ORIGINAL RESEARCH ARTICLE

DETERMINANTS OF HEALTH RELATED QUALITY OF LIFE IN PATIENTS WITH CHRONIC OBSTRUCTIVE PULMONARY DISEASE IN CHITWAN, NEPAL

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ABSTRACT

Background: Chronic Obstructive Pulmonary Disease (COPD) is a growing cause of morbidity and mortality worldwide. However, the determinants and its impact on Health Related Quality of Life (HRQL) are not well-studied in Nepal. This study aimed to assess the determinants of HRQL in patients with COPD in Chitwan, Nepal.

Methods: Cross-sectional study was conducted in outpatient departments of two medical colleges and two governmental hospitals of Chitwan district. A stratified proportionate sampling technique was used to select 470 patients suffering from COPD for at least 3 months and data were collected using pretested HRQL instruments. Linear regression model was constructed to identify the determinants of HRQ.

Results: The mean age patients was 68.64 (±10.25 SD) years and 54.0% were female. The mean score and standard deviation of total HRQL was 55.84 ± 11.21, while 54.10 ±13.95 was for physical, 56.69 ±13.73 for social and 56.96 ±12.05 for psychological components respectively, showing higher impairment on physical health. Dyspnea (β = -0.301, p = <0.001), perceived health status (β = 0.264, p<0.011), financial difficulties for treatment (β = -0.195, p = <0.011), regular follow-ups (β = -0.116, p = 0.001), age (β = -0.101, p = 0.006) and exacerbations (β = -0.098, p = 0.008) were the notable determinants of HRQL. In addition, other predictors of HRQL were smoking status, duration of illness, and exposure to dust & smoke in work place.

Conclusions: Patients with COPD have impaired HRQL. Hence, attention should be paid by nurses and health care planner on enhancing HRQL by addressing notable determinants while treating them in health care setting.

INTRODUCTION

Chronic obstructive pulmonary disease (COPD) is a leading cause of morbidity and mortality amongst the adult population worldwide. It affects 9-10% of people over 40 years of age.[1] Globally there are around 3 million deaths annually and it is expected to raise over 5.4 million deaths annually by the year 2060 AD due to worldwide tobacco consumption, environmental exposure to biomass fuel smoke and growing elderly population in the world.[2] Despite constituting a major public health problem, national data on COPD is scant in our country. Hospital-based studies [3,4] have reported it as the most important non-communicable disease with increasing trend. Bhandari et al revealed that out of 31% of NCD sufferers; COPD accounts 43% of all NCDs burden.[5] Smoking and air pollution are still high among Nepalese population which put them at greater risk of COPD. [4,6]

Health related quality of life has received greater attention as a result of increasing income levels and life expectancy. Numerous studies[7-10] illustrated that the COPD patients have low QOL. Evidence also found an impaired health status as risk factors for frequent exacerbations and hospital admissions.[11]

Previous studies in the other context have shown the relationship between HRQL and disease severity,[8] respiratory symptoms,[12] gender,[13] co-morbidity,[14] and psychological status.[15] Forced expiratory volume in one second, use of oxygen therapy, number of visits to emergency rooms and hospital admissions are also identified as the determinants of HRQL of COPD patients.[10]

Identification of the HRQL may be effective for the holistic evaluation of the impact of COPD on individual's life. However, there is dearth of information regarding HRQL of COPD patients in Nepalese context. Hence, this study aimed to assess the determinants of HRQL in patients with COPD in Chitwan, Nepal.

METHODS

This cross-sectional study was conducted in Chitwan District. The population of this study consisted of patients who were clinically diagnosed as COPD based on GOLD diagnostic criteria (FEV1/FVC ratio <0.7) and attending at OPD for follow up visits in various hospitals of Chitwan district. Those COPD patients who fulfilled the following criteria were included in the study: (i) patients who were clinically diagnosed as COPD cases based on spirometry (FEV1/FVC ratio <0.7) and had h/o illness for at

least 3 months, (ii) patients who were under regular treatment for COPD for at least 3 months. Those patients who were clinically diagnosed to have mental problem and or physically ill to response were excluded from the study.

There were 28 hospitals in the Chitwan District. Among them four hospitals were main treatment center for the COPD patients. Hence, two government hospitals (Bharatpur Hospital and Ratnagar Tandi Hospital) and two Private Medical Colleges Teaching Hospitals (Chitwan Medical College Teaching Hospital, College of Medical Sciences Teaching Hospital) were selected purposively for the study setting. Government and private hospitals were considered as strata and then, stratified proportionate sampling technique was applied to meet the required sample size (as shown in figure 1).
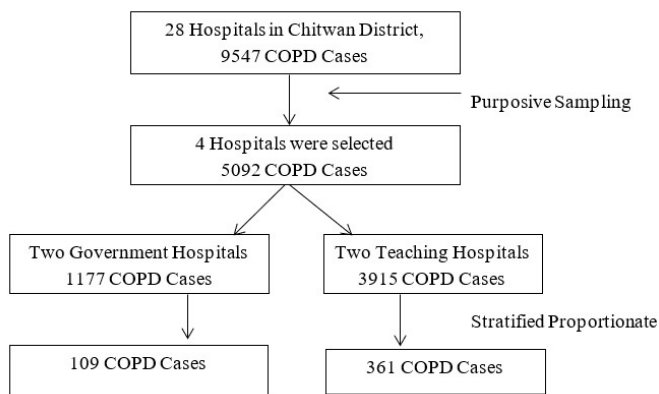
Figure 1: Schematic representation of sample selection

Studies related to HRQL of COPD patients in Nepalese context were not available as per researcher knowledge. Hence, taking standard deviation of HRQL of COPD patients as 22 (Mean HRQL score: 38.8, SD: ±22.0) from the study conducted in Nigeria [9], the sample size estimated for this study was 470. Desired sample size was determined by applying following formula and criteria:

$$n = \frac{Z_\alpha^2 . \sigma_p^2 . N}{e^2.(N-1) + Z_\alpha^2 . \sigma_p^2} \text{ (Kothari, 2014)}$$

ses in Chitwan district (N) = 9547, absolute tolerance error (e) =2, standard deviation of HRQL of COPD patients (σ_p) = 22.0, confidence level (Z_α) **=** 1.96 (at alpha= 0.05) ----> in 95% confidence level

Required sample size (n) calculated from the formula (n) = 443. Assuming 5% non-response error, final sample size (n) = 5% × 443+ 443 = 466≈470. Therefore, required number of sample for the study was 470.

There were many validated tools available for the assessment of general and respiratory specific quality of life, but information related to psychological and social domain of quality of life was seemed to be inadequate in our context. Therefore, researcher developed structured interview schedule with HRQL instrument based on the review of the pertinent literatures related to COPD, previously published QOL instruments i.e. St. George"s Respiratory Questionnaire by Jones & Forde, 2009, SF-36 by

Ware, Snow, Kosinski, & Gandek, 1993), WHOQOL-BRIEF, 2004, Clinical COPD Questionnaire of Molen, 1999, Hospital Anxiety and Depression Scale developed by Zigmond & Snaith, 1983, and Modified Medical Research Council (mMRC) dyspnea scale. Separately, five COPD patients were interviewed and based on their responses more items were added in psychological and social components. HRQL instrument had, in total 51 weightage items. First two items were global indicators of quality of life and health. Remaining items were grouped into 3 domains: physical domain (18 items), psychological domain (18 items) and social domain (13 items). Each item was rated on a 5 point rating scale. In this study, the responses were obtained with reference to the last three months.

Content and construct validity of the instrument was tested with health professionals that included two nursing experts, a chest physician, a psychologist and a psychiatrist. The translation and linguistic validation of the HRQL instrument was done in three steps: forward translation into Nepali language, backward translation into English language and pre-testing of the instrument on COPD patients. The reliability of the instrument was determined by internal consistency method which found Cronbach's alpha value 0.921, 0.812, 0.877 and 0.954 for physical, social, psychological domains and total HRQL respectively, indicating the highly reliable instrument

Prior to data collection, ethical approval was obtained from the Institutional Review Board of Institute of Medicine (IRB, IOM), Kathmandu, Nepal. Data collection permission was obtained from hospital authorities of the selected hospitals and written informed consent was obtained from all participants. Data were collected by researcher and four trained enumerators who have completed Bachelor level in Nursing from 18th August 2014 to 14th January 2015. To ensure standardization and good quality of data, researcher trained the enumerators for about two hours for the selection of patients, use of research instrument and interview process by discussion and role play. Enumerators collected information from those COPD patients who were diagnosed through GOLD criteria (FEV1/FVC ratio <0.7). Enumerators identified them through OPD tickets and consulted the treating physicians to verify the diagnosis. Information on medications and co-morbid conditions were obtained through the patients' chart. Data were collected in a single visit and researcher supervised at least 25% of works of each enumerator in the beginning of data collection to ensure the quality data collection. During the data collection period, 20 COPD patients who were clinically diagnosed to have mental problem and 40 patients who were unable to interact due to physical disability were excluded from study. To meet the sample size, next 60 COPD patients were taken as a sample.

Obtained data were entered in EpiData 3.1 and exported into IBM SPSS version 20 for window for analysis. Initially, continuous variables were expressed as mean and standard deviation (SD) or median and interquartile range (IQR) while qualitative variables were described as frequency and percentages. Confidence intervals (CIs) were calculated at the 95% level. The average domains scores and total HRQL score were computed

and linearly transformed to standardize the raw scores, so that the scores ranged from 0 to 100. After transformation, higher scores indicated better HRQL. The formula applied for linear transformation is as follows:

{(Actual raw score-Lowest possible raw score)/possible raw score range)*100}

Before inferential analysis, data normality was tested with application of Shapiro Wilks test and data were found to be normally distributed (p>0.05). The differences in HRQL in the subgroups of patients according to their socio-demographic and clinical characteristics were analyzed with the independent sample t-test and one way ANOVA. To investigate the predictors of HRQL, a multiple regression analysis was performed with those variables which have significant association of p≤ 0.10 with HRQL score in univariate analysis. The statistical

significance was set at p<0.05.

RESULTS

Out of 470 patients recruited for this study, proportions of women were slightly higher than men (54% vs. 46% respectively). The mean age of the patients was 68.64 years (±10.25 SD). Two third (66%) of the patients were illiterate, and 65% resided in rural areas. Around 58% of the patients were involved in agriculture previously and 51.5% claimed that that they gave up or changed their work due to their illness. Three hundred and eleven (66.2%) patients were ex-smokers, 22.5% had never smoked and 11.3% were current smokers. The mean number of packed years smoked was 22.47 (range 2-99). The mean number of exacerbations for all patients within previous 12 months was 1.78 (SE = 0.09) which ranged from 0-10 and mean number of hospital admission within that period was 1.08 (±0.06 SE) which ranged from 0-10 *(Table 1).

Table 1: Socio-demographic and clinical characteristics of patients with chronic obstructive pulmonary disease

n=470

Characteristics	Number (%)/Mean (SD)/Median (IQR)	Characteristics	Number (%)/Mean (SD)/Median (IQR)
Mean age (SD)	68.64 (10.25) year	**Dyspnea grade**	
Sex		Grade 0	9 (1.9)
Male	216 (46.0)	Grade 1	113 (24.0)
Female	254 (54.0)	Grade 2	140 (29.8)
Residence area		Grade 3	175 (37.2)
Rural	306 (65.1)	Grade 4	33 (7.0)
Urban	164 (43.9)	*Median duration of COPD diagnosis*	4.0 (1.0 to 9.3) year
Educational status		**Presence of co-morbidity**	
Illiterate	310 (66.0)	Yes	238 (50.6)
Literate	160 (34.0)	No	232 (49.4)
Smoking status		**Oxygen use for treatment at home**	
Never Smoker	106 (22.6)	Yes	45 (9.6)
Ex-Smoker	311 (66.2)	No	425 (90.4)
Current Smoker	53 (11.3)	**History of hospital admission**	
Mean number of packed years smoked	22.47 (range 2-99)	Yes	255 (54.3)
Perceived impact in work status		No	215 (45.7)
Yes	242 (51.5)	*Mean number of hospital admission*	1.08 (±0.06 SE)
No	228 (48.5)	*Mean number of exacerbations*	1.78 (SE = 0.09)

Table 2: Health related quality of life scores of patients with chronic obstructive pulmonary disease

n=470

Domains	Transformed Score (Mean ± SD)	95% CI	Range
Total QOL	55.84 ± 11.21	54.82 to 56.86	27.55 -93.88
Physical Domain	54.10 ± 13.95	52.84 to 55.37	12.50-93.06
Social Domain	56.69 ± 13.73	55.44 to 57.93	13.46-96.15
Psychological Domain	56.96 ± 12.05	55.87 to 58.06	27.78-93.06

Possible transform score ranges from 0 (worse)-100(best)   *SD= Standard Deviation*

The major finding of the study revealed that the mean and standard deviation of total HRQL of entire population was 55.84 ± 11.21, while 54.10 ± 13.95 was for physical, 56.69 ± 13.73 for social and 56.96 ± 12.05 for psychological domains showing impairment of HRQL in all aspects but a greater impairment was observed in physical health (Table 2).

The results of the univariate regression analysis reveals age in years, duration of COPD in year, education, smoking status, co-morbidities, number of exacerbations, number of hospital admissions, working capacity, regular check-ups, dyspnea score, self-perceived health status and financial difficulties in treatment were the important determinants for total HRQL and its component domains scores in patients with COPD (Table 3).

Table 3: Univariate regression analysis of health related quality of life and component domains scores on study parameters n=470

Variables	Physical	Social	Psychological	Total
Age	-0.226	-0.195	-0.151	-0.226
Sex	0.017	0.015	0.76	0.027
Smoking status	-0.086	-0.037	-0.146	-0.109
Duration of illness	-0.261	-0.150	-0.102	-0.208
Perceived impact on work status	-0.187	-0.135	-0.135	-0.188
Dyspnea score	-0.498	-0.366	-0.388	-0.500
Number of comorbid condition	-0.125	-0.040	-0.095	-0.108
Number of exacerbation	-0.221	-0.290	-0.242	-0.291
Number of hospital admission	-0.195	-0.214	-0.209	-0.241
Financial difficulties in treatment	-0.308	-0.307	-0.318	-0.366
Perceived health status	0.468	0.332	0.255	0.423
Regular follow up visit	0.115	0.134	0.072	0.125
Regular exercise	0.106	0.154	0.145	0.157
Under regular medications	-0.121	-0.029	-0.042	-0.048
Need of oxygen therapy	-0.192	-0.171	-0.171	-0.211

Significant variables at p<0.05, are bold

The independent variables shown to determine the HRQL in multiple regression analysis were age, duration since diagnosis of COPD, number of hospital admissions, number of exacerbations, effects on working status, dyspnea score, self-perceived health status and economic hardship for treatment. In addition, smoking status was the determinant of total and physical health whereas number of co-morbidity was the predictors of total, physical health and psychological health. After adjusting age, duration, smoking status, dyspnea, self-perceived health status, economic difficulties, exacerbations, co-morbidities, regular check-ups, perceived effect on work status, the model accounted for 42%, 42%, 27%, and 24% of the variance in the HRQL total, physical, social and psychological domains scores respectively (Table 4).

DISCUSSION

In this study, patients had low HRQL in total and its physical, social and psychological domains. HRQL showed a significant association with dyspnea score, self-perceived health and economic hardship in treatment. In addition, dyspnea, self-perceived health and economic hardship in treatments were the strongest independent determinants of HRQL.

In general, the HRQL was moderately impaired (mean score: 55.84; SD± 11.21) in the patients with COPD. This finding is almost consistent with the studies conducted in seven European countries,[17] Nigeria,[9] Egypt,[18] and Sweden[19] which found the marked impairment of QOL in COPD patients when compared to general public. It was also reported that the COPD patients had an impaired QOL as the disease advanced and the deterioration of QOL was related to the increasing severity of COPD.[8,18] The total HRQL score of the patients of this study is slightly higher than the previously published studies. The possible reasons for the difference in HRQL score might be due to inclusion of majority of COPD patients from joint family structure where younger family members were responsible for the supportive care to older and ill individuals. Other facts might be due to culture for respecting the elderly in Nepalese society where older person are usually considered to be the most authoritative person in the family and are respected and supported by family members. This argument is also supported by the studies conducted in China [20] and UK [21] which indicated that the family and social networks have a positive effect on the patients' quality of life and health outcomes.

With respect to different components domains of HRQL, it is remarkable to note that the patients' score of HRQL was lower in physical health domain (symptoms and activity subscales) compared to social and psychological domains. This finding is supported by the findings from many studies conducted in Spain,[10, 22] and Sweden[8, 19] which reported lower scores in the physical health component compared to mental health component. Similarly, lower HRQL scores in physical component (especially symptoms and activity) than the mental health component was also reported in the studies conducted

Table 4: Multiple Linear Regression Analysis of Determinants of Health Related Quality of Life of Patients with COPD

HRQL Scores / Variables	Total		Physical		Social		Psychological	
	Unadjusted β (SE)	Adjusted β (95% CI)	Unadjusted β (SE)	Adjusted β (95% CI)	Unadjusted β (SE)	Adjusted β (95% CI)	Unadjusted β (SE)	Adjusted β (95% CI)
Constant	60.55 (3.99)		58.23 (4.98)		57.81 (5.53)		64.87 (4.92)	
Age in year	-0.10 (0.04)	-0.09 (-0.18 to 0.02)	-0.12 (0.05)	-0.09 (-0.22 to -0.03)	-0.13 (0.05)	-0.10 (-0.24 to 0.02)	-0.06 (0.05)	-0.05 (-0.15 to 0.04)
Duration in year	-0.09 (0.06)	-0.06 (-0.21 to -0.03)	-0.21 (0.08)	-0.10 (-0.35 to -0.06)	-0.10 (0.08)	-0.05 (-0.27 to 0.06)	-	-
Smoking Status	-1.49 (0.69)	-0.08 (-2.84 to -0.14	-1.19 (0.86)	-0.05 (-2.88 to 0.50)	-0.36 (0.95)	-0.02 (-2.23 to 1.52)	-2.62 (0.85)	-0.12 (-4.28 to -0.95)
Dyspnea score	-3.48 (0.46)	-0.30 (-4.38 to -2.57)	-4.47 (0.57)	-0.31 (-5.60 to -3.34)	-2.70 (0.64)	-0.19 (-3.95 to-1.45)	-3.01 (0.56)	-0.24 (-4.12 to -1.91)
Perceived health status	3.81 (0.57)	0.25 (2.70 to 4.93)	5.94 (0.71)	0.31 (4.55 to 7.34)	3.55 (0.79)	0.19 (2.00 to 5.10)	1.83 (0.70)	-0.11 (0.46 to 3.19)
Financial difficulties	2.18 (0.38)	0.21 (1.43 to 2.93)	1.80 (0.48)	0.14 (0.86 to 2.74)	2.44 (0.53)	0.19 (1.39 to 3.35)	2.37 (0.47)	0.211 (1.44 to 3.30)
Exacerbations in last 3 months	-1.67 (0.50)	-0.12 (-2.65 to -0.69)	-0.82 (0.62)	-0.05 (-2.04 to 0.40)	-2.68 (0.69)	-0.16 (-4.04 to -1.32)	-1.80 (0.61)	-0.12 (-3.00 to-0.59)
Co-morbidity	-0.86 (0.65)	-0.05 (-2.14 to 0.41)	-1.33 (0.81)	-0.06 (-2.92 to 0.26)	0.25 (0.90)	0.01 (-1.51 to 2.01)	-1.14 (0.78)	-0.06 (-2.68 to 0.40)
Regular Check up (0-no, 1-yes)	3.19 (1.07)	0.11 (1.08 to 5.30)	3.93 (1.34)	0.10 (1.29 to 6.57)	4.47 (1.49)	1.54 (1.54 to 7.40)	1.60 (1.31)	0.05 (-0.97 to 4.18)
Perceived impact on work status (0-no, 1-yes)	-2.00 (0.82)	-0.09 (-3.61 to -0.40)	-2.43 (1.02)	-0.09 (-4.43 to -0.43)	-1.36 (1.13)	-0.05 (-3.59 to 0.86)	-1.98 (0.99)	-0.08 (-3.94 to-0.02)
	Adjusted R^2 = 0.430		Adjusted R^2 = 0.427		Adjusted R^2 = 0.272		Adjusted R^2 = 0.251	

in UK,[17] Nigeria,[9] and Spain.[13] In this study, the patients rated lower score in the symptoms and physical activities subscales due to which HRQL was more impaired in the physical health domain. Consistent to this, many researchers stated that the COPD patients' physical health component decreased with increasing number of symptoms [23] and decreasing physical activities.[7] This observation might be explained by the fact that patients develop dyspnea and exhaustion immediately following any activities due to irreversible progressive airway obstruction and diminished lung functions. As a result patients' physical activities further deteriorate.

The notable determinants of HRQL were dyspnea, self-perceived health status, financial difficulties for treatment, regular check-ups, age, duration of COPD since diagnosis, number of exacerbations, and perceived impact on work status and use of oxygen at 3 months. However, in multiple regression model, the key determinants of HRQL were age, duration since diagnosis of COPD, number of exacerbations, impact on work status, dyspnea score, perceived health status and financial difficulties for treatment. In addition, smoking status was the determinant of total and physical health whereas number of co-morbidity was the predictors of total, physical health and psychological health. Dyspnea was the main determinants of total HRQL and component domains. The inverse relationship between dyspnea and HRQL is in agreement with previous studies [9, 24-27] which reported that the key predictors of health related quality of life was self-reported breathlessness. This indicates that nurses need to provide teaching and counseling to the COPD patients about management of dyspnea while caring them in hospital as well as in community setting.

Other determinants of HRQL total and all three component domains observed in this study were perceived health status, financial difficulties for treatment and regular check-ups. These findings indicate that the strategies addressing these issues might be helpful to enhance HRQL of COPD patients. However, no existing studies explored the relationship of economic status, self-perceived health status and regular follow-up visit with HRQL.

Number of exacerbation was other significant determinant of total HRQL and social and psychological domains in the patients of this study. These findings are consistent with many other studies[20,24-25,28] which reported that the increase number of exacerbations/patient/years were associated with the lower HRQL in COPD patients. Similarly, review article [29] stated that the patients with frequent exacerbations often experienced impaired quality of life and faster decline in lung function over time.

Age was also identified as a significant determinant for total and physical and social domains of HRQL. This finding is also similar with the findings of other studies [27, 28, 30] which reported that the advancing age is associated with the low health related quality of life in COPD patients. However, Garrido et al indicated that the age is the determinant factor for physical component score of COPD patients but not with the mental component. [10]

These findings suggest that the quality of life is decreased with increasing age. This observation might be explained by the fact that majority of patients included in the study were elderly and the severity of the disease increases as a result of cumulative effects of smoking and age related physiological deterioration in lung function. In addition, other possible reason might be related to the fact that the older population tend to restrict their daily activities and expectations due to which their physical health further deteriorates.

Smoking status of the patients with COPD was found as a significant determinant of health related quality of life in total and psychological domain of HRQL. In contrast to this, a study in Spain [10] and Nigeria [9] found that the smoking status did not determine the QOL of the COPD patients once the COPD was established.

The findings of this study demonstrated the association of duration of COPD diagnosis with the physical domain of HRQL score. The same had happened in study conducted in Iran [31] which found a relationship with poorer QOL whereas a multicenter observational study in Spain found the significant association between a higher duration of COPD diagnosis and HRQL worsening in patients with COPD.[32] On the contrary, other authors have not evidenced any influence of duration of COPD diagnosis on the overall QOL of the patients with COPD. [33] This discrepancy in the finding might be due to difference in design and nature of the sample selected in the study.

Also, in this study, presence of co-morbidities was found to be significantly associated with the total, physical and psychological domains of HRQL in univariate regression analysis but it did not independently influence the HRQL in multivariate regression model. This finding is consistent with the study conducted in France [24] which revealed that the co-morbidity did not influence the HRQL scores. In contrast to this finding, the study conducted in Netherlands [14] reported that the co-morbidities was associated with poor disease specific HRQL and poorest HRQL was found in COPD patients with more than one co-morbid conditions.

Perceived impact on work status was also found as an independent factor influencing the total, physical and psychological domain of HRQL in COPD patients included in the study. This finding is supported by the longitudinal study conducted over a 5 year period in Spain[34] which found that the patients who reported low physical activity at baseline and who increased their physical activity over the study period improved HRQL scores whereas patients maintaining a low level of physical activity or decreasing physical activity over the study period was associated with significant HRQL decline. This suggests that participation in physical activity is important for the enhancement of HRQL.

The understanding of quality of life is recognized as an increasingly important healthcare topic because the relationship between cost and value raises complex problems, often with high emotional attachment. Hence, the findings of

this study would provide information regarding current health related quality of life of COPD patients in Nepal which might be beneficial for healthcare providers, nurses, investigators, policy makers and patients along with their care providers to plan and an intervene the context suitable health program to enhance the health related quality of life by addressing the notable determinants of vulnerable groups.

This study was limited to those COPD patients who attended the outpatient departments of selected hospitals, therefore, it might not represent the COPD population at large because physically disabled, severely ill and mild stage of COPD patients might not visit the hospital OPD for check-up and patients who were attending in hospital through indoor or emergency were not included in the study.

CONCLUSION

In general, COPD patients have impaired HRQL in total and a greater impairment is observed in physical health compared to social and psychological health. Dyspnea, perceived health status, financial difficulties for treatment and regular check-ups are the independent determinants of health related quality of life. In addition, other factors of HRQL are age, smoking status, number of exacerbations, and impact on work status. Hence, attention should be paid on enhancing HRQL with more emphasis on the physical health including identified notable determinants of HRQL while planning health services to these vulnerable groups.

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