**Prevalence of chronic obstructive pulmonary disease (COPD) in Qena Governorate**

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**Abstract:**

**Backgrounds:** COPD is a common health problem with increasing prevalence all over the world. It is under-diagnosed with very few studies about its prevalence in developing countries. Hence it is important to know and evaluate the prevalence of this disease in our community.

**Patients and methods:** A prospective cross sectional study was performed in the southern area of Egypt where 2400 subjects above 40 years old agreed to participate and filled questionnaires that included demographic data and CAT questionnaire. Suspicious cases according to symptoms, smoking status and positive CAT score were performed spirometry and confirmed cases were defined as FEV1/FVC post bronchodilator <0.70.

**Results:** There was 25% of studied population resident in urban and 75% in rural areas with 1675 (70%) being males and 725 (30%) females. There was 37.5% in age group 50–59 and 26.4% above 60 years. In the confirmed COPD cases the main symptom was dyspnea 93.7%, followed by cough and expectoration 67.8%, and wheezy chest 52.5%. There was 32% of cases having CAT scores <10 and 68% was >10. Reflux was the main comorbidity with 75% followed by diabetes 31.2%, heart diseases 24.3%, and hypertension 15%. The presentations of suspicious COPD cases were 495 cases, 20.6%; by comparing the confirmed and not confirmed cases there were significant differences between both groups in cough, expectoration, dyspnea, wheeze, CAT score and comorbidity P value <0.0001 except hypertension and depression. 42.5% of COPD confirmed cases were categorized into stage B followed by stage D (25.6%) then stage C (20.6%) and stage A 11.3%. The prevalence rate of COPD was 6.6% with the highest prevalence in age above 60 years 9.2% with significant P value <0.0001 between different age groups. Prevalence in urban area was 7.6% and in rural area was 6.3% without significant difference. As regards smoking habits the high prevalence was in X smoker 16.3% followed by current smoker 8.6% with significant P value <0.0001. There is high prevalence rate in cases exposed to biomass fuel 13.6% versus 5.8% in not exposed cases with significant P value <0.0001.

**Conclusion:** Prevalence of COPD in our locality was 6.6 % with high rates among x and current smokers and in those exposed to biomass fuels.

# **Introduction:**

Chronic obstructive pulmonary disease (COPD) is a common community problem and considered an essential cause of morbidity and mortality in both developed and developing countries. COPD is expected to be the third leading cause of death by 2020 [1,2]. There were no previous studies conducted to show the prevalence of COPD in Qena governorate. So, this study was considered as a nucleus study for this purpose. Estimation of COPD prevalence in some regions may vary due to underutilization of spirometry and inadequate diagnosis.

The diagnosis of COPD is based on symptoms, the presence of risk factors and spirometry. Smoking is an important cause for the development of COPD. Exposure to biomass fuel is an important risk factor in nonsmoker and female population. Although COPD develops in only about 10–15% of smokers, studies have shown that 4 of 5 patients with COPD are either current or former smokers [3,4]. There is under diagnosis of COPD which can result in under treatment as less than one third of patients in the MENA region receive appropriate treatment for COPD [5].

A study showed that less than 6% of the people informed having COPD [6]. This likely reflects the widespread under recognition and under diagnosis of COPD as well as the fact that those with Stage I: Mild COPD may have no symptoms, or mild symptoms and not perceived by individuals or their health care providers as abnormal and possibly indicative of early COPD [7]. By contrast, data from prevalence surveys carried out in multiple countries, using spirometry, estimate that up to about one-quarter of adults aged >40 years may have airflow limitation diagnosed as mild COPD or higher [8,9]. In this regard, there is a need for a field study survey to estimate the prevalence of COPD in our locality.

# **Subjects and methods:**

A cross sectional study was done in the south Upper Egypt, Qena governorates by chest department, South Valley University in collaboration with community and public health department, Sohag University. The total area of this governorate covers 10,798 Km2 representing 1.1% of the republic area. According to preliminary results of the 2014 census, the population is about 3 million, 21.4% of them live in urban areas and 78.6% in rural areas. Qena area included two cities and eleven districts. Qena and Nag Hammadi are considered urban areas. Qena city is the capital of the governorate. It is situated on the east bank of the Nile. It is most famous for its proximity to the ruins of Dendra. The population is 230.392. Nag Hammadi is located on the west bank of the Nile. It is an industrial city as sugar and aluminum are produced there. It has a population of about 30,000. The 11 districts are considered as rural areas, which are distributed around Nile, where most of people are farmers.

The sample size was calculated using EPI tools for calculating sample size for single proportion [10]. Based on an expected prevalence of 7% among adults, with 2 percentage point error and 95% confidence interval, allowing for a 10% refusal to participate, 626 people were needed to be involved in the study. The study was conducted over a one year period from June 1, 2014 to the prevalence day which is May 31, 2015.

**Sampling methodology:**

A simple random sample of 10 study areas was chosen from the governorate. According to the geographic location we selected 3 districts randomly from eleven districts, and then we chose two villages from each district, that is Nagada from the west, Qift from the east, Dishenna from the north with a total of 6 villages considered as rural population. Second we selected 2 areas from each Qena and Nag Hammadi with a total 4 urban areas by a simple random technique. A systematic random sample of households in the 10 areas was then taken by selecting every third household in every 10 field areas. If individuals did not agree for the test, we replaced them with the family next door.

# **Data collection:**

Subjects fulfilling the screening criteria of more than 40 years old were invited to complete a more detailed questionnaire on the disease to assess the severity of COPD (CAT questionnaire) [11]. The questionnaire was in classical Arabic easily understandable. Written informed consent was obtained from all participants. There is no gift to invited subjects. Patients with COPD suspicions based on the symptoms and clinical presentation and CAT scoring above zero were asked to undergo spirometry.

**Pilot study:**

A pilot study has been carried out to test the validity of the questionnaire and checklist and to carry out the necessary developments and corrections (3 weeks duration). Then the final questionnaire and checklist were used in the implementation of the study.

The survey team comprised of 5 social workers who used the screening questionnaire headed by 2 chest physicians who confirmed the diagnosis by reusing the screening questionnaire and performing spirometry. The team received 3 weeks of training on how to carry out the protocol before starting the study. The study was approved by the ethics committee of our faculty of medicine.

The total number of the interviewed subjects was 2500. Only 2400 completed the questionnaire and are included in the analysis: 600 in the urban area and 1800 in the rural area according to population distribution. The causes for exclusion included the following: refused the interview or was busy (40 people); subject request, and fail to perform spirometry for individuals suspicious of having COPD (60 people).

Those people have been interviewed and subjected to the following:

1. Filling the questionnaires of the history taking and eight items of CAT score and divided into low symptoms score <10 and high score P10.
2. General and local examination; Information about age; sex, smoking habits either cigarette or goza, exposure to biomass fuels; occupation; comorbidities; medication; family history of lung disease; and whether the person was previously diagnosed with COPD were collected in a face-to-face interview. Occupation also was reported to the interviewing physician. Participants were also asked to report symptoms of wheeze, and dyspnea with either yes or No.
3. Pulmonary function test by the portable spiro-sift SP-5000 Fukuda DENSHI, Japan was done for suspicious cases of having any symptoms suggestive of COPD. Spirometry was performed according to the American Thoracic Society (ATS) criteria [12] by trained physicians using a spirometer with subjects in a seated position. Two measurements were taken, one before and after two puffs of salbutamol (400 lg) using a metered-dose inhaler. COPD was defined as a ratio of post-bronchodilator-predicted forced expiratory volume in the 1st second to forced vital capacity of less than 0.70 (FEV1/FVC <0.70). The severity of function impairment was categorized by GOLD as: mild, FEV1 P80% of predicted; moderate, FEV1 <80–50%; severe, FEV1 <50–30%; very severe, FEV1 <30% [3].

**Statistical analysis:** Data were analyzed using STATA intercooled version 12.1. Quantitative data were represented as mean and standard deviation. Data were analyzed using a paired t-test to compare means of the result of the test pre and post bronchodilator. Quantitative data and prevalence of COPD in different groups were presented as number and percentage and compared using either Chi square test. P value was considered significant if it was less than 0.05.

# **Results:**

2400 subjects included in the study filled the questionnaire with 25% in urban and 75% in rural area with 1675 (70%) males and 725 (30%) females. 37.5% was in the age group between 50 and 59 and 26.4% was above 60 years old. The main occupation was farmer 37.7% among the studied population followed by house wife 26.4%. 50.4% were currently smokers and 42.7% was never smoker. There was 10.8% exposed to biomass fuel, 7.5% was previously diagnosed COPD and maintained on medication and 3% had family history of chest diseases as shown in (Table 1).

The clinical presentations of suspicious cases of COPD were (495 cases, 20.6%) comparing the confirmed and not confirmed cases by spirometry. There were statistically significant differences between both groups among all parameters except hypertension and depression. In the confirmed COPD cases the main symptom was dyspnea 93.7%, followed by cough and expectoration 67.8%, wheezy chest 52.5%. There was 31% of cases with CAT score <10 and 68% was >10. Reflux was the main comorbidity 75% followed by diabetes 31.2%, heart diseases 24.3%, hypertension 15%, and depression 10.6% as presented in (Table 2).

There were no statistically significant differences between all parameters as regards mean ± SD of all values except for FEV1 with P value 0.02. In confirmed COPD cases as regards FEV1 there was 54% in stage 2 and 24% in stage 3, 15% in stage 4 and only 7% in stage 1 as shown in (Tables 3 and 4). Using CAT scores of less and more than 10 and FEV1 less or more than 50% the main COPD confirmed cases were categorized into stage B 42.5% followed by stage D 25.6% then stage C 20.6% and stage A 11.3% as in (Table 5).

The prevalence rate of COPD among the studied population was 6.6%. The highest prevalence was in age above 60 years old 9.2% with significant P value <0.0001 between different age groups. Male gender had more prevalence than female gender with insignificant difference. Prevalence in urban area was 7.6% and in rural area was 6.3% with no significant difference. Highest prevalence was in retired population 10% followed by worker 7.1% with insignificant difference between different occupations. As regards smoking habits the high prevalence was in X smoker 16.3% followed by current smoker 8.6% with significant P value <0.0001. There is a high prevalence rate in cases exposed to biomass fuel 13.6% versus 5.8% in cases not exposed with significant P value <0.0001 as shown in (Table 6).

**Discussion:**

COPD is a common health problem with increasing prevalence all over the world. It is important to know and evaluate the burden of this disease in our community. Although there is a considerable healthcare demand, COPD is still under diagnosed, inadequately evaluated and inadequately treated. The prevalence of COPD in our study was 6.7% which is in agreement with studies done in Asia–pacific countries specially in Vietnam [13]. Also in a Jordanian study using the latest GOLD criteria 8% were found to be with COPD [14]. In an Egyptian study done by Tageldin et al., the prevalence of COPD in the general population using the GOLD clinical definition of symptomatic COPD was 3.6 [15]. However, their case definition of COPD was smokers (P10 pack-years) who had symptoms of COPD or were already diagnosed by their physicians. The results between studies from populations, methodology, and case definition were very different. Our study is considered a new field, based on the epidemiological data of COPD in a developing country.

Our data revealed that the prevalence of COPD among males was higher than among females, 7.04 versus 5.79, old age >60 than <60 as 9.2 versus 7.7 and X smoker 16.3, current smoker 8.6 versus nonsmoker 2.8 and this is in concordance with the study done in Japan [16]. There is a great variation in studies that report the prevalence of comorbidity among COPD cases, our study found that hypertension was present in 15%, diabetes 31%, ischemic heart diseases 24% which is in agreement with Antonelli et al. [17]. Reflux was reported in 75% near results was found with Casanova et al. who found gastro esophageal reflux disease in 62% [18]. Depression was found in 10.5% based on history or medication usage which is less compared to another study which mainly researched on depression among COPD using specified depression scales and found it to be 72% [19].

We found a history of dyspnea 93%, productive cough 76%, wheezy chest 52% and 68% of CAT scoring >10 to be strongly associated with the presence of COPD with statistically significant difference versus not confirmed cases. And this is in agreement with that of Shahab et al., and Former [20,21]. Very few cases were diagnosed COPD while CAT scoring positive either less or more than 10 as this is related to other causes than COPD such as heart diseases, occupational role and recurrent chest infection.

In our study the prevalence of COPD among population in rural area was 6.3 versus 7.6 in urban area without significant difference this is in disagreement with a Chinese study with an overall prevalence of COPD in rural and urban areas being 9.4%, with a significantly higher prevalence of COPD in rural than in urban (12.0% versus 7.4%, P, 0.01) and this may be related to different population numbers of the study [22].

The prevalence of COPD among biomass fuel exposure was 13.6% most of them were females in the rural area using wood, agricultural crop residues, and associated with poor kitchen ventilation with a known risk factor for COPD as leading to greater destruction of airway and parenchyma more than cigarette with more chest symptoms. This is in agreement with that of Hu, et al. [23].

Previously diagnosed COPD 7.5% was found in our study, which indicates underuse of the important diagnostic tool of spirometry in our community. There is a near finding reported in a Japanese trial, 9.4% of cases with airflow limitation reported in a previous diagnosis of COPD [24]. Tunisia with 3.5% had diagnosed COPD [25], while in Sweden 29% had previously diagnosed lung disorders [26].

According to GOLD 2009 [27] our results revealed that stage 1 disease was present in 12 cases (7.5%), stage 2 was in 86 cases (53.7%), stage 3 was in 39 cases (24.3%) and stage 4 was in 23 cases (14.3%) which are in concordance with those of Al Omari et al., who found that 19% had a mild disease and 57 had a moderate disease [14]. In MENA region study [28] COPD was detected at a late stage which is in agreement with our study when using GOLD 2011 [29] we found 25% of cases were in stage D when firstly diagnosed.

Limitations of our study including diagnosis of COPD cases were based on a fixed ratio of FEV1/FVC <70% according to GOLD criteria. It under measures the prevalence in young adults and over measures it among old persons. Although, more studies used the fixed ratio because it is easily applicable [30]. A second limitation is in not using the modified medical research council assessment for a smooth and easily applicable questionnaire. Also exacerbation history or hospital admission for complete data about recent staging of COPD according to GOLD 2011 was not asked as our goal was to estimate the prevalence in our community.

# **Conclusion:**

Prevalence of COPD in our locality was 6.6% with high rates among x and current smokers, males more than females and in those exposed to biomass fuels. Using CAT scoring as a case finding tool may help to identify people who need spirometry for a possible diagnosis of COPD.

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**Table (1) Socio-demographic characteristics of the studied cases.**

| **Socio-demographic characters** | **Number** | **%** |
| --- | --- | --- |
| **Age** | | |
| 40–49 | 865 | 36.04 |
| 50–59 | 900 | 37.50 |
| >60 | 635 | 26.46 |
|  | | |
| **Gender** | | |
| Males | 1675 | 69.79 |
| Females | 725 | 30.21 |
|  | | |
| **Residence** | | |
| Urban | 600 | 25.00 |
| Rural | 1800 | 75.00 |
|  | | |
| **Occupation** | | |
| Farmer | 905 | 37.71 |
| Worker | 435 | 18.13 |
| Employee | 315 | 13.13 |
| Retired | 110 | 4.58 |
| House wife | 635 | 26.46 |
|  | | |
| **Smoking status** | | |
| Current smoker | 1210 | 50.42 |
| X-smoker | 165 | 6.88 |
| Never smoker | 1025 | 42.71 |
|  |  |  |
|  | | |
| Biomass fuel exposure | 242 | 10.08 |
| Previously diagnosed COPD | 12 | 7.50 |
| Family history of chest disease | 86 | 3.58 |

**Table (2) Clinical presentations of studied suspicious COPD cases and comparing confirmed with not confirmed cases.**

| **Variables** | **Suspicious COPD** | | | | | | | | ***P* value** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Confirmed COPD (160)** | | **Not confirmed COPD (335)** | | | | **Total (495)** | |
| **No.** | **%** | **No.** | | **%** | | **No.** | **%** |
| Cough and expectoration | 123 | 76.80 | 181 | | 54.03% | | 304 | 61.41 | <0.0001 |
| Dyspnea | 150 | 93.75 | 34 | | 10.15% | | 184 | 37.17 | <0.0001 |
| Wheeze | 84 | 52.50 | 50 | | 15.38 | | 134 | 27.63 | <0.0001 |
|  | | | | | | | | | |
| **CAT score** |  |  | |  |  |  | |  | <0.0001 |
| <10 | 51 | 31.87 | | 280 | 80.46 | 331 | | 66.87 |  |
| >10 | 109 | 68.13 | | 35 | 16.42 | 164 | | 33.13 |  |
|  | | | | | | | | | |
| **Co-morbidity** | | | | | | | | | |
| Hypertension | 24 | 15.00 | | 68 | 20.30 | 92 | | 18.59 | 0.16 |
| Diabetes | 50 | 31.25 | | 54 | 16.12 | 104 | | 21.01 | <0.0001 |
| Heart disease | 39 | 24.38 | | 18 | 5.37 | 57 | | 11.52 | <0.0001 |
| Reflux | 120 | 75.00 | | 17 | 5.07 | 137 | | 27.68 | <0.0001 |
| Depression | 17 | 10.63 | | 20 | 5.97 | 37 | | 7.40 | 0.07 |

**Table (3) Mean value of respiratory functions data of confirmed cases.**

| **Mean value**  **parameters** | **Pre-**  **bronchodilator test** | **Post-**  **bronchodilator test** | ***P* value** |
| --- | --- | --- | --- |
| FVC % | 81.3 ± 9.5 | 82.1 ± 9.7 | 0.35 |
| FEV1 % | 51.2 ± 12.5 | 53.8 ± 13.6 | 0.02 |
| FEV1/FVC | 62.9 ± 10.3 | 64.63 ± 12.5 | 0.10 |
| FEV 25–75 % | 56.1 ± 13.8 | 57.2 ± 15.2 | 0.42 |
| PEF % | 65.5 ± 16.7 | 66.4 ± 19.4 | 0.60 |

**Table (4) Severity of COPD according to FEV1in the studied confirmed cases.**

| **Variables** | **No.** | **%** |
| --- | --- | --- |
| **Stage 1** | 12 | 7.50 |
| **Stage 2** | 86 | 53.75 |
| **Stage 3** | 39 | 24.38 |
| **Stage 4** | 23 | 14.37 |

**Table (5) Staging of COPD confirmed cases according to CAT scores and FEV1 more or less than 50%.**

| **Variables** | **No.** | **%** |
| --- | --- | --- |
| **Stage A** | 18 | 11.3 |
| **Stage B** | 68 | 42.5 |
| **Stage C** | 33 | 20.6 |
| **Stage D** | 41 | 25.6 |

**Table (6) Relation between prevalence rates of confirmed COPD to socio-demographic data of studied populations.**

| **Socio-**  **demographic characters** | **Total Number** | **Number of confirmed**  **COPD** | **Prevalence of COPD**  **(%)** | ***P* value** |
| --- | --- | --- | --- | --- |
| **Over all** | 2400 | 160 | 6.67 |  |
|  | | | | |
| **Age** | | | | |
| 40–49 | 865 | 35 | 4.05 |  |
| 50–59 | 900 | 70 | 7.78 | <0.0001 |
| >60 | 635 | 59 | 9.29 |  |
|  | | | | |
| **Gender** | | | | |
| Males | 1675 | 118 | 7.04 | 0.26 |
| Females | 725 | 42 | 5.79 |  |
|  | | | | |
| **By residence** | | | | |
| Urban | 600 | 46 | 7.67 | 0.26 |
| Rural | 1800 | 114 | 6.33 |  |
|  | | | | |
| **Occupation** | | | | |
| Farmer | 905 | 58 | 6.41 |  |
| Worker | 435 | 31 | 7.13 | 0.61 |
| Employee | 315 | 18 | 5.71 |  |
| Retired | 110 | 11 | 10.00 |  |
| House wife | 635 | 42 | 6.61 |  |
|  | | | | |
| **Smoking status** | | | | |
| Current smoker | 1210 | 104 | 8.60 | <0.0001 |
| X-smoker | 165 | 27 | 16.36 |  |
| Never smoker | 1025 | 29 | 2.83 |  |
|  |  |  |  |  |
|  | | | | |
| **Biomass fuel exposure** | | | | |
| Yes | 242 | 33 | 13.64 | <0.0001 |
| No | 2158 | 127 | 5.89 |  |