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PREDICTING THE PREVALENCE OF SMALL AIRWAY DISEASE IN NON-SMOKERS THROUGH SPIROMETRY

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INTRODUCTION

Small airway disease (SAD) represents early, often silent airway pathology that can precede the onset of chronic obstructive pulmonary disease (COPD) and other chronic respiratory disorders.[1] Traditionally, smoking has been regarded as the main etiological factor; however, recent evidence suggests that non-smokers may also develop SAD due to other environmental and physiological influences.[1-3] In tropical and island populations, chronic exposure to biomass fuel, air pollution, and recurrent respiratory infections could further contribute to airway injury.[4] This study aimed to determine the prevalence of SAD among non-smokers using spirometry, identify potential associated factors and highlight implications for early respiratory health surveillance.

METHOD

A cross-sectional study was conducted on 294 subjects who underwent spirometry testing, and lung function parameters including FEV1/FVC, FEV1%pred, FVC%pred, FEF50%pred, and FEF75%pred were collected. Of them, subjects with no evidence of obstructive or restrictive pattern were analyzed. Demographic data, anthropometric measurements, and smoking history were also collected. SAD was defined as predicted FEF50% and FEF75% value <65% in the absence of obstructive or restrictive patterns.[5] Prevalence rates were calculated, and potential associations with age, sex, and nutritional status and smoking status were explored.

RESULT

About 294 subjects underwent spirometry testing between January 2024 and August 2025 at NTB Provincial Hospital, 45 subjects showed no evidence of either obstructive or restrictive patterns. Among those with normal spirometry results, 20 were non-smokers. The mean predicted FEF50% and FEF75% were lower among female, underweight and normal nutritional status, non smokers, and younger age group. Interestingly, 5 of the non-smoking patients demonstrated reduced predicted FEF50% and FEF75% values, suggesting the presence of small airway disease (SAD), whereas none of the smokers exhibited indications of SAD. The majority of SAD cases occurred in subjects aged under 65 years, with a female predominance.

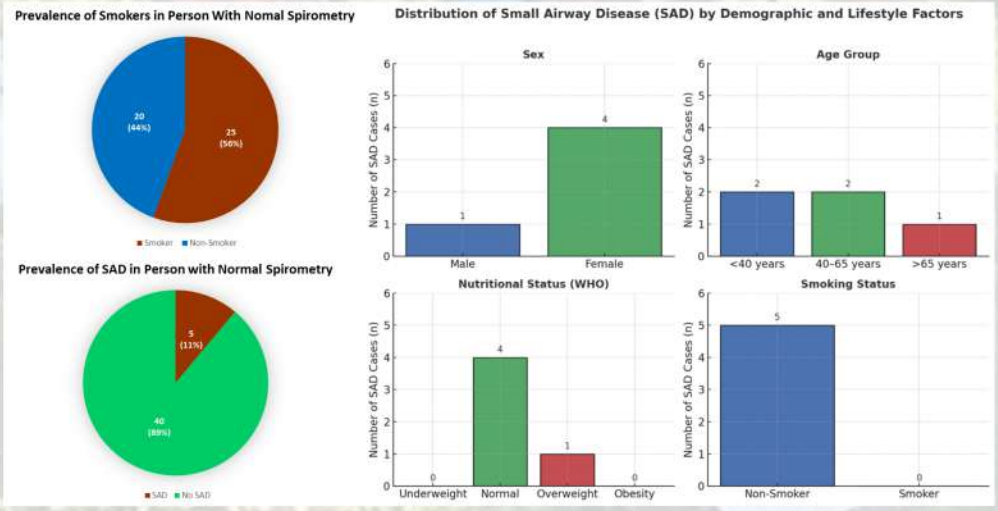

TABLE 1. DISTRIBUTION OF MEAN PREDICTED FEF50% AND FEF75% ACROSS DEMOGRAPHIC VARIABLES

Category	n	FEF_{50}% Pred (Mean ± SD)	FEF_{75}% Pred (Mean ± SD)
Overall	45	86.3 ± 22.4	90.1 ± 37.2
Sex			
Male	31	88.9 ± 17.8	93.5 ± 34.6
Female	14	74.3 ± 15.2	77.4 ± 25.7
Nutritional Status			
Underweight	3	79.0 ± 8.2	81.0 ± 9.4
Normal	19	83.5 ± 16.7	88.0 ± 28.5
Overweight	11	90.7 ± 18.3	94.2 ± 32.6
Obesity	12	92.4 ± 17.1	96.3 ± 30.5
Smoking Degree			
Non-smoker	19	75.8 ± 14.9	80.4 ± 27.6
Mild	7	88.1 ± 19.7	91.3 ± 30.1
Moderate	10	90.2 ± 18.5	94.7 ± 29.8
Heavy	9	92.5 ± 20.3	98.4 ± 33.5
Age Group (years)			
<40	10	84.2 ± 18.6	87.6 ± 29.3
40–65	21	83.1 ± 17.5	89.7 ± 31.6
>65	14	85.6 ± 18.9	92.1 ± 32.4

CONCLUSION

This study revealed a considerable prevalence of SAD (25%) among non-smokers, emphasizing that factors beyond smoking such as age, sex, and nutritional status may contribute to early small airway impairment. Routine spirometry including mid-expiratory flow analysis should be considered in health screening programs, particularly in tropical and island populations where environmental exposures and limited healthcare access may accelerate disease progression. Further longitudinal studies are needed to confirm risk factors and guide preventive strategies.

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