Factors Associated with Complaints of Hearing Impairment in Workers in the Wet Production Section at PT HEVEA MK I Palembang in 2023

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ABSTRACT
Advances in science and technology have driven the rapid rate of industrialization and contributed to the success of improving the quality of life and welfare of mankind. The application of advanced technology and equipment on the one hand creates ease in production, in larger quantities, higher quality and in a relatively short time, but on the other hand tends to increase work risk or hazard, as well as the possibility of increasing problems and incidence of disease due to Work. This research was conducted with the aim of knowing the factors associated with complaints of hearing loss in the wet production section of PT HEVEA MK I Palembang in 2023. This research method uses a cross-sectional method, which is a study in which the independent and dependent factors are examined simultaneously. in the same time period. To obtain data in the field, it was carried out by measuring noise intensity in the production work area and distributing questionnaires to 49 respondents who were working. The conclusion of the study showed that there was a relationship between noise intensity (P=0.001), working time (P=0.017), work period (P=0.022), and use of ear protection devices (P=0.000) with complaints of hearing loss in production workers wet at PT. HEVEA MK I Palembang in 2023.

Keywords : Hearing Loss Complaints, Noise
INTRODUCTION

The advancement of science and technology has driven the rapid pace of industrialization and successfully contributed to improving the quality of life and well-being of humanity. The application of advanced technology and sophisticated equipment, on the one hand, has created convenience in production, increased quantities, higher quality, and shorter processing times. However, on the other hand, it tends to increase the risks or hazards of work, as well as the possibility of work-related health issues and diseases. The use of advanced machines in processing and manufacturing goods needed by humans can produce high-intensity noises.

More than 5% of the world's population, which amounts to approximately 360 million people, experienced hearing impairments according to the WHO's data in 2017. Among them, 328 million were adults. According to the 2013 Basic Health Research (Riskesdas) data from the Republic of Indonesia, the national prevalence of hearing impairments was 2.6 percent. One of the causes of hearing impairments is excessive exposure to noise, including noise in the workplace.

Noise-Induced Hearing Loss (NIHL) is a hearing impairment caused by long-term exposure to workplace noise, approximately 85 dB level for more than 8 hours a day, over a period of about 10 years in both ears. There are several known risk factors that can affect hearing impairments caused by noise.

The importance of using Personal Protective Equipment (PPE) to reduce the severity of hearing impairments is crucial. As explained in PERMENAKERTANS Number 8 of 2010 regarding Personal Protective Equipment, PPE is a device with the capability to protect an individual by isolating part or the entire body from potential hazards in the workplace. The hazards of workplace noise can be addressed by using Hearing Protective Devices (HPDs) such as earplugs and earmuffs.

The research conducted by Prakoso obtained results indicating several factors contributing to work accidents at PT. ABCD, including Personal Protective Equipment (APD) (23%), driving (4%), body posture (1.5%), and work area (0.6%). Based on these percentages, APD emerges as the most significant factor compared to other accident-related factors. The research also explains that workers who do not use APD tend to disregard its importance due to their habitual non-compliance, emphasizing the need to improve compliance with APD usage by promoting behavioral changes in its usage. These behavioral changes aim to reduce the risk of work-related diseases, particularly hearing impairments, and decrease the reduction of work efficiency.

PT. Hevea MK 1 is an industrial raw rubber processing company legally registered as PT, operating in Palembang, South Sumatra. The raw rubber materials are sourced from rubber farmers outside Palembang. The factory receives the raw rubber materials in the form of slabs, lumps, or cuplump, commonly known as "BOKAR" (Bahan Olah Karet Rakyat - Rubber Processing Materials of the People), and transforms them into semi-finished products of export quality.

In the production process, advanced machines and technological equipment are used. These machines have high production capacity, making them a potential source of noise in the production
area. The company itself is aware of this issue and provides ear protection devices for employees working in the production area.

The noise that occurs in the workplace is a problem that requires adequate attention, especially for the health of workers, as the human auditory system has certain limits that can still tolerate noise. If these limits are exceeded, it can lead to hearing impairments.

Based on data from PT HEVEA MK 1, in the year 2022, audiometric examinations (hearing function tests) were conducted on 104 workers, resulting in 60 people having normal hearing and 38 people experiencing mild hearing loss.

Therefore, research related to hearing impairment complaints among workers in the wet production section at PT HEVEA MK 1 in Palembang is necessary.

METHODS
This research is a quantitative study that is analytical in nature, with a cross-sectional study approach. The research is conducted using interview methods and noise intensity measurements, where both the dependent and independent variables are observed simultaneously. The population in this study consists of 49 workers in the wet production section at PT HEVEA MK 1 in Palembang. The sample represents the entire population, which means that all 49 workers are included in the study.

This research was conducted in May 2023 at PT HEVEA MK I, located on Jl. Sutami, Sei Selayur, Kalidoni, Kota Palembang, South Sumatra, 30118. Data analysis is carried out using two methods: univariate and bivariate analysis.

RESULTS
Table 1 Presents the Frequency Distribution of Respondents based on the research findings and data processing. The variables observed include complaints of hearing impairments, noise intensity, working time, length of employment, and the use of Personal Protective Equipment (PPE).

<table>
<thead>
<tr>
<th>No</th>
<th>Variable</th>
<th>Frequency (f)</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Hearing Impairment</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Complaints</td>
<td>34</td>
<td>69.4</td>
</tr>
<tr>
<td></td>
<td>Exist</td>
<td>15</td>
<td>30.6</td>
</tr>
<tr>
<td></td>
<td>No Complaints</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Noise Intensity</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>High</td>
<td>27</td>
<td>55.1</td>
</tr>
<tr>
<td></td>
<td>Low</td>
<td>22</td>
<td>44.9</td>
</tr>
<tr>
<td>3.</td>
<td>Working Time</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Low Risk</td>
<td>25</td>
<td>51.0</td>
</tr>
<tr>
<td></td>
<td>High Risk</td>
<td>24</td>
<td>49.0</td>
</tr>
<tr>
<td>4.</td>
<td>Length of Employment</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Low Risk</td>
<td>20</td>
<td>50.2</td>
</tr>
<tr>
<td></td>
<td>High Risk</td>
<td>20</td>
<td>49.8</td>
</tr>
<tr>
<td>5.</td>
<td>Use of PPE</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Not using</td>
<td>21</td>
<td>42.9</td>
</tr>
<tr>
<td></td>
<td>Using</td>
<td>28</td>
<td>57.1</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>48</td>
<td>100</td>
</tr>
</tbody>
</table>

Based on Table 1, the research findings regarding the variable of hearing impairment complaints show that out of 49 workers in the wet production section at PT HEVEA MK I in Palembang, 34 workers (69.4%) reported having hearing impairment complaints. Additionally, 27 workers (55.1%) experienced high noise intensity, 25 workers (51.0%) had high-risk working hours, 29 workers (59.2%) had high-risk length of employment, and 28 workers (57.1%) used Personal Protective Equipment (PPE).

Table 2 The relationship of variables (complaints of hearing loss, noise intensity, working time, length of work, and use of PPE) with complaints of
workers in the wet production department at PT HEVEA MK I

<table>
<thead>
<tr>
<th>Variable</th>
<th>Hearing Impairment</th>
<th>Total</th>
<th>p-Value</th>
<th>OR</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Complainants</td>
<td>Expt</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Noise Intensity</td>
<td></td>
<td>12</td>
<td>0.001</td>
<td></td>
<td>0.205-</td>
</tr>
<tr>
<td>High</td>
<td>8</td>
<td>32</td>
<td></td>
<td></td>
<td>0.977</td>
</tr>
<tr>
<td>Low</td>
<td>4</td>
<td>7</td>
<td></td>
<td></td>
<td>0.764</td>
</tr>
<tr>
<td>Working Time</td>
<td></td>
<td>12</td>
<td>0.017</td>
<td></td>
<td>0.135-</td>
</tr>
<tr>
<td>High Risk</td>
<td>8</td>
<td>32</td>
<td></td>
<td></td>
<td>0.977</td>
</tr>
<tr>
<td>Low Risk</td>
<td>4</td>
<td>7</td>
<td></td>
<td></td>
<td>0.368</td>
</tr>
<tr>
<td>Length of Employment</td>
<td></td>
<td>20</td>
<td>0.022</td>
<td></td>
<td>0.132-</td>
</tr>
<tr>
<td>High Risk</td>
<td>16</td>
<td>68</td>
<td></td>
<td></td>
<td>0.977</td>
</tr>
<tr>
<td>Low Risk</td>
<td>4</td>
<td>7</td>
<td></td>
<td></td>
<td>0.368</td>
</tr>
<tr>
<td>Use of PPE</td>
<td></td>
<td>1</td>
<td>0.000</td>
<td></td>
<td>0.467</td>
</tr>
<tr>
<td>Not Using PPE</td>
<td>13</td>
<td>51</td>
<td></td>
<td></td>
<td>0.008-</td>
</tr>
</tbody>
</table>

Table 2 above shows the results of statistical analysis, where the obtained p-value is 0.001 < (α=0.05). Therefore, Ho is rejected, and Ha is accepted, indicating a significant relationship between noise intensity and workers’ complaints of hearing impairment. The results of the statistical analysis show a p-value of 0.017 < (α=0.05). Thus, Ho is rejected, and Ha is accepted, indicating a significant relationship between working time and workers’ complaints of hearing impairment.

The results of statistical analysis reveal a p-value of 0.022 < (α=0.05). Therefore, Ho is rejected, and Ha is accepted, indicating a significant relationship between working time and workers’ complaints of hearing impairment.

The results of statistical analysis indicate a p-value of 0.000 < (α=0.05). Thus, Ho is rejected, and Ha is accepted, indicating a significant relationship between the use of PPE and workers’ complaints of hearing impairment.

DISCUSSION
The Relationship between Noise Intensity and Hearing Impairment Complaints.

Based on Table 4.7, it can be observed that out of 49 workers in the wet production section at PT HEVEA MK 1 in Palembang, 13 workers (48.1%) were exposed to high-intensity noise, of which 14 workers (51.9%) did not have any hearing impairment complaints. On the other hand, 21 workers (95.5%) were exposed to low-intensity noise, and only 1 worker (4.5%) did not have any hearing impairment complaints.

Hearing impairment caused by noise is a common occupational disease found among many industrial workers. The effects of noise-induced hearing impairment can range from mild to severe due to prolonged exposure to noise, which gradually damages hair cells without the workers’ awareness. In severe cases, it can disrupt communication, thereby impacting an individual’s social life.

The results of the statistical analysis show a p-value of 0.017 < (α=0.05) was obtained. Therefore, Ho is rejected, and Ha is accepted, indicating a significant relationship between noise intensity and hearing impairment complaints among workers. Based on the statistical test conducted in this research, it was found that the intensity of noise in the production area plays a role in the occurrence of hearing impairment complaints. The higher the noise intensity, the greater the potential for workers to experience hearing impairment complaints.

This finding is consistent with a study conducted by Amira (2015) on risk factors associated with hearing loss. In their research, Amira found that the main risk factor likely causing hearing loss in workers exposed to noise is the extremely high noise levels originating from production testing activities.
The results of this research are in line with another study by Hasbi (2014), which stated that there is a relationship between noise intensity and hearing impairment at PT. Japfa Comfeed Indonesia (p-value = 0.000). 23

Similarly, another study by Hardini (2012) on the effect of electronic machine noise on hearing function impairment among workers aligns with this research. Their study showed that workers exposed to high noise intensity (> 85 dBA) have a greater risk of experiencing hearing impairment compared to those working in low noise intensity (< 85 dBA). 24

This indicates that a significant number of workers operating grinding and crushing machines are exposed to high noise intensity, resulting in a high number of hearing impairment complaints among the workers.

Relationship between Working Time and Hearing Impairment Complaints

Based on Table 4.8, it can be observed that out of 49 workers in the wet production section at PT HEVEA MK 1 in Palembang, 13 workers (52.1%) who have high-risk working hours experienced hearing complaints, while 12 workers (48.0%) did not have any hearing impairment complaints. On the other hand, 21 workers (87.5%) with low-risk working hours did not have any hearing impairment complaints, and only 3 workers (12.5%) experienced hearing complaints.

Extending working hours beyond the recommended capacity is usually not accompanied by efficiency, effectiveness, and optimal work productivity. In fact, it often leads to a decrease in work quality and results, as well as prolonged work hours leading to fatigue, health problems, illnesses, accidents, and dissatisfaction. 25

Based on the results of cross-tabulation and analysis using Chi-Square statistical test, a p-value of 0.017 < (α=0.05) was obtained. Therefore, Ho is rejected, and Ha is accepted, indicating a significant relationship between working time and hearing impairment complaints among workers.

This finding is consistent with a study conducted by Jacky (2019), which emphasizes this notion in a study titled “The Relationship between Noise and the Incidence of Hearing Loss and Work Stress in Production Areas.” The study states that hearing impairment due to noise occurs gradually over several months to years. It often goes unnoticed by the affected individuals, and by the time they start complaining of hearing impairment, it is usually at an irreversible stage. 22

This is in line with a study conducted by Hasbi (2014), which stated that there is a relationship between working time and hearing impairment at PT. Japfa Comfeed Indonesia with p=0.05 < (α = 0.05). 23

Furthermore, a study by Khoirul (2011) also supports the findings of this research. The study examined factors related to the incidence of hearing impairment among rice milling workers, and the results showed that prolonged exposure to noise is one of the significant factors associated with hearing impairment among workers. 23

This is because working time has an impact on the effectiveness and productivity of workers. Longer working hours can lead to fatigue, health issues in workers, and inefficiency in performing their tasks.
Relationship between Length of Employment and Hearing Impairment Complaints

Based on Table 4.9, it can be observed that out of 49 workers in the wet production section at PT HEVEA MK 1 in Palembang, 16 workers (55.2%) with a high-risk length of employment experienced hearing complaints, while 13 workers (44.8%) did not have any hearing impairment complaints. On the other hand, 18 workers (90.0%) with a low-risk length of employment did not have any hearing impairment complaints, and only 2 workers (10.0%) experienced hearing complaints.

The length of employment refers to the duration a worker has been employed in the production area, calculated from the time they first joined as workers until the research was conducted, expressed in years. Length of employment is one of the factors that can pose a risk of hearing impairment complaints. The longer a worker is exposed to noise, the greater the potential for them to experience hearing impairment complaints.26 Based on the results of cross-tabulation and analysis using Chi-Square statistical test, a p-value of 0.022 < (α=0.05) was obtained. Therefore, Ho is rejected, and Ha is accepted, indicating a significant relationship between length of employment and hearing impairment complaints among workers.

This finding is consistent with a study conducted by Marisdayana (2018), which stated that there is a relationship between length of employment and hearing impairment at PT. ISCM with (p-value = 0.000).23 Similarly, a study by Hasbi (2014) also supports this result, stating that there is a relationship between length of employment and hearing impairment at PT. Japfa Comfeed Indonesia with p=0.002 < (α=0.05).23

This research also aligns with a study by Kusumadewi (2018). In that study, it was found that workers with a length of employment ≥ 5 years experienced subjective complaints, including psychological, physiological, communication, and hearing impairments. Thus, it can be concluded that the longer a person spends in the workplace or the longer their length of employment, the higher the potential for damage to both hearing and non-hearing functions.27

This is because length of employment influences hearing impairment complaints. The longer a worker is exposed to high levels of noise, the higher the risk of experiencing hearing impairment.

Relationship between the Use of Hearing Protection Devices (HPD) and Hearing Impairment Complaints

Based on Table 4.10, it can be observed that out of 49 workers in the wet production section at PT HEVEA MK 1 in Palembang, 8 workers (38.1%) who do not use HPD experienced hearing complaints, while 13 workers (61.9%) did not have any hearing impairment complaints. On the other hand, 26 workers (92.9%) who use HPD did not have any hearing impairment complaints, and only 2 workers (7.1%) experienced hearing complaints.

The use of Hearing Protection Devices (HPD) is one of the methods to control the risks of noise exposure. These devices work by covering the human auditory senses, thereby reducing the intensity of high noise levels in the work environment. Generally, there are two common types of hearing protection devices, namely earplugs and earmuffs.
HPD is believed to reduce the level of noise exposure received by workers. Based on the results of cross-tabulation and analysis using Chi-Square statistical test, a p-value of 0.000 < ($\alpha=0.05$) was obtained. Therefore, Ho is rejected, and Ha is accepted, indicating a significant relationship between the use of HPD and hearing impairment complaints among workers.

This finding is consistent with a study conducted by Setya (2019) titled "The Contribution of Noise Dose and the Use of HPD to the Hearing Quality of Garment Workers." In this research, Setya found that there is a tendency for an increase in hearing impairment percentage when HPD is not used. This finding is also consistent with a study conducted by Hasbi (2014), which stated that there is a relationship between the length of employment and hearing impairment at PT. Japfa Comfeed Indonesia with $p=0.029 < (\alpha = 0.05)$. The results of this study align with the findings of Ramadhani (2018) who found that there is a relationship between the use of hearing protection devices and hearing impairment among ground handling workers at Kualanamu International Airport ($p$ value = 0.001). The use of hearing protection devices (HPD) is a preventive measure to prevent hearing impairment from worsening.

This indicates that some respondents mentioned that the use of hearing protection devices is not considered essential during work, even in noisy work environments. This is due to the lack of understanding among workers about the role of hearing protection devices in reducing potential exposure to noise impacts.

CONCLUSIONS

Based on the results of the study on factors related to hearing impairment complaints among workers in the wet production section at PT. HEVEA MK I Palembang in 2023, it can be concluded that there is a relationship between the intensity of noise, working time, length of employment, and the use of hearing protection devices with hearing impairment complaints among workers in the wet production section at PT. HEVEA MK I Palembang.

SUGGESTIONS

1. For Researchers
   Furthermore, the results of this research can be used as a reference for future research and as a basis for further in-depth studies.

2. For Institutions
   The findings of this research can be utilized as a reference in the campus library to support further research endeavors.

3. For Companies
   The company should closely monitor workers who are employed in noisy areas and ensure that they use Hearing Protection Devices (HPD) such as safety earplugs or earmuffs, which can reduce the effects of noise exposure.

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Menteri tenaga kerja dan transmigrasi republik indonesia. Nilai Ambang Batas Faktor Fisika dan Faktor Kimia di tempat kerja.


Untuk Memenuhi Persyaratan Memperoleh Gelar Sarjana Sains Terapan.


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