ANALYSIS REPORT

Summary

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ABSTRACT

**Background**: Quality of Life in COPD patients are assessed using SGRQ method. However, SGRQ questionnaire is complex and requires a longer time to complete than COPD Assessment Test (CAT).

**Objective** To evaluate factors associated St. George’s Respiratory Questionnaire (SGRQ) value in COPD patients.

**Methods** 101 observations were collected from COPD patients and 85 data were included in the analysis. Multivariate linear regression was used to assess factors that may contribute to SGRQ value.

**Results** The mean of SGRQ in the COPD patients is 39.7±17.4. In multivariable analysis, CAT and HAD been two factors that were significantly associated with SGRQ value.

**Conclusion** CAT and HAD been important predictors of quality of life in patients with COPD. Further analysis is required to obtain other predictors.

INtroDUCtion

The St. George's Respiratory Questionnaire (SGRQ) is a specialized tool designed to measure health-related quality of life in patients with chronic respiratory diseases, particularly chronic obstructive pulmonary disease (COPD). However, SGRQ questionnaire is complex and requires a longer time to complete than COPD Assessment Test (CAT). This analysis aims to develop a regression model to predict SGRQ score based on COPD patient’s characteristics.

RESULT AND INTERPRETATION

The database consists of 24 variables and 101 observations:

* Characters: Age, Gender, Pack History, Smoking
* Disease: COPDSeverity, CAT
* Walking ability: MWT1, MWT2, MWT1Best
* Lung function: FEV1, FEV1PRED, FVC, FVCPRED
* Anxiety Depression: HAD
* QoL: SGRQ
* Comorbidities: Diabetes, Muscular, Hypertension, AtrialFib, IHD

SQGR value stratified by gender, smoking history, COPD severity and comorbid

1. **Data exploration**

Variables with potential outliers:

* AGE (55-85)
* PackHistory >95)
* MWT1Best (value > 650 and < 150)
* CAT (value > 40)
* HAD (value > 50)
* Outliers and NAs were removed using imputation. The number of observations included in the model was 85.

**Correlation matrix**

A chart of a number of dots

Description automatically generated with medium confidence

**Figure 1**. Correlation matrix of FEV1, FVC, CAT, SGRQ, HAD, MWT1Best

According to correlation matrix, variables which have moderate to strong correlation to SQRQ are :

1. MWT1Best (-0.51)

2. CAT (0.77)

3. HAD (0.62)

1. **Descriptive analysis**

**Table 1**. Subject characteristics for multivariate model candidate

|  |  |
| --- | --- |
|  | Mean±SD or n(%)  n = 85 |
| Age (years) | 71.2±5.97 |
| Male | 54(63.5) |
| Pack history | 36 (3-90) |
| Smoking | 71(83.5) |
| FEV | 1.59±0.68 |
| FVC | 2.97±1.00 |
| Walking distance | 420(176-582) |
| COPD Assessment Test (CAT) | 18(3-32) |
| COPD Severity |  |
| Mild | 18(21.2) |
| Moderate | 38(44.7) |
| Severe | 22(25.9) |
| Very severe | 7(8.2) |
| Hospital Anxiety and Depression Scale (HAD) | 9(0-30) |
| SGRQ | 39.7±17.4 |
| Comorbid | 47(55.3) |
| Diabetes | 17(20) |
| Muscular | 16(18.8) |
| Hypertension | 9(10.6) |
| Atrial fibrillation | 19(22.4) |
| IHD | 7(8.2) |

1. **Univariate analysis**

**Table 2**. Univariate analysis of variables correlates to SGRQ

|  |  |  |
| --- | --- | --- |
| **Variables** | **95% CI** | **p-value** |
| Age | -0.26(-0.90 to 0.37) | 0.409 |
| Female | -2.48 (-10.32 to 5.36) | 0.53 |
| Pack history | -0.00154(-0.18 to 0.18) | 0.99 |
| Smoking | -10.76(-20.69 to -0.83) | <0.05 |
| FEV | -9.77(-14.93 to -4.61) | <0.001 |
| FVC | -4.76(-8.41 to -1.10) | <0.05 |
| Walking distance | -0.09 (-0.12 to – 0.06) | <0.001 |
| COPD Assessment Test (CAT) | 1.72 (1.43 to 2.00) | <0.001 |
| COPD Severity |  |  |
| Moderate | 5.46(-3.62 to 14.53) | 0.234 |
| Severe | 19.05(8.96 to 29.13) | <0.001 |
| Very severe | 19.63(5.50 to 33.76) | <0.05 |
| Hospital Anxiety and Depression Scale (HAD) | 1.52(1.10 to 1.94) | <0.001 |
| Comorbid | 4.71(-2.83 to 12.25) | 0.218 |
| Diabetes | 7.51(-1.80 to 16.82) | 0.113 |
| Muscular | 2.24(-7.42 to 11.91) | 0.645 |
| Hypertension | 4.75(-7.50 to 17.00) | 0.443 |
| Atrial fibrillation | 7.22(-1.72 to 16.16) | 0.112 |
| IHD | -1.14(-14.90 to 12.62) | 0.869 |

According to univariate analysis, variables which show significant correlation SGRQ : Smoking, FEV1, FVC, walking distance, CAT, HAD, COPDSeverity (severe or very severe)

1. **Multivariate Analysis**

**Table 3**.Multivariate regression model to SGRQ

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | Variables | Coeff | 95% CI | p-value | R2 | F-stats | p-value |
| Model 0 | Intercept | 37.87 | -12.34 to 88.09 | 0.137 | 0.739 | (17,67) 11.2 | <0.001 |
|  | AGE | -0.20 | -0.68 to 0.27 | 0.393 |  |  |  |
|  | Gender1 | 2.00 | -4.38 to 8.38 | 0.533 |  |  |  |
|  | FEV1 | -6.44 | -14.96 to 2.08 | 0.136 |  |  |  |
|  | FVC | 2.03 | -2.48 to 6.55 | 0.371 |  |  |  |
|  | CAT | 1.37 | 0.96 to 1.78 | <0.001 |  |  |  |
|  | MWT1Best | -0.02 | -0.05 to 0.021 | 0.362 |  |  |  |
|  | COPDSEVERITYMODERATE | 0.82 | -6.40 to 8.05 | 0.821 |  |  |  |
|  | COPDSEVERITYSEVERE | -0.90 | -12.40 to 10.62 | 0.878 |  |  |  |
|  | COPDSEVERITYVERYSEVERE | -10.66 | -27.43 to 6.11 | 0.209 |  |  |  |
|  | HAD | 0.47 | 0.06 to 0.88 | 0.026 |  |  |  |
|  | Comorbid1 | 0.35 | -8.80 to 9.51 | 0.939 |  |  |  |
|  | Smoking | -3.18 | -9.63 to 3.28 | 0.329 |  |  |  |
|  | Diabetes | 0.91 | -6.97 to 8.80 | 0.818 |  |  |  |
|  | Hypertension | 5.54 | -4.14 to 15.22 | 0.257 |  |  |  |
|  | Muscular | -2.00 | -10.07 to 6.08 | 0.623 |  |  |  |
|  | Atrial fibrilation | 1.29 | -7.39 to 9.97 | 0.767 |  |  |  |
|  | IHD | 0.91 | -8.94 to 10.77 | 0.854 |  |  |  |
| Model 9 | Intercept | 8.17 | 2.95 to13.40 | <0.001 | 0.681 | (2,82) 87.6 | <0.001 |
|  | CAT | 1.41 | 1.09 to1.73 | <0.001 |  |  |  |
|  | HAD | 0.63 | 0.27 to1.00 | <0.001 |  |  |  |
| Model 10 | Intercept | 17.70 | 3.10 to 32.30 | 0.02 | 0.689 | (3,81) 59.7 | <0.001 |
|  | CAT | 1.33 | 0.99 to 1.67 | <0.001 |  |  |  |
|  | HAD | 0.56 | 0.18 to 0.94 | 0.004 |  |  |  |
|  | MWT1Best | -0.02 | -0.04 to 0.01 | 0.168 |  |  |  |
| Mlr2 | Intercept | 16.55 | -10.70 to 43.80 | 0.230 | 0.685 | (5,79) 34.4 | <0.001 |
|  | CAT | 1.42 | 1.09 to1.74 | <0.001 |  |  |  |
|  | HAD | 0.60 | 0.22 to 0.98 | 0.002 |  |  |  |
|  | AGE | -0.13 | -0.51 to 0.24 | 0.490 |  |  |  |
|  | Gender1 | 0.45 | -4.23 to 5.14 | 0.848 |  |  |  |
|  | Comorbid1 | 1.70 | -2.73 to 6.14 | 0.447 |  |  |  |
| Mlr6 | Intercept | 24.45 | -4.04 to 52.95 | 0.092 | 0.696 | (6,78)29.8 | <0.001 |
|  | CAT | 1.355 | 1.02 to 1.68 | <0.001 |  |  |  |
|  | HAD | 0.559 | 0.18 to 0.93 | 0.004 |  |  |  |
|  | AGE | -0.165 | -0.54 to 0.21 | 0.385 |  |  |  |
|  | FEV1 | -3.034 | -6.60 to 0.53 | 0.094 |  |  |  |
|  | Gender1 | 1.652 | -3.19 to 6.50 | 0.499 |  |  |  |
|  | Comorbid1 | 1.814 | -2.58 to 6.20 | 0.4138 |  |  |  |

According to table above, we found that CAT and HAD are consistent predictors for SGRQ value in patients with COPD. However, Age, gender and comorbid are potentially related to SGRQ values. With R2 value 0.696, Mlr6 model seems to be most appropriate model to predict the SGRQ score.

**Table 3**.Multivariate regression model to predict SGRQ

|  |  |  |  |
| --- | --- | --- | --- |
| Variables | Coeff | 95% CI | p-value |
| Intercept | 24.45 | -4.04 to 52.95 | 0.092 |
| CAT | 1.355 | 1.02 to 1.68 | <0.001 |
| HAD | 0.559 | 0.18 to 0.93 | 0.004 |
| AGE | -0.165 | -0.54 to 0.21 | 0.385 |
| FEV1 | -3.034 | -6.60 to 0.53 | 0.094 |
| Gender1 | 1.652 | -3.19 to 6.50 | 0.499 |
| Comorbid1 | 1.814 | -2.58 to 6.20 | 0.4138 |

Adjusted R2 : 0.696; F-statistics : (6,78) = 29.8, p<0.002

CONCLUSION

CAT and HAD scores were significant predictors of worse quality of life in COPD patients. Other variables such as age, gender, FEV1 and comorbidities were not statistically significant in the final model.