

TUESDAY, SEPTEMBER 4TH 2012

407. COPD beyond tobacco

P3996

Inflammation in traffic professional from Sao Paulo after pollutants emission control implementation

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In the last decade, ambient particles have decreased from 150 $\mu\text{g}/\text{m}^3$ to 40 $\mu\text{g}/\text{m}^3$ in São Paulo city (SP) because of public policies to control fuel emissions. Traffic professionals are more exposed to air pollution. We tested if ambient air from SP is still deleterious to traffic professionals. Non or ex-smokers (≥ 1 year) cab drivers (N=46) and traffic controllers (N=23) were evaluated 4 times. We checked clinical symptoms and blood inflammatory markers (HDL/LDL/total cholesterol, triglycerides, blood cell counting, clot tests, ultra sensitive c reactive protein- usCRP and erythrocyte sedimentation rate-ESR) on the day after workshift. Pollutants were collected during 24h exposure by individual samplers for fine particles (reflectance) and NO₂(colorimetry). Clinical and blood data were tested against pollutants by linear regression model for repeated measures through generalized estimated equation (GEE). Alpha was 5%. PM_{2.5} was 40,33 \pm 20.83 $\mu\text{g}/\text{m}^3$ and NO₂ 197 \pm 43,47 $\mu\text{g}/\text{m}^3$. Traffic professional referred cough (19%), coryza (21,4%), sneezing (35,6%), nasal stuffiness (34,5%) and itch (28,6%), rhinitis (35,6%), wheezing (14,3%), dyspnea (10,7%) which improved during non working periods (60,7%) (holidays or weekends). ESR, clot tests (prothrombin INR, activated partial thromboplastin time and thromboplastin time), LDL chol and mononuclear cells in blood were associated to both PM_{2.5} (p<0.05). There was no correlation of usCRP to inflammation and fibrinogen to pollutants. We conclude that urban pollutants exposure in SP city is still associated with clinical upper respiratory, vascular and systemic inflam-

TUESDAY, SEPTEMBER 4TH 2012

mation, hypercoagulability and lymphocytes and monocytes increment in traffic professional.

P3997

Troller fuel exhaust and respiratory impairments; a cross sectional study in Indian fishermen

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Introduction: The fishermen of India are exposed regularly to the fuel exhausts of the trollers. No study has been reported on the respiratory health of the fishermen. **Aim:** The study aimed to see whether there is a relationship between troller fuel exhaust and respiratory impairments among the fishermen in India.

Methods: A total of 259 male fishermen participated in the study among which 152 were regularly exposed to troller fuel exhaust (mean age 58±9.8 years) and 107 were never exposed to that (mean age 53±10.3 years). Evaluation of the examined subjects included ECRHS questionnaire for the assessment of respiratory symptoms and lung function test. Data were analysed using odds ratio with 95% confidence interval and independent 't' test adjusting for age, smoking status, parental asthma and second hand smoke exposure at home or work.

Results: Fishermen exposed to troller fuel exhaust had higher prevalence of respiratory symptoms for chronic phlegm (OR = 3.4, 95% CI = 1.2-8.3), morning cough with sputum (OR = 2.3, 95% CI = 1.1-4.6), prolonged cough (OR = 2.5, 95% CI = 1.4-6.2), whistling in chest (OR = 2.8, 95% CI = 1.4 = 7.3) and breathing trouble (OR = 2.6, 95% CI = 1.2-6.2) compared to the those unexposed to troller fuel exhaust. Spirometric parameters showed that the mean values of FVC, FEV1, FEV1/FVC, FEF25%, FEF50%, FEF75% and FEF25-75% were lower in the subjects exposed to fuel exhausts but statistically significance (p<0.01) was observed for FEF25%, FEF50%, FEF75% and FEF25-75%.

Conclusion: The study suggests that occupational exposure to troller fuel exhaust is associated with higher prevalence of respiratory symptoms and lung function impairment among fishermen of India.

P3998

To study the effect of chronic inhalation of street dust on pulmonary functions in street cleaners

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Purpose: Street cleaners who sweep streets manually are exposed to different types of dusts, which have deleterious effect on pulmonary functions. We carried out this study to know the status of pulmonary functions in these occupationally exposed persons.

Methods: One hundred ten street cleaners, 80 non-smokers and 30 smokers, who were cleaning the streets for more than 5 years were included in this study. Sixty controls, 30 smokers and 30 non smokers, were also included for comparison. Their lung functions FVC, FEV1, PEFR and FEV25-75 were assessed by spirometry. Statistical analysis of data was done according to unpaired 't' test using SPSS version 16.0 software.

Results: The mean FVC, FEV1, PEFR and FEV25-75 were 85.87±15.16%, 63.82±14.79%, 65.65±16.22% and 53.31±20.20% respectively in nonsmoker cleaners, while in smoker cleaners these were 85.0±15.96%, 59.96±17.35%, 60.90±16.91% and 51.78±19.31% respectively. FVC was not found to be affected in these persons while other parameters were significantly decreased as compared to those in controls. In controls these were 88.66±12.92%, 88.50±18.80%, 90.16±14.30% and 84.00±18.20% respectively in nonsmokers and 84.25±11.2%, 78.42±16.80%, 60.62±18.22% and 62.30±16.50% respectively in smokers.

Conclusions: Obstructive pattern was observed in both smoker and non smoker cleaners. Smoker cleaners had significantly higher obstruction than smoker controls. Thus street dust was found to act synergistically with smoking and further deteriorated the lung functions.

Clinical implications: Street dust acts synergistically with smoking and further aggravates obstruction in airways so these persons should take proper preventive measures.

P3999

COPD among non-smokers

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Aim: This study aims at determining the number and percentage of non-smokers suffering from chronic obstructive pulmonary disease [COPD] and at investigating into its etiology.

Subjects & methods: The study comprised a total of 250 subjects, diagnosed with COPD in line with 2010 Global Initiative for chronic Obstructive Lung Disease [GOLD] criteria. The subjects were first divided into 3 GOLD criteria-based subgroups [GOLD I, GOLD II & GOLD III/IV] and later on into the smoking and

non-smoking arm. The non-smoking arm was also subdivided based on possible COPD risk factors. All study subjects underwent lung function and bronchodilator reversibility testing.

Results: Age differences between the two study arms were proven statistically insignificant. Age differences between GOLD I and GOLD II subgroups proved statistically significant [p=0.0405]. The disease severity registered across younger smokers equalled to that of far older non-smokers.

As for COPD risk factors, occupational exposure and earlier pulmonary TB were far more common in men, while passive smoking and the exposure to bio-fuel combustion releases were more common in women. Frequent respiratory infections experienced during childhood and adolescence were also more common in women. Out of 66 non-smokers, 40 had only one, 17 two and the remaining 9 none of the COPD risk factors, but this failed to affect the disease severity.

Conclusion: The results of this study prove that tobacco smoke and its constituents are not the only culprits for COPD onset. The disease can also be developed by non-smokers due to a number of risk factors elaborated herein.

P4000

Respiratory symptoms and lung function parameters in workers exposed to wood smoke and cooking oil fumes in Nigeria

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Introduction: Exposures to wood smoke and oil fumes occurs in both home and industrial setting and is associated with occurrence of both respiratory and non respiratory diseases.

Mai suya is a common job in most northern Nigeria. Our aim is to study the prevalence and respiratory function parameters among this group.

Method: This is a community, and case controlled study involving mai suya and workers who are not exposed to wood smoke and oil fumes in an occupational setting. Both groups underwent an interviewer administered questionnaire followed by on spot spirometric test. Chi square was used to test for association between respiratory symptoms and the job categories. Odd ratios were determined for the risk of respiratory symptoms and exposure to wood smoke and oil fumes.

Result: Both groups are similar in their demographic characters except in their smoking status. The test group had significantly increased occurrence of respiratory symptoms compared with the control group, p value <0.05. The most common respiratory symptoms was cough; present in 23 (48%) of the test group and 7 (22%) of the control group. Among non smokers OR for dyspnea and wheeze was 3.1 CI (0.1-5.08), p value =0.04 and 1.2, CI (0.4-1.3), p value =0.04 respectively. The mean FEV1, FEV1 (predicted), FVC (predicted) were significantly lower among the test group compared with the control group among all respondents.

Conclusion: Workers exposed to wood smoke and oil fumes have increased risk of respiratory symptoms and altered pulmonary functions.

P4001

Gene polymorphism could be a useful prognostic tool in patients with work-related chronic bronchitis

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Objective: Study aimed to assess gene polymorphism for the prognosis of the work-related chronic bronchitis.

Methods: 63 patients with work-related chronic bronchitis were enrolled to the study. Control group included 20 healthy comparable male volunteers without occupational hazards. Study participants were genotyped on tumor necrosis factor-α (TNF-α) gene - G(-308)A and G(-238)A, IL-8 gene (A(-252)T), protein tyrosine phosphatase 22 (PTP 22) gene(R620W), microsomal epoxidohydrolase gene (T337C and A416G). Spirometry, CAT questionnaire data were analyzed.

Results: TNF-α gene polymorphism revealed that heterozygous type was most frequent. IL-8 gene heterozygotes A(-252)T carriers revealed higher IL-6 values vs the homozygotes AA and TT (Kruskal-Wallis test: H=5.34; p=0.07). Respiratory failure was the rare complication in protein tyrosine phosphatase 22 gene(R620W) heterozygotes (Chi-Square=6.12, p<0.05). TrpTrp carriers had higher pulse rate vs the ArgArg carriers (Kruskal-Wallis test: H=9.23, p<0.01). Heterozygotes had higher CAT points and lower minute volume of respiration vs the ArgArg carriers (Chi-Square = 10.28, p<0.005). PTP 22 heterozygotes revealed first work-related chronic bronchitis manifestation in younger age than those with the ArgArg type (Chi-Square=3.96, p<0.05).

Conclusions: PTP22 gene polymorphism assessment could be a useful tool for the prognosis of the work-related chronic bronchitis onset and risk of respiratory failure development. PTP 22 heterozygotes are the risk group for the work-related chronic bronchitis development.

P4002**Indoor pollution and poor ventilation inside the houses synergize to cause airflow limitation in non smokers high altitude dwellers**

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Indoor air pollution from biomass fuel smoke is linked to respiratory diseases. We performed spirometry in 3 villages of a nepalese valley where neither traffic nor industries are present, people use biomass fuels for heating and cooking, often without a chimney, and have a very low smoke habit (4%) so that only the effect of indoor pollution can be investigated. We measured the ventilation inside the houses (Ventilation Index [VI] = window surface/kitchen cubic meters) and the environmental (not reported) and exhaled carbon monoxide as a surrogate marker of indoor pollution. A total of 304 subjects performed acceptable and reproducible spirometry. We calculated the % of subjects with non reversible bronchial obstruction (GOLD) and the % of subjects with FEF25-75 <70% of predicted. Note that in the last ten years indoor ventilation has been improved in the buildings of Pengboche, the village most frequented by trekkers.

Results

| Village-altitude, m | Subjects | Age (range) | FEV1/FVC <0.07 | FEF25-75 <70% | Exhaled CO, ppm ±SD | VI ±SD |
|---------------------|-----------|--------------|----------------|---------------|---------------------|------------|
| Thame, 3900 | 154 (76M) | 41.2 (14-84) | 11.8% | 46.8% | na | 0.06±0.02* |
| Phakding, 2500 | 58 (24M) | 34.8 (16-73) | 11.7% | 44.8% | 9.1±5.3 | 0.08±0.07* |
| Pengboche, 3900 | 92 (43M) | 32.9 (14-70) | 2.2% | 21.7% | 9.6±7.7 | 0.12±0.07 |

In cell 4, 5, the % of subjects with spirometric characteristic (i.e. FEV1/FVC <0.7) is reported.

Exhaled CO and VI are negatively correlated (p 0.002). We conclude that subjects living in poorly ventilated houses and only exposed to indoor pollution have a high incidence of COPD and of abnormalities of FEF25-75 which could be interpreted as an early marker of bronchial obstruction (Pellegrino R et al, 2005).

*p <.05 vs Pengboche

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P4003**Investigation of lung involvement with DLCO in women exposed to biomass smoke**

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Background and aim: It is predicted that half of the world population and more than 90% of the rural population in developing countries uses biomass fuels. Biomass smoke is a mixture of complex particles and gases that are harmful to human health especially for lung. We aimed to search the pulmonary diffusing capacity (DLCO) of women who exposed to biomass smoke.

Methods: All participants' history of tobacco and biomass smoking, physical examination, respiratory function tests including DLCO test were investigated. Including criteria were; exposed to biomass smoke, no have smoking history, have no respiratory problem. Study group was consisted of 65 women, and control group was consisted of 25 women.

Results: Mean the biomass smoke exposure densities was 17.6±6.8 hour/years. Mean age of study group was 50.7±10 and control group was 45±60 years. The ratio FEV1/FVC of study and control groups were 87.4±6.9%, 92±7.3 with respectively (p=0.006). FEV1/FVC rate was above % 70 and FVC values were above %80 for all patients. Mean DLCO values of study and control groups were 23.6±0.7 (%110±3.5) ml/sn/mmHg and 26.1±10 (%117.5±5.6) ml/sn/mmHg with respectively (p>0.05). There were DLCO values of below % 80, study group 15%, while the control group 0% (p<0.01).

Conclusion: DLCO can be lower in women who exposed to biomass smoke, although respiratory function test is normal. Reduction of diffusion capacity of these womens may be the first warning for future respiratory problems.

P4004**Gender differences in the pulmonary acute inflammatory response to concentrated ambient particles in mice**

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The reason why the female gender has a significantly higher risk factor to respiratory illnesses compared to males is not known, although some researchers speculate that sex hormones may interfere in the proneness to these diseases. The

physiologic hormonal fluctuation during the menstrual cycle is known to induce changes in nasal epithelium and lung inflammation. The aim of this study is to analyze how the hormonal cycling of female mice is affected by near-ambient levels of pollution. Particulate matter (PM) was concentrated by an ambient particle concentrator (APC). 14 Male (M) Balb/C mice were divided into two groups: without exposure to PM (M/A; control group) and exposed to PM. 28 Female Balb/C were divided into four groups, according to the estrous cycle. Only female mice from proestrus (PE) and estrus (E) were enrolled. Those from PE were divided into two subgroups: with and without exposure to PM (PE/PM and PE/A). Mice from E were also divided into two subgroups: with and without exposure to PM (E/PM and E/A). Neutral and acidic nasal mucus content was quantified in epithelium through morphometry. Inflammatory cells were analyzed by bronchoalveolar lavage (BAL). APC exposure in M/PM increased both neutrophils in BAL (p=0.031) and neutral mucus content (p=0.016) from nasal epithelium, when compared to PE/PM. No statistical difference was observed to E/PM. In the M/A group, it was observed an increase in both total BAL (p=0.042) and macrophages (p=0.043) when compared to PE/A. These findings indicate that near-ambient levels of PM exposure promoted a higher neutrophil recruitment in male than in female mice in proestrus.

P4005**Tumor necrosis factor-α (TNF-α) gene polymorphism in work-related chronic bronchitis prognosis**

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Objective: Cytokine gene polymorphism could contribute to different susceptibility of occupational dust exposure and work-related chronic bronchitis development and management.

Methods: 87 work-related bronchitis patients were enrolled to the study. Spirometry, pulse oximetry data, autonomic regulation, questionnaire SAN data were assessed on exacerbation and after treatment. Patients were genotyped on TNF-α gene G(-308)A and G(-238)A transitions.

Results: TNF-α gene polymorphism revealed that heterozygous type was most frequent. Homozygous GG - G(-308)A and G(-238)A were determined in 5,7% and 12,6% of patients respectively. GG 308 carriers had lower body mass than those in heterozygotes -70 kg vs 85 kg, p<0,04). Homozygotes revealed better pulmonary tests results after the treatment- FEV1/FVC increase (1,00 vs -0,69, respectively, p<0,04), respiratory volume (0,18 vs 0,02 l, p=0,05), minute volume of respiration (6,20 vs 0,55 l, p<0,01). GG 238 homozygotes demonstrated lower vital capacity vs those in the heterozygous (63 vs 71,5% of the predicted, respectively, p<0,02). GG 238 had higher oxygen saturation at rest (p<0,02), at the breath holding (p<0,01) and at the hyperventilation (p<0,005). Homozygotes had lower points increase in CAT test than those in heterozygotes after the treatment (-5 vs -1, p<0,04), better SAN test results (1,20 vs 0,35 points, p<0,04).

Conclusions: TNF-α gene polymorphism is reliable for the prognosis of the work-related chronic bronchitis. GG 308 and GG 238 carriers with work-related chronic bronchitis revealed better pulmonary tests results and better improvement after the treatment vs the heterozygotes with the comparable length of service.

P4006**Cytokines and immunoglobulins for the prognosis of the work-related chronic bronchitis**

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Objective: Study aimed to assess cytokines and immunoglobulins for the prognosis of the work-related chronic bronchitis due to the occupational dust exposure.

Methods: 63 patients with work-related chronic bronchitis were enrolled to the study. Control group included 20 healthy comparable male volunteers without occupational hazards. Serum IL-1β, IL-6, IL-10, TNF-α, IgG, IgA, IgE, IgM values were measured. Spirometry and respiratory pressure measurements were analyzed.

Results: TNF-α levels correlated with the body mass (r=-0,39, p<0,05), age (r=-0,37, p<0,05) and spirometry data - minute volume of respiration (r=-0,51, p<0,01) and respiratory volume (r=-0,44, p<0,03). IL-10 values were associated with the body mass (r=-0,45, p<0,02) and total protein level (r=0,50, p<0,02). IL-6, Ig A and Ig M levels revealed statistically significant correlation with the WBC counts - (r=-0,67, p<0,01; r=0,59, p<0,03; r=0,51, p<0,05 respectively). Ig A, E, G values correlated with the minute volume of respiration (r=0,42, p<0,05;

$r=0.46$, $p<0.03$; $r=0.49$, $p<0.02$ respectively). Increased Ig M concentration was associated with the oxygen saturation at breath holding ($r=0.55$, $p<0.01$) and hyper-ventilation ($r=0.53$, $p<0.02$). Complement C3 values correlated with the SpO2min at hyperventilation ($r=0.47$, $p=0.05$), C4 levels – with the total cholesterol values ($r=0.53$, $p<0.03$).

Conclusion: Cytokine and immunoglobulin levels could be useful for the prognosis of the work-related chronic bronchitis.

P4007

Effects of differences in exposure conditions on pulmonary functions

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Introduction: Air pollution due to industrial waste and tobacco smoke has a serious detrimental influence on pulmonary functions. However, few reports have been published regarding the effects of differences in exposure conditions on the pulmonary functions.

Aims and objectives: The objective of this study was to examine how the differences in exposure conditions affect the pulmonary functions.

Methods: The subjects consisted of 869 people presented with functional decline as a result of working or living in an area with air pollution, and 434 people participated in an epidemiological investigation in an area without air pollution. Reviews of pulmonary function tests were conducted by employing the medical examination data. Pulmonary functions were compared in smokers versus non-smokers in the area with pollution (smokers with pollution vs. non-smokers with pollution) and were also compared to smokers in the non-polluted area (smokers without) and non-smokers in the non-polluted area (non-smokers without).

Results: In terms of the %VC, the values were 90.9%, 95.9%, 98.2%, and 97.4% in the smokers with pollution, non-smokers with pollution, smokers without and non-smokers without, respectively. For the FEV₁%, the value for smokers with pollution was 65.2%, non-smokers with pollution was 70.1%, smokers without was 70.8%, and non-smokers without was 79.2%. The smokers with pollution had a lower FEV₁% than the other groups ($p<0.001$).

Conclusions: Air pollution and tobacco smoke exposure are associated with reduced VC and FEV₁. In particular, exposure to both factors had a stronger effect on the FEV₁ than did exposure to one factor. Therefore, active smoking cessation instruction is necessary for subject in the polluted area.

P4008

Respiratory complaints and functions in barn workers

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Aim: This study aimed to investigate the respiratory complaints and functional impairments in workers included in family plants with few cattle.

Materials and methods: One hundred fifty workers (128 female) accepted were included between October, 2011 and January, 2012. Occupational and Environmental Lung Diseases Questionnaire of Turkish Thoracic Society, pulmonary function tests, physical examinations and eosinophil counts in nasal drainage were performed on all subjects.

Results: The mean age was 47.7 ± 14.2 years. Smoking rate was 12% (18/150). The declaration rate for both feeding cattle and gardening was 90.7% (136/150). Almost half of the subjects (73/150) noted that they were exposed to dust and fumes in barns. More than 80% of the subjects used wood, coal, hazelnut shell and gas for heating and cooking. was present in of subjects. Cough, phlegm, wheezing, chest tightness and dyspnea were 24%, 13.3%, 6%, 6% and 27.3%, respectively. The mean percentages of predicted FVC, FEV₁, FEV₁/FVC and maximal midexpiratory rate were 78.2 ± 24.1 , 74.5 ± 24.4 , 80.7 ± 12.8 and 60.9 ± 26.6 , respectively. There were significant negative correlations between the duration of working in barns and FVC ($r=-0.281$, $p=0.001$), FEV₁ ($r=-0.217$, $p=0.008$), MMFR ($r=-0.168$, $p=0.040$). Nasal eosinophils were detected in 47.3% (71/150). Heating houses had an independent effect on cough ($F=3.156$, $p=0.048$) and working years in barn had an independent effect on phlegm ($F=2.034$, $p=0.003$). Multivariate analysis did not reveal any effect.

Conclusion: Increased impairments in pulmonary functions by years were detected. It is necessary to improve both working place and house ventilation and to prevent the workers respiratory system.

P4009

The effects of atorvastatin in mustard gas exposed patients with chronic obstructive pulmonary disease: A randomized controlled trial

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Background: Statins have anti-inflammatory effects in patients with chronic obstructive pulmonary disease. This study designed to evaluate the effects of atorvastatin on serum highly sensitive C-reactive protein (hs-CRP) and pulmonary function in sulfur mustard (SM) exposed patients with chronic obstructive pulmonary disease.

Methods: In a double blind clinical trial, 50 patients with chronic obstructive pulmonary disease due to sulfur mustard and high hs-CRP, randomly entered in this study. 45 patients completed the study ($n=22$, placebo and $n=23$, atorvastatin). Serum hs-CRP, pulseoximetry, spirometry and six-minute walk distance test (6MWD) were measured, COPD assessment test (CAT) and St George's respiratory questionnaire (SGRQ) were completed by patients at the beginning of trial and after 9 weeks of prescription of 40 mg/day atorvastatin or placebo. At 4th week, pulseoximetry, spirometry and 6MWD were measured.

Results: At 4th week, there was no improvement in the atorvastatin group compared to the placebo group in SPO₂, FEV₁, and 6MWD ($p=0.79$, $p=0.12$, $p=0.12$ respectively). At 9th week, there was no improvement with atorvastatin in serum hs-CRP, SPO₂, FEV₁ and 6MWD compared to the placebo ($p=0.35$, $p=0.28$, $p=0.94$, $p=0.43$ respectively) but there was an improvement with atorvastatin in quality of life (with CAT score, $P<0.001$ and SGRQ total score, $P=0.004$).

Conclusion: Atorvastatin does not alter serum hs-CRP and lung functions but may improve quality of life in SM-injured patients with chronic obstructive pulmonary disease.

Key Word: Sulfur mustard, Atorvastatin, hs-CRP, Chronic obstructive pulmonary disease.

P4010

Presence of hypertension (HT), ischemic heart diseases (IHD) and a family history of hypertension are independently associated with reduced peak expiratory flow (PEF) values

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Background: Reduced lung function has been shown to be an independent predictor of cardiovascular mortality in patients of hypertension and IHD in earlier studies.

We aimed to study the association between HT, IHD and PEF values amongst road transport workers from Andhra Pradesh State in India.

Methods: 7,154 bus drivers, conductors, garage workers and office-based workers of the Andhra Pradesh State Road Transport Corporation (APSRTC) were randomly selected from 24 bus depots and administered a health questionnaire, underwent blood pressure monitoring and performed peak flow meter using the EU scale peak flow meter (Breathometer®, Cipla Ltd., India). Current, past and family histories of cardiovascular and respiratory ailments were captured. Associations between PEF values and HT and IHD were studied using the chi square test and the values expressed as odds ratios.

Results: Presence of HT, IHD and a family history of HT were independently associated with low PEF values, defined as less than 80% predicted PEF value [OR 1.3, 95% CI 1.1 – 1.5, $p=0.008$; OR 1.9, 95% CI 1.2 – 3.0, $p=0.004$; OR 1.2, 95% CI 1.0 – 1.4, $p=0.039$ respectively]. No difference in odds ratios were observed between different occupations.

Conclusion: PEF values less than 80% predicted are strongly associated with presence of HT, family history of HT and presence of IHD. Reduced peak flow values should stimulate the need for performing a cardiovascular assessment.

P4011

Study of daytime sleepiness among tunnel workers on rotating schedule

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Introduction: Working on shifts, and especially, on a night shift, influences the endogenous sleep regulation system leading to diminished sleep time and increased somnolence. This may be dangerous in some cases, especially in large scale constructions, such as tunnels.

Aims and objectives: The aim of our study was to examine whether sleep duration and daytime sleepiness differed between day and night shifts among tunnel workers.

Methods: In this study 42 male workers (during the last semester) in a tunnel construction were recruited and examined at workplace. They underwent spirometric control and they were asked to complete a questionnaire referring to demographic factors, status of health and the Epworth Sleepiness Scale.

Results: The workers present a mean age of 42 years old and a mean Body Mass Index (BMI) of 27.2 kg/m^2 . 69% of them were active smokers, while 31% have never tried smoking. Interestingly, 93% of the tunnel workers were consuming two coffees per day at least, while the remaining 7% were not drinking coffee at all. Almost one third of them reported alcohol consumption on a daily basis. Severe cardiologic, respiratory or endocrine disease was not reported among the participants and neither were depression and anxiety disorders. Our results showed that almost all the workers had gathered a score less than 10 in the Epworth

TUESDAY, SEPTEMBER 4TH 2012

Sleepiness Scale (a score of 10 or more is considered sleepy), except for two subjects in which statistical analysis did not reveal any statistically significant correlation between somnolence and the work schedule ($p=0.88$).

Conclusions: The rotating shift in a dark and demanding environment, as in the tunnel construction, does not play a significant role in daytime sleepiness.

P4012

Basic spirometric parameters of coke plant workers over the years

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The aim of this study was to examine respiratory system efficiency in workers employed as coke plant battery staff in Steel Mill in Krakow over the years.

Methods: The spirometric examinations were performed at 3 different times:

1st in 1974 - 65 workers (age: $32,7 \pm 4,8$ years, period of occupational exposure - $8,8 \pm 4,6$ years); 2nd in 1990 - the same 65 workers (they worked all the time in the same workshop; $48,8 \pm 5,1$ years; $24,6 \pm 4,7$ years respectively); 3rd in 2012 - 49 workers (age: $46,27 \pm 8,9$, period of occupational exposure - $22,4 \pm 7,91$)

In 1974 -1990 the levels of industrial pollution at workplace were similar. The concentration of SO_2 was $15,4 \pm 6,6$ mg/m³ and exceeded TLV, NO_x $-2,6 \pm 1,5$ mg/m³, total dust $-7,5-29,1$ mg/m³ and free silicon dioxide $-1,5-11,5\%$, geometric dimension of dust granule $-3,9-4,5$ um. In 2012 due to changes in both ownership of coke plants and increase in workers security, measured values were: SO_2 - $8,9 \pm 4,4$ mg/m³, NO_x $-2,1 \pm 1,1$ mg/m³, total dust $-0,3-3,0$ mg/m³ and free silicon dioxide $-2,0-3,6\%$

Results: The medians of basic parameters measured at 1st, 2nd and 3rd examination were as follows:

VC - 5,22 l (118,2%N); 4,46 l (91,1%N) and 4,89 l (97,8%N).

FEV1 - 4,19 l (107,2%N); 3,37 l (90,6%N) and 3,81 l (99,94%N).

FEV1/VC: 79%; 76%; and 79,04% respectively.

Conclusions: After 16 years of occupational exposure to gaseous and dust pollutants (1st & 2nd) significant decline of basic respiratory parameters was noted but they were still in the normal range.

After transformations in Poland the coke plant was modernized and environmental conditions significantly improved therefore it was agree with expectation that the new generation of workers also had the high efficiency of respiratory system.