ISSN. 2338-7475
E-ISSN. 2620-7869
Hearty
Jurnal Kesehatan Masyarakat
Berinan, Tulus, Sepenuh Hati,Berbesar Hati, Jujur, Sehat dan Kuat
Vol. 14 No. 1, Februari 2026, Hal. 177-183

ANALYSIS OF RISK FACTORS ASSOCIATED WITH HAND ARM VIBRATION SYNDROME (HAVS) COMPLAINTS AMONG WORKERS AT PT BEURATA SUBUR PERSADA (BSP) IN NAGAN RAYA IN 2025

Nasyhwaa Rahma Fitri *, Susy Sriwahyuni, Firman Firdauz Saputra, T. Alamsyah, Jun Musnadi Is
Program Studi Kesehatan Masyarakat, Fakultas Ilmu Kesehatan, Universitas Teuku Umar
Jl. Alue Peunyareng, Ujong Tanoh Darah, Kec. Meureubo, Aceh Barat, 23681, Indonesia
Email: nasyhwaarahmafitri@gmail.com

Abstract

In palm oil mill processing companies, workers do a lot of activities using tools and machines that have a high frequency of vibration so that there is a risk of Hand Arm Vibration Syndrome (HAVS) complaints in PT Beurata Subur Persada (BSP) Nagan Raya workers. This study aims to analyze the risk factors associated with HAVS complaints in workers at PT Beurata Subur Persada Nagan Raya. This research method uses quantitative analytics with a crossectional design. The results of bivariate analysis showed that age was associated with HAVS complaints p-value=0,05 while the last level of education p-value=0,99, unit/section p-value=0,31, and knowledge p-value=0,22 were not associated with HAVS complaints. Based on these results, the company is expected to provide safety antivibration gloves that meet safety stnadards and pay attention to comfort aspects, schedule regular health screenings for each worker so that they can detect HAVS complaints early.

Keywords: HAVS, Individual Characteristics, Medical History

Introduction

HAVS is an occupational disease caused by vibration, HAVS is a collection of vascular, sensorineural, and musculoskletal symptoms affecting the fingers, hands and arms caused by the use of tools that can vibrate the hands excessively or above the threshold (Thamrin & Baharuddin, 2024). Sensorineural disorders can be found in patients with HAVS with numbness or tingling in one or more fingers, this symptom starts mildly and is only felt at the tip of the finger which is lost and arises, while in severe symptoms it can affect all fingers and this situation can interfere with work activities and daily activities (Dina Azizah Wulandari, 2023). HAVS disease is most common in workers employed in mining, construction, forestry and manufacturing (Bezanson et al., 2025). HAVS is characterized by debilitating paralysis followed by symptoms of Raynaud's phenomenon (Wu et al., 2021).

According to data from the International Labor Organization (ILO), the number of people who died due to accidents or occupational diseases was more than 2.78 million, there were injuries and contracted occupational diseases which resulted in work absenteeism of around 374 million (Zulkarnaen & Bagye, 2024). HAVS cases in Canada were found to be 72,000-144,000 cases (Thamrin & Baharuddin, 2024). Based on Malaysia's 2010 national labor statistics report, it is estimated that there are more than four million jobs at risk of HAVS. The number of cases reported to the Malaysian Social Security Organization (SOCSO) under the category of "vibration-induced diseases (disorders of tendons muscles, joints bones, peripheral blood vessels or peripheral nerves)" has increased from only 34 in 2010 to 160 in 2015 (Qamruddin et al., 2021).

Submitted: July-2025 Received: September-2025 Available Online: February-2026

Continuous exposure to vibration can damage blood vessel walls and peripheral nerves, resulting in decreased blood flow to tissues. This can lead to symptoms such as blanching of the fingers (Raynaud's phenomenon), with symptoms such as cold pallor of the fingers, and numbness due to impaired blood circulation. The effects of vibration depend on the magnitude, time, exposure and frequency. The longer the duration of workers using vibrating equipment and the faster it is transmitted to the hands and arms, the higher the risk of HAVS. The impact on the work environment such as physical work environment is biologically chemical, ergonomic, psychological. (Dina & Ummi, 2023) If HAVS is left unchecked, it can cause disability to the hands. This study aims to analyze the risk factors associated with Hand Arm Vibration Syndrome (HAVS) complaints in workers.

Methods

This study used quantitative analytical method with crosssectional design. The location and time of this research was conducted at PT.Beurata Subur Persada (BSP) Nagan Raya in January-March 2025. The population of this study were workers of PT Beurata Subur Persada (BSP) in the production and maintenance units. The sample in this study were 45 workers in the production and maintenance unit. The sampling technique of this study used the total sampling method, which is a method of drawing samples by sampling as a whole from the total population of 45 workers divided into 2 work units.

The dependent variable in this study is Hand Arm Vibration Syndrome (HAVS) Complaints, while the independent variables in this study are sociodemographic factors (age, latest level of education, knowledge of HAVS). Data collection was carried out by interview using a questionnaire and observation using an observation sheet.

Hand Arm Vibration Syndrome (HAVS) Complaint variables were collected through interviews using a checklist form. Respondents can be said to experience HAVS symptoms if they experience complaints of vascular symptoms, sensorineural, and musculoskletal complaints. HAVS variables were categorized into experiencing HAVS and not experiencing HAVS.

Socio-demographic variables consisted of the respondent's age which was expressed in early adulthood (≤46-55) late adulthood (≤36-45), early adulthood (≤26-35), late adolescence (≤17-25), the last education the respondent had (high and low education).

Knowledge variables about HAVS were measured using a questionnaire. The knowledge variable has 5 constructs, namely, definition, symptoms, impact, prevention and treatment. Measurement of knowledge variables about HAVS uses a Guttman scale with a score of 0-1. If the respondent answers correctly, they will get point 1 and if the respondent answers incorrectly, they will get point 0. If the respondent gets a score < 7, the knowledge of HAVS is poor and if the respondent gets a score > 6, the knowledge of HAVS is good.

Data analysis in this study was carried out in the form of univariate, and bivariate analysis. Univariate analysis was used to describe each variable separately. Then, bivariate analysis to test the relationship between two variables, the statistical test used was the binary logistic regression test to determine whether there was a significant relationship between the dependent and independent variables.

Results

The population and sample of this study amounted to 45 workers with 44 males working in the production and maintennace divisions and 1 woman as a maintenance clerk. Statistical analysis was carried out using SPSS ver 26.0.

Univariate Analysis

Table 1. Distribution Based on the Frequency of Age of Respondents of PT.BSP Workers

Variable		n	%
Age (Years)	Early Elderly (≤46-55)	6	13,3
	Late Adult (≤36-45)	19	42,2
	EarlyAdulthood (≤26-35)	17	37,8
	Late Adolescent (≤17-25)	3	67

Table 1. Table 1 shows that most respondents were in the late adult age group (≤36-45) years as many as 19 (42.2%). Based on interviews, the company recruits workers aged ≥ 18 years in accordance with established policies.

Table 2. Frequency distribution of the last aducation level of PT.BSP workers

Variable		n	%
Last Education Level	Low (≤9 tahun)	2	4,4
	Tinggi (≥9 tahun)	43	95,6

Table 2. shows that most respondents have a high education ≥ 9 years as many as 43 (95.6%) while only 2 (4.4%) respondents have a low education.

Table 3. Frequency distribution of work units/divisions of PT.BSP workers

Variable		n	%
Unit/Section	Production	32	71,1
	Maintenance	13	28,9

Table 3. Shows that respondents who work in the production unit are 32 (71.1%) while respondents who work in the maintenance unit are 13 (28.9%). Based on observations that the production unit is more at risk of exposure to vibration from palm oil production machines compared to maintenance unit workers.

Table 4. Frequency distribution of PT.BSP workers' knowledge

Variable		n	%
Knowledge	Poor	16	35,6
	Good	29	64,4

Table 4. Shows that most respondents have good knowledge of HAVS as many as 29 (64.4%) while respondents who have poor knowledge of HAVS are 16 (35.6%).

Table 5 Bivariate Analysis of Age Relationship with HAVS Complaints

Variable		HAVS Complaints				Total	Sig
		Yes	%	No	%		
Age	Early elderly (≤46-55)	6	23,1	0	0,0	6	0,05
	Late adult (≤36-45)	11	24,3	8	42,1	20	
	Early adult (≤26-35)	8	30,8	9	47,4	17	
	Late adolescent (≤17-25)	1	3,8	2	10,5	3	

Table 5 shows that the late adult age group (≤ 36-45) is more prone to HAVS complaints with a frequency of 11 (24.3%) having a significant relationship with HAVS complaints with a p-value = 0.05. The age of respondents affects HAVS complaints because the average age of respondents ranges from 36-45 years which is prone to the risk of occupational disease complaints.

Table 6 Bivariate Analysis of Last Education Level with HAVS Complaints

Variable		HAVS Complaints				Total	Sig
		Yes	%	No	%		
Last Education Level	Low (≤9 tahun)	2	7,7	0	0,0	2	0,99
	High (≥9 tahun)						
		24	92,3	19	100	43	

Table 6 shows that respondents who have a high level of education experienced many HAVS complaints with a frequency of 24 (92.3%) did not have a significant relationship with HAVS complaints with a p-value = 0.99 which proves that the p-value = ≥0.05.

Table 7 Bivariate Analysis of Unit/Section with HAVS Complaints

Variable		HAVS Complaints				Total	Sig
		Yes	%	No	%		
Unit/section	Production	20	62,5	12	37,5	32	0,31
	Maintenance	6	46,2	7	53,8	13	

Table 3.4 shows that production unit workers are more prone to HAVS complaints with a frequency of 20 (62.5%) which does not have a significant relationship with HAVS complaints with a p-value = 0.31.

Table 7 Bivariate Analysis of Knowledge with HAVS Complaints

Variable		HAVS Complaints				Total	Sig
		Yes	%	No	%		
Knowledge	Poor	11	68,8	5	31,3	16	0,22
	Good	15	51,7	14	48,3	29	

Table 3.5 shows that respondents with good knowledge experiencing HAVS complaints with a frequency of 25 (51.7%) do not have a significant relationship with HAVS complaints with a p-value = 0.22.

Discussion

The results of the age analysis show that the average age of respondents ranged from 36-45 years, totaling 19 (42.2%) with a p-value = 0.05, which can be concluded that age has a significant relationship with HAVS complaints. The greater the age of the respondent, the weaker the strength or functional ability of the body, making it vulnerable to HAVS disease. More workers at PT Beurata Subur Persada (BSP) Nagan Raya are ≤ 40 years old because the company recruits many workers over 20 years old. Age factors can affect various aspects of life, both social, economic and health, which can reduce the level of function of organs (Keumalahayati & Alamsyah, 2018).

These results are supported by research conducted by (Nabila et al., 2020) with a p-value of 0.0001 stating that there is a significant relationship between the age of respondents and HAVS complaints in construction workers. According to Ronald E. Pakasi quoted by Sardi (2007) states that increasing age is vulnerable to the risk of complaints of various diseases and other threats, especially those caused by vibration exposure, where the age of occurrence of this disease ranges from 20-60 years. The results of this study are not in line with research conducted by (Ghaly & Sari, 2024) which states that there is no significant relationship between age and subjective complaints of HAVS in USU RSGM dentists with a p-value of 0.806.

The results of the analysis of the last level of education show that most respondents have a high education ≥ 9 years as many as 43 (95.6%) with a p-value = 0.99 which proves that the p-value = ≥0.05 which can be concluded that the last level of education with HAVS complaints does not have a significant relationship. This is because HAVS is a Occupational diseases that are influenced by direct physical exposure to vibration cannot be seen only from the status of education level.

The results of this study are in line with the results of research conducted by (Qamruddin et al., 2021) the last level of education does not have a significant relationship with HAVS complaints p-value owned 0.247 statistically these results do not have a meaningful relationship to HAVS complaints in tire workshop workers Kelantan, Malaysia.

The results of the unit / section analysis show that working in the production unit as many as 32 (71.1%) with a p-value = 0.31 which can be concluded that the work unit / section does not have a significant relationship with HAVS complaints. This is because HAVS complaints are caused by direct physical exposure from vibrating tools/machines not caused by work units or proportions. The need for HAVS prevention interventions for workers at PT BSP Nagan Raya such as the use of PPE in accordance with the type of work of each unit/section.

The results of this study are supported by research conducted by (Stjernbrandt et al., 2023) that 41 respondents (26.8) worked in Swedish mines and 31 subjects (34.1%) in Norwegian mines, which showed no significant relationship between work sections and HAVS complaints exposed between countries (p=0.229).

The results of the knowledge analysis show that most respondents have good knowledge of HAVS as many as 29 (64.4%) with a p-value = 0.22, which can be concluded that the knowledge of respondents does not have a significant relationship with HAVS complaints. Knowledge is not related because more respondents have good knowledge about HAVS. This is also due to the fact that knowledge is not physical in nature which cannot affect HAVS complaints, good knowledge about HAVS is a deterrent and can reduce the risk of HAVS complaints. In research conducted by (Leduc et al., 2016) increasing workers' knowledge about HAVS disease can improve their ability to deal with complaints of HAVS symptoms.

The results of this study are in line with research conducted by (Fisk & Ek, 2025) showing that the knowledge of masons in Sweden about vibration exposure and injury is still lacking. Workers lack knowledge about occupational safety and health training in a company. Interviews were also conducted with managers and supervisors of construction companies who had limited knowledge of vibration threshold value laws including the application of health surveillance and risk assessment and

limited knowledge of vibration exposure levels.

This study is not in line with research conducted by (Łastowiecka-Moras, 2025) which showed that most Polish workers 75.2% with good (52.5%) and very good (23%) frequencies received education from field supervisors about health risks associated with work exposed to vibration. There was a statistically significant correlation between the degree to which workers were educated about the health risks associated with exposure to vibration and the reporting of such symptoms by workers. Workers who received education and reported HAVS symptoms were better than workers who did not receive education related to HAVS p-value=0.0001.

Conclusion

The results of the research conducted show that the factors associated with HAVS complaints are age with HAV complaints, while other unrelated factors, namely, the last level of education, unit / section and knowledge have no relationship with HAVS complaints in PT BSP Nagan Raya workers in 2025.

To prevent HAVS complaints in PT BSP Nagan Raya workers, the company is expected to provide anti vibration gloves that meet safety standards, as well as pay attention to comfort, schedule regular health screenings for each worker so that they can detect HAVS complaints early. Then, the company can also develop policies to limit the duration of workers' overtime to reduce the risk of high vibration exposure and provide routine education and understanding of HAVS. It is expected that PT BSP Nagan Raya workers do not ignore the early symptoms of HAVS and immediately report to the management of PT BSP Nagan Raya in order to get treatment and prevention of HAVS disease.

References

[1] Bezanson, S., Ruco, A., Howse, M., Budd, D., House, R., Khakpour, M., & Holness, D. L. (2025). Exploring psychological impact of hand-arm vibration syndrome (HAVS). *Occupational Medicine*, *75*(1), 69–72. https://doi.org/10.1093/occmed/kqae138

[2] Dina Azizah Wulandari, et al. (2023). Effect Of Neurodynamic Mobilization On Reducing Sensori neural Symptopms In Dawung Village Wood Craftsmen With The Risk Of Hand Arm Vibartion Syndrome (HAVS). *Jurnal Keperawatan Dan Fisioterapi (Jkf)*, *6*(1), 134–139. https://doi.org/10.35451/jkf.v6i1.1772

[3] Dina, S. L., & Ummi, J. N. (2023). *Hand Arm Vibration Syndrome Pada Pekerja Penggiling Daging*.Penerbit Rena Cipta Mandiri. https://books.google.co.id/books?hl=id&lr=&id=ls-wEAAAQBAJ&oi=fnd&pg=PA1&dq=Paparan+getaran+yang+terus-menerus+dapat+merusak+dinding+pembuluh+darah+dan+

[4] Fisk, K.,& Ek, Å. (2025). Aspects affecting the health and safety management and the implementation of measures to reduce vibration exposure in industry. *International Journal of Occupational Safety and Ergonomics*, *3548*. https://doi.org/10.1080/10803548.2025.2469998

[5] Ghaly, A., & Sari, H. (2024). Hubungan Karakteristik Dan Lama Kerja Dengan Keluhan Subjektif Hand-Arm Vibration Syndrome Pada Dokter Gigi Di Rsgm Usu Tahun 2024 Usu . This research is quantitative with a cross-sectional approach . The results. *Jurnal Kesehatan Masyarakat*, *7*(1), 192–201. https://doi.org/https://doi.org/10.36656/jpksy.v7i1.2070

[6] Keumalahayati, K., & Alamsyah, T. (2018). Hubungan Pengetahuan dan Dukungan Keluarga terhadap Kegiatan Posyandu Lansia. *Jkep*, *3*(1), 1–14. https://doi.org/10.32668/jkep.v3i1.196

[7] Łastowiecka-Moras, E. (2025). Assessment of hand–arm vibration syndrome in Polish workers: results from a questionnaire study. *International Journal of Occupational Safety and Ergonomics*, *3548*. https://doi.org/10.1080/10803548.2025.2471669

[8] Leduc, M., House, R., Eger, T., Thompson, A., & Holness, L. (2016). Health and safety training and prevention of hand-arm vibration syndrome through education. *Occupational Ergonomics*, *13*(1), 45–51. https://doi.org/10.3233/OER-160238

[9] Nabila, A., Fitri, A. M., Buntara, A., & Utari, D. (2020). Analisis Faktor yang Berhubungan dengan Keluhan Hand Arm Vibration Syndrome pada Pekerja Konstruksi. *Jurnal Penelitian Kesehatan "SUARA FORIKES"(Journal of Health Research"Forikes Voice")*,*11*(April),16. https://doi.org/10.33846/sf11nk103

[10] Qamruddin, A. A., Nik Husain, N. R., Sidek, M. Y., Hanafi, M. H., & Mohd Ripin, Z. (2021). Factors associated with vascular and neurological complications of hand-arm vibration syndrome among tire shop workers in Kelantan,Malaysia. *Journal of Occupational Health*, *63*(1), 1–9. https://doi.org/10.1002/1348-9585.12220

[11] Stjernbrandt, A., Johnsen, M., Liljelind, I., Aminoff, A., Wahlström, J., Höper, A. C., Pettersson, H., & Nilsson, T. (2023). Neurosensory and vascular symptoms and clinical findings in the hands of Arctic open-pit miners in Sweden and Norway–a descriptive study. *International Journal of Circumpolar Health*, *82*(1). https://doi.org/10.1080/22423982.2023.2254916

[12] Thamrin, Y., & Baharuddin, A. (2024). *Analisis Faktor yang Berhubungan dengan Hand Arm Vibration Syndrome pada Pekerja Konstruksi Bangunan di PT PAS Indonesia Timur Nusa Tenggara Barat Tahun 2024*. *5*(2), 358–366.

[13] Wu, C., Laswell, S., Mentz, J. A., & Morales, R. (2021). Vibration Exposure Safety Guidelines for Surgeons Using Power-Assisted Liposuction (PAL). *Aesthetic Surgery Journal*, *41*(7), 783–791. https://doi.org/10.1093/asj/sjaa373

[14] Zulkarnaen, M. F., & Bagye, W. (2024). Alat Kendali Hand Tractor Berbasis Berbasis IoT Pencegah Penyakit Hand-Arm Vibration Syndrome. *Jambura Journal of Electrical and Electronics Engineering*, *6*(1), 52–56. https://doi.org/10.37905/jjeee.v6i1.23271

[15] Bezanson, S., Ruco, A., Howse, M., Budd, D., House, R., Khakpour, M., & Holness, D. L. (2025). Exploring psychological impact of hand-arm vibration syndrome (HAVS). *Occupational Medicine*, *75*(1), 69–72. https://doi.org/10.1093/occmed/kqae138