

# Occupational noise exposure and cardiovascular diseases: A pilot study in a metalworking industry

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Exposure to noise is an important risk to human health. Despite that, its control in the occupational environment is only made considering the prevention of hearing loss. Portuguese law for this subject neglect the non-auditory effects, such as sleep disturbances, annoyance and stress, reduction of cognitive performance and cardiovascular diseases. Over the past years a great deal of studies was designed and developed to assess the influence of noise exposure, both occupational and environmental, on the cardiovascular system. The results are contradictory, while some report a weak connection or defend that workers bodies may be adaptive to noise, others connect noise exposure to hypertension, ischemic heart disease and higher risk of myocardial infarction. The aim of this study is to evaluate the effect of occupational noise exposure on the cardiovascular system. The study took place in a metal treatment and coating factory with 75 workers, both male and female, of whom 71 agreed to participate. Two groups of workers were defined: 1. Exposed to noise (workers directly involved in the production process), and 2. Non-exposed to noise (administrative activities and similar). Noise measurements were performed using three sound-level meters class 1 (Brüel&Kjær, models 2250 and 2260). To ensure the accuracy of the measurements, recordings were preceded by the calibration of the sound-level meters with the respective acoustic calibrators class 1 (Brüel&Kjær, model 4231). The measurement protocol was established according to the ISO 9612:2009. Regarding worker's cardiovascular health, several methods were used. Firstly, standard 12-lead electrocardiogram was performed, using the electrocardiograph ELI 150 by Mortara Instruments and following the AHA/ACCF/HRS recommendations for the standardization and interpretation of the electrocardiogram. Blood analysis were also done, measuring various cardiovascular related parameters. Finally, the participants were asked to fill in 3 questionnaires: I. Sociodemographic data, II. Cardiovascular risk assessment, III. Noise exposure. The data collected will be managed and analyzed using the software IBM SPSS 23<sup>rd</sup> version.

The processing and analysis of the data will involve descriptive and inferential statistics. The normality test will be applied and, according to the result, parametric or non-parametric tests will be used to analyze the association between relevant variables. The study was approved by the Ethics Committee of the National Institute of Health Dr. Ricardo Jorge and all the

participants provided the informed consent forms. Preliminary analysis of noise exposure showed, as expected, higher levels in the production sector. The cardiovascular risk is predicted to be higher those individuals exposed to noise, evidenced by variations in the analysis and eletrocardiographic abnormalities. Therefore, this study is expected to provide some evidence for the non-auditory effects of noise, more specifically the cardiovascular effects, and to promote discussion of the subject in order to take these effects into consideration while trying to control noise exposure.