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Mini-Nutritional Assessment Questionnaire for Assessing the Nutritional Status of Patients with Chronic Obstructive Pulmonary Disease: A Cross-sectional Study

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ABSTRACT

Introduction

Chronic obstructive pulmonary disease (COPD) has systemic effects like malnutrition that increase morbidity and mortality. Nutritional assessment in COPD is not adequately addressed in Nepal even though the assessment is clinically relevant. The objective of the study is to determine the nutritional status of COPD patients based on MNA and to evaluate the correlation between the MNA and demographic, anthropometric and spirometry variables.

Methods

The study involved 140 stable COPD patients, who were studied using cross-sectional study design. Mini Nutritional Assessment (MNA) was used to determine the nutritional status. Demographic variables, anthropometric and spirometry parameters and clinical variables were taken. The associations were compared based on chi-square, one-way ANOVA, and Pearson correlation whereby $p < 0.05$ was regarded as significant.

Results

GOLD stage was associated with nutritional status ($p = 0.034$), and BMI differed across nutritional categories ($p < 0.001$). No association was observed between nutritional status and spirometry indices or dyspnea grade (all $p > 0.05$). MNA score showed a moderately positive correlation with BMI ($r = 0.501$, $p < 0.001$), whereas no correlation was noted with FEV_1 or mMRC grade. These findings suggest that nutritional impairment is more closely related to anthropometric parameters than to pulmonary function.

Conclusion

COPD patients have a high prevalence of malnutrition, and poorer nutritional status was associated with more advanced GOLD stages. COPD management should include routine MNA screening and early nutritional interventions to improve clinical outcomes.

Keywords

Body mass index; anthropometry; chronic obstructive pulmonary disease; mini nutritional assessment

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INTRODUCTION

COPD is a major cause of morbidity and mortality in the world with persistent airflow limitation along with systemic inflammation which also affects extrapulmonary organs and systems.[1,2] One of the most frequent extra-pulmonary manifestations that exacerbates respiratory muscle activity, exercise capacity, and survival is nutritional depletion, especially muscle loss and wasting which is approximately found in 21% of COPD patients.[3]

Although the role of COPD is growing in South Asia, dietary assessment is not a common practice in the day-to-day treatment, especially in the lower-resource environment of Nepal, where food habits and health care access also vary significantly compared to western groups. MNA is a validated screening instrument that initially was intended to be used with the elderly group however, has been broadly utilized in the identification of nutritional risk in chronic diseases, such as COPD, at early stages.[4,5]Nonetheless, there is limited data about its applicability and correlation with severity of the disease, pulmonary functions, and anthropometric parameters in Nepal.

The objective of the study is to determine the nutritional status of COPD patients based on MNA and to evaluate the correlation between the MNA and demographic, anthropometric and spirometry variables.

METHODS

This was a cross-sectional observational study in Tribhuvan University Teaching Hospital. The ethical approval was approved by the Institutional Review Committee of Institute of Medicine. The objectives of the study, and the confidentiality of the study were explained to all the participants, and a written informed consent was taken prior to the study. The research followed the ethics given in the Declaration of Helsinki.

The participants included adult patients aged 40 years and above diagnosed with COPD according to the GOLD 2024 criteria, either as an outpatient in the outdoor patient department, patient admitted in the respiratory unit and patient at intensive care unit. Patients who had acute exacerbation needing invasive mechanical ventilation, patients with systemic diseases with advanced cases (e.g., malignancy, end-stage liver or renal disease), and those patients who could not provide reliable responses because of a severe cognitive or psychiatric disorder were excluded from the study. Convenience sampling method was used to recruit 140 participants that were used as an average patient flow within the study period. The sample size was calculated based on the past estimates of malnutrition levels in the region in COPD, and the calculation was done to ensure that its power was sufficient to identify the relationships between nutrition status and severity of the disease.

The structured proforma was used to collect data, which fulfilled the aims of the study to evaluate the nutritional condition of COPD patients and determine its clinical and demographic correlations. The proforma had three large segments (1) sociodemographic variables (age, sex, residence, education, occupation), (2) clinical and spirometric parameters (BMI, FEV_1, FVC, FEV_1 to FVC ratio, mMRC dyspnea grade, GOLD stage, comorbidities), and (3) the MNA questionnaire- validated nutritional assessment tool in chronic disease populations. All the data presented in the MNA were awarded based on the conventional criteria, and the respondents were divided into the groups of normal (≥24), in danger of malnutrition (17 to 23.5), and malnourished (<17).

Primary data was gathered by direct interviews with patients, anthropometry, and spirometry reports. The nutritional status of participants was assessed using the Mini Nutritional Assessment (MNA), a validated screening tool widely used to identify malnutrition or risk of malnutrition in chronic disease populations.[1,2] All MNA components were categorized according to standard scoring criteria. Food intake was classified based on self-reported changes in dietary consumption over the past three months and was described as severe decrease, moderate decrease, or no decrease. Weight loss during the same period was categorized as no weight loss, 1–3 kg loss, 4–5 kg loss, or loss greater than 5 kg. Mobility was evaluated by determining whether the participant was bed- or chair-bound, able to get out of bed but unable to leave the house, or able to go out independently. The MNA also assesses recent stress or acute illness, defined as either the absence or presence of psychological stress or an acute medical event within the preceding three months.

Neuropsychological problems were classified into severe dementia or depression, mild dementia, or absence of psychological problems, based on clinical history and patient reporting. Body mass index (BMI) was scored according to MNA categories: <19 kg/m², 19 to <21 kg/m², 21 to <23 kg/m², and ≥23 kg/m². Following standard MNA scoring guidelines, overall nutritional status was categorized as normal (score ≥24), at risk of malnutrition (17–23.5), or malnourished (<17). These definitions reflect the validated structure of the MNA and ensure consistent classification across participants.

In order to address the research question, the cross-comparisons were conducted in respect to MNA categories to determine clinical predictors of poor nutrition. IBM SPSS statistics version 26.0 was used to perform statistical analysis. Mean ± SD (standard deviation) was used to summarize continuous variables and frequency (percentage) summarized categorical variables. The chi-square was used to test association between categorical variables, one-way ANOVA was used to compare the means, Pearson correlation was used to establish linear associations between MNA score and continuous variables; BMI, FEV_1 and mMRC grade. The p-value of 0.05 was taken to be significant.

RESULTS

The study included 140 patients with COPD. The mean age was 60.61 ± 9.47 years, and the mean BMI was 21.34 ± 3.49 kg/m². Of the total participants, 86 (61.4%) were males and 54 (38.6%) were females. A majority were rural residents: 99 (70.7%), while 41 (29.3%) lived in urban areas. Regarding occupation, 45 (32.1%) were skilled workers, 32 (22.9%) were unskilled workers, 22 (15.7%) were professionals, 21 (15.0%) were unemployed, and 20 (14.3%) were retired. In terms of education level, 41 (29.3%) had completed intermediate schooling, 30 (21.4%) were graduates, 34 (24.3%) had secondary-level schooling, 26 (18.6%) had primary education, and 9 (6.4%) were illiterate. Based on GOLD staging, 80 (57.1%) were in group E, 50 (35.7%) were in group B, and 10 (7.1%) were in group A. According to the mMRC dyspnea scale, most had grade 3 dyspnea 45 (32.1%), followed by grade 2 42 (30.0%), grade 4 23 (16.4%), grade 1 19 (13.6%), and grade 0 11 (7.9%). Hypertension was present in 49 (35.0%) participants, and diabetes mellitus in 31 (22.1%). Other comorbidities included coronary artery disease in 13 (9.3%) and chronic kidney disease in 12 (8.6%). Table 1 summarizes these findings.

The Mini Nutritional Assessment (MNA) showed that 98 patients (70.0%) were at risk of malnutrition, 17 patients (12.1%) were malnourished, and 25 patients (17.9%) had normal nutritional status. Regarding food intake, 19 patients (13.6%) reported a severe decrease, 48 patients (34.3%) reported a moderate decrease, and 73 patients (52.1%) reported no decrease in consumption. Almost 99 patients (71.0%) experienced weight loss in the past three months: 24 patients (17.1%) lost 1–3 kg, 51 patients (36.4%) lost 4–5 kg, 49 patients (35.0%) lost more than 5 kg, while 16 patients (11.4%) reported no weight loss. Most participants were ambulatory: 108 patients (77.1%) reported they could go out, 18 (12.9%) could get out of bed but not go outside, and 14 (10.0%) were bed- or chair-bound. Psychological stress or acute illness was present in 105 patients (75.0%), while 35 patients (25.0%) reported none. According to the BMI scoring in the MNA, 45 patients (32.1%) had a BMI ≥23 kg/m², 27 (19.3%) had a BMI 21–<23 kg/m², 32 (22.9%) had a BMI 19–<21 kg/m², and 36 (25.7%) had a BMI <19 kg/m².

Table 1. Baseline Characteristics

Variables	Categories	n (%) / Mean ± SD
Age (years)		60.61 ± 9.47
BMI (kg/m²)		21.34 ± 3.49
FEV_1 (L)		1.44 ± 0.42
FVC (L)		2.09 ± 0.51
FEV_1/FVC (%)		75.17 ± 34.56
Sex	Male	86 (61.4%)
	Female	54 (38.6%)
Residence	Rural	99 (70.7%)
	Urban	41 (29.3%)
Occupation	Professional	22 (15.7%)
	Skilled Worker	45 (32.1%)
	Unskilled Worker	32 (22.9%)
	Unemployed	21 (15.0%)
	Retired	20 (14.3%)
Education	Illiterate	9 (6.4%)
	Primary	26 (18.6%)
	Secondary	34 (24.3%)
	Intermediate	41 (29.3%)
	Graduate	30 (21.4%)
GOLD	A	10
	B	50
	E	80
mMRC Grade	Grade 0	11 (7.9%)
	Grade 1	19 (13.6%)
	Grade 2	42 (30.0%)
	Grade 3	45 (32.1%)
	Grade 4	23 (16.4%)
Hypertension	Yes	49 (35.0%)
	No	91 (65.0%)
Diabetes Mellitus	Yes	31 (22.1%)
	No	109 (77.9%)
Other Comorbidities	CAD	13 (9.3%)
	CKD	12 (8.6%)
	None	115 (82.1%)

Nutritional status and stage of GOLD were statistically correlated (p = 0.034), which means that the deterioration of the disease severity was

Table 2. Mini Nutritional Assessment Component Scores

Variables	Categories	Frequency (n)	Percent (%)
A. Food Intake	Severe decrease	19	13.6
	Moderate decrease	48	34.3
	No decrease	73	52.1
B. Weight Loss	No weight loss	16	11.4
	1–3 kg loss	24	17.1
	4–5 kg loss	51	36.4
	>5 kg loss	49	35.0
C. Mobility	Bed or chair bound	14	10.0
	Able to get out but not go out	18	12.9
	Goes out	108	77.1
D. Stress / Acute Disease	No stress	35	25.0
	Psychological stress / acute illness	105	75.0
E. Neuropsychological Problems	Severe dementia/ depression	9	6.4
	Mild dementia	40	28.6
	No psychological problems	91	65.0
F. BMI Score	<19 kg/m²	36	25.7
	19 to <21 kg/m²	32	22.9
	21 to <23 kg/m²	27	19.3
	≥23 kg/m²	45	32.1
Overall Nutritional Status	At risk	98	70.0
	Malnourished	17	12.1
	Normal	25	17.9

linked to worse nutritional conditions. In the same way, the BMI demonstrated a significant difference between nutritional categories ($F = 5.61$, $p < 0.001$). Nonetheless, there were no strong correlations between nutritional status and age, sex, residence, occupation, mMRC grade, FEV_1, FEV_1/FVC percentage, or the frequency of exacerbation. Table 3 explains these outcomes.

In the present study, assessment of nutritional status using the MNA tool revealed that a majority of the COPD patients (70.0%) were at risk of malnutrition, 12.1% were malnourished, and only 17.9% were found to have normal nutritional status. The distribution of nutritional status across various demographic and clinical variables is summarized in Table 3. Although age group appeared to influence nutritional status—with a higher proportion of malnourished individuals in the 70–80 years age group (26.3%) the difference did not reach statistical significance ($p = 0.070$). Likewise, sex-wise distribution showed that 15.1% of males and 7.4% of females were malnourished, though this was not statistically significant ($p = 0.169$). No significant association was observed between nutritional status and residence ($p = 0.522$) or occupation ($p = 0.591$). When analyzed according to the modified Medical Research Council (mMRC) dyspnea grade, the prevalence of malnutrition was higher among those with higher symptom grades (grade 2–4), but the difference was not statistically significant ($p = 0.820$). These findings suggest that although nutritional risk tends to increase with age and symptom severity, the association was not statistically established in this cohort.

Analysis of variance (ANOVA) was performed to compare clinical parameters across nutritional status groups (Table 4). The mean BMI showed a statistically significant difference among the groups

Table 3. Association of nutritional status with demographic and clinical variables

Variables	Categories	At Risk n (%)	Malnourished n (%)	Normal n (%)	p-value
Age Group (years)	<40	0 (0.0)	1 (100.0)	0 (0.0)	0.070
	40–50	13 (65.0)	1 (5.0)	6 (30.0)	
	50–60	38 (77.6)	4 (8.2)	7 (14.3)	
	60–70	36 (73.5)	6 (12.2)	7 (14.3)	
	70–80	10 (52.6)	5 (26.3)	4 (21.1)	
	>80	1 (50.0)	0 (0.0)	1 (50.0)	
Sex	Male	61 (70.9)	13 (15.1)	12 (14.0)	0.169
	Female	37 (68.5)	4 (7.4)	13 (24.1)	
Residence	Rural	67 (67.7)	12 (12.1)	20 (20.2)	0.522
	Urban	31 (75.6)	5 (12.2)	5 (12.2)	
Occupation	Professional	16 (72.7)	2 (9.1)	4 (18.2)	0.591
	Retired	10 (50.0)	5 (25.0)	5 (25.0)	
	Skilled Worker	35 (77.8)	3 (6.7)	7 (15.6)	
	Unemployed	14 (66.7)	3 (14.3)	4 (19.0)	
	Unskilled Worker	23 (71.9)	4 (12.5)	5 (15.6)	
mMRC Grade	0	7 (63.6)	2 (18.2)	2 (18.2)	0.82
	1	13 (68.4)	2 (10.5)	4 (21.1)	
	2	28 (66.7)	8 (19.0)	6 (14.3)	
	3	34 (75.6)	3 (6.7)	8 (17.8)	
	4	16 (69.6)	2 (8.7)	5 (21.7)	
Total	—	98 (70.0)	17 (12.1)	25 (17.9)	

Table 4. One-Way ANOVA of clinical parameters across study groups

Variable	Sum of Squares	df	Mean Square	F	p-value
BMI (kg/m²)	514.44	10	51.44	5.61	0.000*
FEV_1 (L)	1.20	10	0.12	0.66	0.760
FEV_1/FVC (%)	8449.64	10	844.96	0.69	0.731
Exacerbations (past 12 months)	10.10	10	1.01	0.83	0.598

($F = 5.61$, $p < 0.001$), indicating that BMI decreased significantly with worsening nutritional status. However, no statistically significant difference was observed in FEV_1 (L) ($p = 0.760$), FEV_1/FVC (%) ($p = 0.731$), or the number of exacerbations in the past 12 months ($p = 0.598$) among the different nutritional categories. This suggests that while nutritional deterioration is reflected by lower BMI values, spirometry parameters and exacerbation frequency did not differ significantly with nutritional status.

DISCUSSION

This paper has shown that most of the COPD patients were either malnourished or at risk based on MNA. The chi-square test demonstrated an association between nutritional status and GOLD stage ($p = 0.034$), with a higher proportion of malnourished or at-risk patients found in the more advanced GOLD groups. This suggests that nutritional decline parallels disease progression in this cohort. Also, BMI showed a moderate level of correlation with MNA scores, which strengthens its position as an anthropometric measure of nutritional health. Spirometry indices including FEV_1 and FEV_1/FVC ratio and symptom grade (mMRC) were, however, not strongly correlated and it is possible to suggest that nutritional impairment progress is independent of pulmonary function decline.

The findings align with global evidence that malnutrition is a frequent systemic manifestation of COPD. Nguyen et al. (2019) reported that nearly 75% of COPD patients experience some form of nutritional depletion according to subjective global assessment, which adversely impacts respiratory muscle performance, exercise tolerance, and prognosis with its significant association with severity and protein ratio.[6] Similarly, in a cohort from India, Priya et al. (2025) found 41% of COPD patients were malnourished or at risk.[7] Study from Bangladesh (Nawasabah et al., 2022) also reported comparable patterns, underscoring that malnutrition in COPD is a pervasive issue across South Asia.[8]

Our observation of a positive correlation between BMI and MNA score is consistent with the findings of M. Kostecka et al. (2021) ($p<0.0001$, $rs=0.72$), who validated the MNA as a sensitive nutritional screening tool where low BMI strongly predicted poor nutritional status.[9] M Kaiser et al. (2009) also validated MNA, with demonstration of low BMI as a predictor of poor nutritional status.[10] Conversely, the lack of a significant relationship between spirometry values and nutritional indices diverges from studies such as by Yang et al. (2025) and Priya et al. (2025), which reported that lower FEV_1 and FVC were associated with poorer nutritional status.[7,11] One possible explanation for this difference is that our population largely consisted of stable COPD outpatients, while other studies included more acute or advanced cases where systemic catabolism is greater. Moreover, ethnic and dietary variations in Nepalese populations, as well as altitude-related metabolic adaptation, might influence nutritional patterns differently than in Western populations.

The consistency of our results with regional studies reinforces the critical need to include nutritional assessment as a routine component of COPD care in low- and middle-income countries. Malnutrition not only reflects disease severity but also predicts morbidity and mortality, affecting response to bronchodilators, steroid therapy, and rehabilitation outcomes.[12,13] The MNA offers a low-cost, simple, and reproducible method to identify patients requiring nutritional intervention, making it particularly valuable in resource-constrained settings such as Nepal.[5,14] Additionally, our finding that nutritional decline correlates more with anthropometric than spirometry parameters suggests that regular weight and BMI monitoring can serve as pragmatic proxies for early malnutrition screening.

The cross-sectional nature of the study limits the ability to infer causality between malnutrition and COPD severity. The sample size was modest and derived from a single tertiary center, possibly introducing selection bias. Moreover, MNA does not assess biochemical parameters such as serum albumin or prealbumin, nor does it account for body composition or muscle mass, which could refine the understanding of malnutrition in COPD. Finally, the study did not evaluate the impact of socioeconomic status, dietary intake patterns, or psychological factors that could modulate nutritional health.

Future studies should adopt prospective, multicenter designs to examine longitudinal changes in nutritional status across GOLD stages and exacerbation frequencies. Combining MNA with biochemical markers and body composition assessments (e.g., bioimpedance or DEXA) would strengthen diagnostic precision. Intervention-based trials evaluating the impact of tailored nutritional support, pulmonary rehabilitation, and micronutrient supplementation on COPD outcomes would be particularly valuable. Protocols incorporation of nutritional screening into standard COPD management protocols, especially in primary and rural healthcare facilities, could help mitigate disease progression and improve quality of life.

CONCLUSION

Malnutrition is a major and under-recognized problem among patients with chronic obstructive pulmonary disease. In this study, more than four-fifths of the participants were either malnourished or at risk, confirming that nutritional compromise is highly prevalent even in stable COPD. Nutritional status showed a clear association with disease severity and body mass index, while spirometry indices did not vary significantly across nutritional groups. This indicates that anthropometric measures such as BMI are more reliable indicators of nutritional health than lung function values in these patients.

Routine screening with the MNA should therefore be incorporated into COPD management to enable early identification of patients requiring nutritional support. Addressing malnutrition through timely interventions can help improve strength, symptom control, and overall clinical outcomes in COPD.

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CONFLICT OF INTEREST

The author(s) declare that they do not have any conflicts of interest with respect to the research, authorship, and/or publication of this article.

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