

## 摘要

本研究針對電線電纜業勞工，進行其作業環境噪音、個人噪音暴露劑量及聽力閾值量測，並結合問卷調查之資料，以探討電線電纜製造廠勞工之噪音暴露對聽力所造成的影響及關聯性。

本研究對象為 214 名在電線電纜製造廠工作之勞工，包括包裝區 27 人、伸線區 33 人、鍍銅區 43 人、鍍錫區 56 人、行政人員(對照組)82 人。其中男性分別於暴露組及對照組中有 150 人、27 人，女性則分別為 9 人、55 人，顯示暴露組勞工大多以男性為主。暴露組及對照組的平均年齡均為 43-44 歲，且均以 41-50 歲的比例為最高。年資分布多為 12 年以下，平均約為 10 年。而勞工學歷則多以高中程度為主。

環境噪音量測結果顯示，其均能音量( $L_{eq}$ )分別為包裝區 92.3 dB、伸線區 87.0 dB、鍍銅區 85.3dB、鍍錫區 81.3dB、對照組 59.4 dB，暴露組之噪音量均遠大於對照組。由頻譜分析之結果可得知，作業環境噪音源以低頻機械運轉聲及收音機之人的言語交談聲為主。個人噪音劑量結果顯示，暴露組之個人噪音劑量(8 小時)皆在我國法規 100% 之範圍內，但包裝及伸線區勞工的個人噪音劑量平均值已達 86.7% 及 53.1%，達到法規規定應需要佩戴防音防護具或實行工程改善之暴露劑量。聽力閾值量測結果與國內聽力常模值比較後發現，在低頻範圍有較明顯的聽力閾值提昇，尤其是伸線區和鍍銅區勞工更為顯著；而在高頻範圍則以包裝區及伸線區勞工有較大的聽力閾提昇值。整體而言，暴露組較對照組明顯有聽力異常情形，並且以三分法有較高的聽力異常率，其次依序為高頻三分法及六分法。此外，暴露組中以包裝區勞工的聽力異常比率較高，其次為伸線區勞工。由不同影響變項之邏輯迴歸分析結果，發現無論何種聽力指標，暴露組均較對照組有較高之勝算，顯示暴露組聽力損失的危險性比對照組高。此外，於六分法中，有吃檳榔者或身體質量指數(BMI)異常者聽力損失的危險性比沒吃檳榔或身體質量指數正常者高，並且檳榔及 BMI 此兩個影響變項與聽力異常具有顯著關聯。

關鍵字：電線電纜、噪音暴露、聽力損失

## Abstract

This investigation studied the noise effect to hearing for cable manufacture workers by the sound level of workplace, personal noise dose, hearing threshold, and questionnaire.

The samples of this study are 214 workers in two cable factories, including 27 packing area workers, 33 drawing of copper area workers, 43 copper plating area workers, 56 tin plating area workers, and 82 administrative staffs (control group). Noise exposure group has 150 males and 9 females, and control group has 27 males and 55 females. It indicates that there are most male workers in exposure group. The average ages of exposure group and control group are 43-44 years old, and the 41-50 years old group is the most. In terms of years of service, those with 12 or less than 12 years of service accounted are the most, and the average is 10 years. Moreover, the most education degree of the workers is senior high school.

The measurements of environment sound levels show the average equivalent energy sound level ( $L_{eq}$ ) is respectively 92.3dB of packing area, 87.0dB of drawing of copper area, 85.3dB of copper plating area, 81.3dB of tin plating area, and 59.4dB of control group. It indicates that sound levels of exposure group are much higher than that of control group. The result of spectrum analysis shows the noise sources at workplaces are low frequency noise from mechanical operation and the speech conversation of the broadcast. Although the personal noise doses (8 hours) of exposure group do not reach the 100% of the permitted value of regulation, however, the personal noise dose averages of packing and drawing of copper area workers are respectively 86.7% and 53.1%, they both go past the standard which the personal protective equipments and engineering improvements need to be provided.

To compare with the hearing threshold measured and the corresponding values of Taiwan's healthy people, it represents obviously raising hearing threshold in low frequency range. In particular, the drawing of copper area and copper plating area workers are more significant. And in high frequency range, the packing and drawing of copper area workers show the more threshold shift. Overall, the exposure group shows more abnormal hearing than that of control group. Besides the packing area workers in exposure group have higher abnormal hearing rate, and the drawing of copper area workers are the next.

The logistic regression analysis result shows no matter what kind of hearing threshold shift criterion, the odds ratio of exposure group is higher than that of control group, it indicates the exposure has higher risk of hearing loss than that of control group. Besides, according to the hearing threshold shift criterion in Taiwan Hearing Conservation Program Guideline, the workers with abnormal BMI and chewing betel nut have higher risk of hearing loss than that of whom without, and these two variables are significantly correlative to abnormal hearing.

Keywords: cable, noise exposure, hearing loss