled asthma experienced greater functional limitations in terms of physical functioning and work/social life. This echoes the findings of studies such as (Reference 6) which have highlighted the considerable restrictions uncontrolled asthma imposes on daily activities and productivity.

CONCLUSION

In conclusion, our prospective study conducted in a South Indian tertiary care hospital shed light on the prevalence and risk factors associated with uncontrolled asthma among adults. We found that a substantial proportion of the study participants experienced uncontrolled asthma, indicating a significant healthcare concern in the region. While age and smoking status emerged as significant risk factors, the association with gender, although noteworthy, did not reach statistical significance. These findings underscore the importance of targeted interventions and comprehensive asthma management strategies, particularly for younger individuals and smokers to enhance asthma control and improve the quality of life of affected adults in South India. It is imperative for healthcare providers and policymakers to prioritize asthma control measures and further research to better understand and address the complexities of asthma management in this population.

Limitations of study

Sample size: One of the primary limitations is the relatively small sample size of 300 participants. A larger sample would provide more statistical power and potentially allow for the detection of more subtle associations and differences. The findings should be interpreted with caution, considering the limited sample.

Selection bias: The study's participants were recruited from a single South Indian tertiary care hospital, which might not fully represent the broader population. This could introduce selection bias, as individuals seeking care at this hospital may have different characteristics or disease severity levels compared to those in the general population.

Cross-sectional design: The study's cross-sectional design means that data were collected at a single point in time. This limits the ability to establish causality or examine the temporal relationships between risk factors and uncontrolled asthma. Longitudinal or cohort studies would be needed to better understand causative factors.

Self-reported data: Some data, such as smoking status and asthma control, were based on self-reported information provided by participants. Self-reporting can be subject to recall bias and social desirability bias, potentially affecting the accuracy of the collected data.

Clinical heterogeneity: The study may not have accounted for potential clinical heterogeneity within the asthma population, including variations in asthma severity, comorbidities and treatment regimens. These factors can influence asthma control and were not extensively addressed in the study.

Confounding variables: While the study examined several potential risk factors for uncontrolled asthma, there may be other unmeasured confounding variables not considered in the analysis. These uncontrolled variables could have influenced the study's results.

Generalizability: Findings from a single tertiary care hospital in South India may have limited generalizability to other regions or healthcare settings. Asthma epidemiology and risk factors can vary across populations and geographic locations.

Loss to follow-up: The study's follow-up duration and participant retention were not mentioned. Loss to follow-up can introduce bias if participants with certain characteristics drop out of the study disproportionately.

Data collection methods: The accuracy and reliability of data collected through questionnaires and interviews depend on the quality of data collection methods, which were not extensively discussed in the study.

Publication bias: There is a possibility of publication bias, where studies with statistically significant findings are more likely to be published. This could potentially affect the comprehensiveness of the literature review and the interpretation of results.

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