URIC ACID LEVELS IN MOTORCYCLE WORKSHOP WORKERS IN PEKANBARU CITY

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Abstract: *A byproduct of purine metabolism is uric acid, which can cause hyperuricemia and increase the risk of gout and other metabolic diseases when blood levels are too high. Long-term exposure to lubricants, vehicle exhaust, and carbon monoxide can increase uric acid levels in motorcycle repair workers. The heart and kidneys, which are important for uric acid metabolism and excretion, may be affected by exposure to substances found in motor vehicle lubricants and exhaust fumes. Additionally, the sedentary work habits of workshop workers, which involve little physical activity, can disrupt kidney function and delay the elimination of uric acid from the body. Therefore, due to the combination of lifestyle and work environment characteristics, motorcycle repair shop workers can be considered a high-risk category for developing gout. However, there is still a lack of information about uric acid levels in this population, particularly in Pekanbaru City. The purpose of this investigation is to determine the uric acid levels of employees at motorcycle workshop X in Pekanbaru City. Samples were taken from employees who met the inclusion and exclusion criteria using a descriptive cross-sectional methodology. The Point-of-Care Testing (POCT) approach, along with strip testing, is used to assess uric acid. According to findings from 24 respondents, 3 workers (12.5%) experienced increased uric acid levels, while 21 workers (87.5%) had normal levels. At 5.44 mg/dL, the average uric acid level is within the reference range. These findings indicate that prolonged working hours and occupational exposure elevate the risk of hyperuricemia, despite the majority of employees exhibiting normal uric acid levels. To reduce the burden of metabolic diseases on the high-risk working population, this study emphasizes the importance of occupational health surveillance and preventive measures.*
Keywords: *Uric acid, Motorcycle workshop workers, Hyperuricemia, Occupational exposure.*

A. Introduction

Motorcycle workshop workers are regularly exposed to a mix of harmful chemicals, like gasoline, oils, and exhaust gases such as carbon monoxide (CO), which can lead to kidney and liver damage because of low oxygen levels and stress on the body (Ainurrozaq et al., 2020 , Nancy et al., 2021). Carbon monoxide binds to hemoglobin 200–250 times more strongly than oxygen, reducing oxygen transport and subsequently causing hypoxia in tissues, including the kidneys, which are critical for uric acid excretion. Chronic exposure to CO and other occupational stressors may therefore contribute to impaired uric acid metabolism and the development of hyperuricemia (Al-Batool et al., 2025).

Uric acid is the end result of breaking down purines, which come from the metabolism of nucleic acids and the purines (Cicero et al., 2023). Under normal conditions, uric acid serves as a potent antioxidant; however, when serum concentrations exceed its solubility threshold (>7 mg/dL), urate crystals may deposit in joints and renal tissues, leading to gout and urate nephropathy. (Mei et al., 2022). In addition to gout, hyperuricemia has been more frequently associated with hypertension, chronic renal disease, and cardiometabolic illnesses (X. Y. Chen et al., 2024).

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Risk factors for hyperuricemia include non-modifiable factors such as age, sex, and genetic predisposition, as well as modifiable lifestyle factors such as diet rich in purines, alcohol intake, obesity, smoking, and physical inactivity (Burnier, 2023). Occupational exposure adds another dimension to this risk, especially in workers who spend prolonged hours in polluted environments and may lack consistent use of personal protective equipment (PPE) (Kar et al., 2024).

Previous studies on occupational exposure have shown higher uric acid levels among welders, traffic police, and mechanics compared to non-exposed populations (Y. Chen et al., 2022a). However, the available evidence from motorcycle workshop workers in urban Indonesian contexts remains extremely limited. This study addresses this knowledge gap by examining uric acid levels among motorcycle workshop workers in Pekanbaru City. The novelty of this research lies in exploring the occupational health implications of uric acid levels in a high-risk but under-studied worker group in Indonesia, using a practical diagnostic method (POCT) that can be applied in field conditions.

B. Methods

This research employed a descriptive cross-sectional design (Prasetya et al., 2024). The study was conducted at motorcycle workshops X Pekanbaru City. The study population consisted of all active motorcycle workshop workers in the area. A total of 24 respondents were recruited using purposive sampling, based on the following inclusion criteria:(1) aged ≥20 years, (2) actively employed as a workshop X, (3) not currently undergoing treatment for hyperuricemia or gout, and (4) willing to participate. Workers aged <20 years or undergoing uric acid treatment were excluded.

Uric acid levels were measured using the POCT method (Autocheck GCU) with strip-based testing. Materials included uric acid test strips, sterile lancets, a lancet pen, alcohol swabs, cotton pads, and a sharps disposal container. Capillary blood samples were obtained by pricking the fingertip after cleansing with 70% alcohol. The first blood drop was discarded, while the subsequent drop was applied to the test strip. Results were displayed automatically in mg/dL within seconds.

The collected data were analyzed descriptively and presented as frequency distributions and percentages. Uric acid levels were compared to standard reference values: males (3.4–7.0 mg/dL) and females (2.4–5.7 mg/dL) (Lu et al., 2020).

C. Results and Discussion

Table 1 presents the distribution of uric acid levels among the 24 respondents.

Table 1. Uric Acid Levels of Motorcycle Workshop Workers in Pekanbaru City

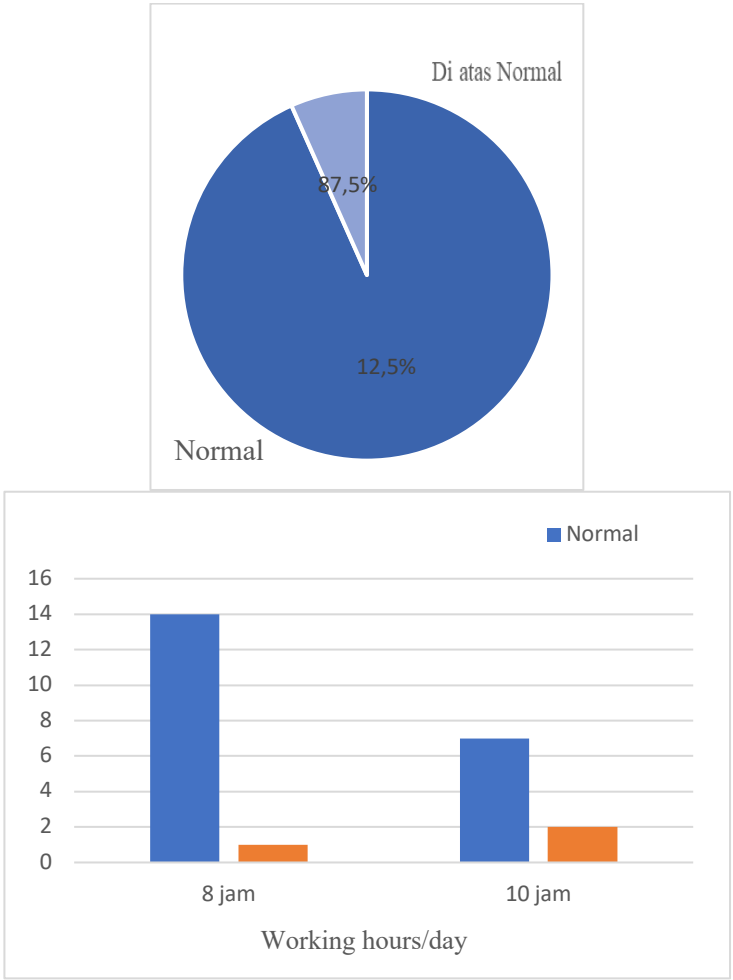
No	Category	N	Value (mg/dL)	(%)
1	Normal	21	3,4 – 7,0	87,5
2	Above normal		> 7,0	12,5
	Total	24		100

The findings show that 87.5% of workers had normal uric acid levels, while 12.5% had elevated levels. The mean uric acid concentration was 5.44 mg/dL, within the normal range.

Table 2. Uric Acid Levels by Working Hours

	Working hours/day	Uric Acid					
		Normal		Above Normal		Total	
		F	%	F	%	F	%
1.	8 hours	14	93,33	1	6,67	15	100
2.	10-12 hours	7	77,78	2	22,22	9	100
	Jumlah	21	87,5	3	12,5	24	100

Workers with longer working hours (10–12 hours/day) were more likely to exhibit elevated uric acid levels compared to those working 8 hours/day. This suggests that prolonged exposure to carbon monoxide and extended physical strain may contribute to impaired uric acid clearance.



Graph 1. Uric Acid Levels of Motorcycle Workshop Workers

- The left graph (pie chart) shows workers with normal levels (87.5%) and above normal (12.5%).
- The right graph (bar) shows uric acid levels based on length of work per day, with levels increasing above normal in workers with 10 hours of work/day

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These findings are consistent with previous reports indicating that occupational exposure to air pollutants and prolonged work shifts elevate the risk of hyperuricemia (Wei et al., 2021). Moreover, lifestyle factors such as consumption of high-purine foods, inadequate hydration, and inconsistent PPE usage further exacerbate the risk.

A nested case–control study among steelworkers in China showed that shift work, heat, and dust exposure independently increased risk of hyperuricemia (Y. Chen et al., 2022b). Similarly, traffic police exposed to high levels of particulate matter and vehicle exhaust demonstrated increased hyperuricemia prevalence (Tang et al., 2023). Coal miners working long shifts and obese workers were more likely to exhibit hyperuricemia (Zhang et al., 2025). Furthermore, aircraft maintenance workers on night shifts showed significant alterations in uric acid metabolism due to circadian rhythm disruption (Dong et al., 2024).

These findings align with our results, where workers with longer working hours demonstrated higher uric acid levels. Potential mechanisms include oxidative stress and hypoxia caused by CO exposure, reduced renal clearance due to toxic pollutant burden, circadian disruption from irregular work hours, and lifestyle factors such as poor hydration and a high-purine diet. While most respondents (87.5%) remained within normal ranges, a vulnerable subgroup (12.5%) already demonstrated elevated levels, suggesting early occupational health impacts.

This study's strength lies in providing localized data on motorcycle workshop workers in Indonesia, an under-studied occupational group, and using POCT as a practical diagnostic tool. Limitations include small sample size (n=24), lack of direct environmental exposure measurements, and absence of confounding factor data such as BMI and diet. The cross-sectional design also restricts causal inference. Despite these limitations, the findings reinforce growing international evidence linking occupational exposure with hyperuricemia.Workplace interventions should include reducing prolonged working hours, improving workshop ventilation, consistent use of PPE, promoting hydration and nutrition, and integrating regular health screening with POCT. Future studies should involve larger samples and environmental monitoring to validate and expand these findings.

D.Conclusion

Most motorcycle workshop workers X in Pekanbaru City had normal uric acid levels, with 87.5% falling within the reference range. However, 12.5% exhibited elevated levels, with a mean concentration of 5.44 mg/dL. Longer working hours were associated with a higher prevalence of elevated uric acid levels. Occupational exposure, dietary factors, and inadequate PPE use were likely contributors. These findings highlight the importance of implementing occupational health interventions, including regulated working hours, promotion of healthy lifestyles, and consistent PPE usage, to prevent hyperuricemia among motorcycle workshop workers.

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