

## Poster Presentation

### Working Conditions

#### 0054 THE RELATIONSHIP BETWEEN ON-CALL WORK AND HEALTH PROBLEM AND INJURY AMONG KOREAN WORKERS

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**Objective** In case of on-call work, it is mixed with day-duty and night-duty, so that workers may have to work anytime of the day. This study aimed to understand the relations between Korean workers' on-call work, health problem, and injury.

**Methods** Using the 3rd Korean Working Conditions Survey in 2011, this study targeted 29 246 paid workers working for more than a year. Conducting the logistic regression analysis of on-call work and health problem based on the surveyed data, the personal/occupational characteristics, working environment, and job stress were controlled.

**Results** In case of on-call work, it showed higher odds ratio like physical health problems (OR, 1.33; 95% CI 1.22–1.44), psychological health problems (OR, 1.31; 95% CI 1.08–1.60), and injury (OR, 2.76; 95% CI 2.26–3.37). In the results of analysing the detailed health problems, workers on-call work showed higher odds ratio of hearing problems (OR, 2.06; 95% CI 1.63–2.62), skin problems (OR, 1.71; 95% CI 1.38–2.12), back pain (OR, 1.22; 95% CI 1.08–1.38), muscular pain in shoulders, neck, and upper limbs (OR, 1.23; 95% CI 1.12–1.34), muscular pain in lower limbs (OR, 1.27; 95% CI 1.15–1.40), headache and eyestrain (OR, 1.46; 95% CI 1.32–1.60), abdominal pain (OR, 1.37; 95% CI 1.02–1.85), depression or anxiety (OR, 1.43; 95% CI 1.07–1.93), overall fatigue (OR, 1.36; 95% CI 1.24–1.49), insomnia or sleep difficulties (OR, 1.41; 95% CI 1.13–1.76).

**Discussion** In the results of this study, on-call work was related to health problems and injury. Additional study should be conducted to understand the correlations in the future.

## Poster Presentation

### Intervention Studies

#### 0055 THE HEALTH RISKS OF OCCUPATIONAL EXPOSURE TO N-HEXANE IN PRINTING INDUSTRY

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**Objective** To evaluate the risks of occupational exposure to n-hexane in printing industry.

**Methods** 76 printing factories using n-hexane were investigated. The concentrations of n-hexane in workplaces were tested. The medical examination was carried out for 179 exposed workers and 208 controls. The concentrations of 2,5-hexanedione in urine were tested among 162 exposed workers and 54 controls. The neural electromyography (EMG) examination was performed on 28 cases exposed to n-hexane for more than 4 years.

**Results** The solvents containing n-hexane are used to clean the printing machines. The concentration of n-hexane in the air of the workplaces was 1.5–1553.5 (median=178.2) mg/m<sup>3</sup> and 17.59% of them exceeded the occupational exposure limit (OEL). The concentration of n-hexane for exposed individuals was 39–215 mg/m<sup>3</sup> and 66.67% of them exceeded the OEL.

The results of medical examination showed that the occurrence of conjunctiva congestion (10.65%)\*, tremor of fingers (10.06%)\* and tendon hyporeflexia (13.41%)\*\* among the exposed workers were significantly higher than that of the controls (4.81%, 6.25% and 4.33%, respectively) (\*p<0.05, \*\*p<0.01). The concentrations of 2,5-hexanedione in urine were 0.25–15.6 (1.78±2.98)mg/L among the exposed workers and 11.73% of them exceeded 5 mg/L. The EMG showed that 2 cases suffer from a slight peripheral nerve injury.

**Conclusion** The concentration of n-hexane in workplaces exceeds the OEL and the abnormal results of medical examinations performed on the exposed workers indicate health risks in the printing industry. These risks are caused by manual labour, overtime work, lack of harmful chemical removal devices and PPE.

## Poster Presentation

### Intervention Studies

#### 0056 INVESTIGATION ON OCCUPATIONAL EXPOSURE TO NON-IONISING RADIATION IN PHYSIOTHERAPY WORKPLACES

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**Objective** To understand the occupational exposure to non-ionising radiation in physiotherapy workplaces.

**Methods** An investigation was conducted in 16 physiotherapy agencies used non-ionising radiation physiotherapy instruments. The ultra-high-frequency radiation, high-frequency radiation and microwave were measured in the points of the head, chest and abdomen. The laser was measured on skin.

**Results** The intensity of ultra-high-frequency radiation produced by 17 ultra-short wave therapeutic apparatus were 0.001–0.306 (median=0.085)mW/cm<sup>2</sup>, 0.008–4.225 (median=0.102)mW/cm<sup>2</sup> and 0.011–2.701 (median=0.292) mW/cm<sup>2</sup> in the point of the head, chest and abdomen, and 70.6%, 47.1% and 17.64% meet the occupational exposure limits (OELs) respectively. The high-frequency radiation in the point of chest (26.7 V/m) and abdomen (40.8 V/m) produced by 1 of the 4 high frequency thermotherapy instruments respectively exceed the OELs. The microwave (0.001–4.668 mW/cm<sup>2</sup>) of 18 microwave therapeutic apparatus meets the OELs in all points mentioned above. The laser of 12 laser therapeutic apparatus were <0.01×10<sup>-4</sup>–0.13×10<sup>-4</sup> W/cm<sup>2</sup> in wavelength range 400–1400 nm on the skin, all of them meeting the OELs.

**Conclusion** The physical therapists are exposed to occupational hazard factors such as ultra-high-frequency radiation, high-frequency radiation, microwave and laser in the workplace. The ultra-high-frequency radiation and high-frequency radiation that exceed the OELs in some measurement points indicate the risks currently in physiotherapy workplaces. It is necessary

to take steps to protect the physical therapists, such as separating the offices of physical therapist from the treatment areas, installing protective facilities in the workplace, and using PPE where necessary.

## Poster Presentation

### Psychosocial

#### 0058 ACCURACY OF A SINGLE ITEM ON MENTALLY TIRING WORK AS PROXY MEASURE OF JOB DEMANDS AND EFFORTS IN THE GAZEL COHORT

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**Objective** Comparing the accuracy of single item about mentally tiring work against validated scales, Demand-Control (DC) and the Effort Reward Imbalance (ERI).

**Methods** We analysed data from the Gazel cohort, where a question about mentally tiring work was administered simultaneously with the DC (in 1997 and 1999) and ERI (in 1998) scales. Correlation and accuracy were studied comparing this single question (8 categories, and recoded into 2 or categories) with DC and ERI scales (without and with recoding into 2 categories based on usual threshold), using sensitivity, specificity, predictive values, and likelihood ratio.

**Results** For the years considered, 5706 (1998) to 11 304 (1997) workers had responded to the questionnaires. The demand and effort dimensions were moderately correlated with the mentally tiring work question showing a good sensitivity (>0.8), and a negative likelihood ratio (<0.33), with a possible dose-response-relationship. Specificity and positive likelihood ratio were low (respectively <0.5 and <2). Job control, Job strain and ERI were not captured by mentally tiring work, and reward only partly.

**Conclusion** Though a single question does not replace validated scales as the DC and the ERI scales, these results indicate that it would be possible to use simple measures in questionnaires and non-specialised cohorts for screening purpose.

## Oral Presentation

### Burden of Disease

#### 0059 A GLOBAL PERSPECTIVE ON COAL-FIRED POWER PLANTS AND LUNG CANCER MORTALITY

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**Background** Lung cancer is the leading cause of cancer mortality in many countries and leads to substantial financial burden globally. The lack of consideration of the widely diverse compositions of particulate matter (PM) may lead to inaccurate

estimation and inability to capture respective contributions as current estimates.

**Methods** Age- and sex-adjusted lung cancer mortalities of 61 countries were followed from 1979 to 2013 while 10-year-accumulative coal capacities is the primary independent variable. We applied a change-in-change model to estimate the preventable deaths of lung cancer from the changes of coal capacities during periods from 1999–2003 to 2009–2013, adjusting for various socioeconomic, demographic determinants, and lag period.

**Results** The average log coal capacity increased from 9.58 in 1980 to 10.35 in 2010, and smoking prevalence dropped by 13.82% among males in the same period. One log coal capacity (unit: logMW) was associated with an increase in lung cancer mortality by 58.31 per million males (SD=28.49,  $p<0.05$ ); while the savings from decreasing smoking prevalence was only 4.86 per million males (SD=0.03,  $p<0.05$ ). Based on the model, we estimated a total of 123.68 thousand lives could be saved from lung cancer among 3477 million males in 2011.

**Conclusion** This study answered a key policy question on the externality cost of coal power plants and estimated global disease burden from preventable lung cancer attributable to coal-fired power plants. By changing a nationwide energy matrix from brown energy to green, some European countries have prevented lung cancer mortality among males successfully.

## Poster Presentation

### Shift Work

#### 0062 "ROTATING SHIFT WORK AND METABOLIC SYNDROME AMONG EMPLOYEES WORKING IN TERTIARY CARE HOSPITAL IN SOUTHERN INDIA"

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**Background** Metabolic syndrome and shift workers are on the rise. There is conflicting evidence whether shift work predisposes to development of metabolic syndrome.

**Objectives** To study the prevalence of metabolic syndrome among shift and daytime workers in a South Indian hospital and to assess the association between shift work and metabolic syndrome.

**Methodology** The study had 2 groups: shift and daytime workers between ages 25–50 years. The sample size calculated was 79 in each group to demonstrate 12.5% difference in the prevalence of metabolic syndrome with a power of 80% and  $\alpha$  error of 5%.

The primary outcome studied was the prevalence of metabolic syndrome and secondary outcomes studied were the odds of developing metabolic syndrome among shift workers. Chi square test was used to measure the difference in the categorical variables; independent student t test for mean difference in the continuous variables. Univariate analysis and multivariable logistic regression were used to test the significance of relevant variables on metabolic syndrome.

**Results** We studied 80 shift and 80 daytime workers. Baseline characteristics were different for the following parameters: daytime workers were older, had more vegetarians, better