# THE EFFECTS OF THE AFŞİN THERMOELECTRIC POWER PLANT ON THE LUNGS OF THE COMMUNITY OF ÇOĞULHAN (PRELIMINARY REPORT)

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**Introduction:**

It can be seen that poor health is increasingly becoming more common as air pollution rises due to industrialisation and urbanisation. The adverse effects of air pollution on the respiratory system are especially prevalent in children, and patients with chronic lung disease and heart disease. The air pollution of the city is closely related with the characteristics and quantity of the industrial organizations in the region. It is for this reason that air pollution parameters need to be closely monitored and necessary precautions should be taken when the level arises to dangerous levels.

**Objective:**

With this study, it is aimed to identify the possible adverse effects of air pollution caused by the Afşin Thermoelectric Power Plant on the health of the persons living in the town of Çoğulhan, located in the vicinity of the power plant.

**Materials and Method:**

In August 2005, a screening study was conducted with the aim of identifying the pathologies connected with air pollution in the town of Çoğulhan in the sub-province of Afşin. The study was conducted on 879 females and 536 males over the age of 35 living in the town of Çoğulhan.

A questionnaire requesting information about any lung complaints, smoking habits and family histories was administered to the subjects. In addition, lung microfilms were taken and a respiratory function test (SFT) was administered for all subjects. The pulmonary function tests were examined by 3 specialists who were not aware of where or for what purpose the tests had been conducted. The tests which were identified as pathologic by 2 of the 3 specialists were also examined in terms of pathology. The parameters of the SFT, Forced Vital Capacity (FVC), the expiratory volume during the first second of the forced expirium ($FEV_1$), the $FEV_1$/FVC, Peak Expiration Flow Rate (PEF) and the mid-expirium flow rate ($FEF_{25-75}$) were examined.

**Findings:**

A total of 386 pulmonary function tests (PA) were found appropriate for examination. Of these PA's, 318 were accepted to be normal (82.4%). Of the PA's which were pathologically examined the following were found: 45 (11.7%) cases of emphysema (increase of air in the lungs); 9 (2.3%) cases of an increase in the cardiothoracic index; 8 (2.1%) cases of expansion of the mediastinum; 1 (0.03%) case of increase in the interstitial and reticular density; 3 (0.8%) old cases of sequela tuberculosis and 2 (0.5%) cases of scoliosis. In this cross-sectional study, there was evidence of mass in the lung (a finding which bought to mind lung cancer). In addition to this, it was found that there were changes in the pulmonary function test due to air pollution. Emphysema was detected in 45 (11.7%) people and 1 (0.03%) person was found to have increased interstitial density and 46 (12%) persons were found to have increased reticular density, which is a critical percentage.

The average FVC (%) value was found to be 69.3 ± 18.6 SD. If it is assumed that the normal FVC value is 80% or over, 51.4% of the test results were below the normal. The $FEV_1$ (%) and $FEV_1$/FVC values are important in showing the affects in the airways. The average $FEV_1$ value was 76.5 ± 20.1 SD while the $FEV_1$/FVC value was found to be 86.6 ± 9.7 SD. The $FEV_1$/FVC value of 16 subjects (3.9%) were below 69 and 399 subjects (96.1%) was 70 or above. The average PEF (%) of the subject sample was found to be 67.1 ± 21.2. Of the 493 subjects, the values of 236 subjects (48.5%) were 65 or less. The average of the $FEF_{25-75}$ measurements were 78.9 ± 27.2. 104 out of 317 subjects (33.4%) scores were 65 or less. The average values of $FEV_1$, $FEV_1$/FVC, PEF, $FEF_{25-75}$ indicating the level of air restriction were normal. However, there is a need to further examine the 16 subjects whose $FEV_1$/FVC values were low. Additionally, risk factors leading to restriction of air flow such as cigarette smoking have not been eliminated in this preliminary report.

**Discussion and Conclusion:**

The finding that only 3.9% of subjects showed a $FEV_1$/FVC value of 69 or less (the value which shows the prevalence of KOAH) can be

interpreted as a low percentage in residents living a town which has such a high concentration of air pollution. It should not be forgotten that KOAH is a chronic illness which is most commonly seen in older age groups and that this value was found in all subjects over the age of 35. Furthermore, the limitations mentioned below should be taken into consideration. A similar study was conducted in the rural regions of Adana by A. Kocabaş (et al., 2004) to investigate the prevalence of KOAH with a BOLD study found that the estimated prevalence of KOAH was 12%. This finding was interpreted to be due to the high prevalence of smoking in the region and the necessary health precautions not being taken by those working under the conditions of the rural areas (including the agricultural workers).

**Limitations of the Study:**

This study is cross-sectional so it can only provide a picture of the status in the region as it is during the implementation of the study. Subjects of the sample in this study were not informed prior to their participation and were not selected randomly therefore their general representation of the population is weak.

The sample for the study were selected from those that were present at the town of Çoğulhan at the time and of those that were able to come to the venue where the study was being conducted therefore the results of the study must be interpreted with caution.

The coordination of the SFT technician and the patient during the FVC value testing is very important. The high number of patients may have effected the concentration of the technicians.