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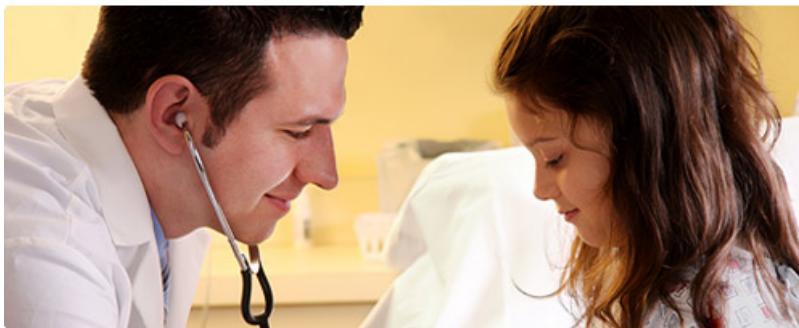
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Risk Factors of Green Tobacco Sickness on Tobacco Farmers in Jember Indonesia

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Abstract

Introduction. Green Tobacco Sickness (GTS) is a disease in the working population that is still not widely disclosed. GTS characterized by the main symptoms of nausea, vomiting, dizziness, excessive sweating, and occurs when in contact with wet tobacco. This research purpose is to assess the factors associated with the incidence of GTS in tobacco farmers in Jember, Indonesia. **Methods.** The research design is case control. Research variables are occupational factors and individual factors. Data analysis using binomial logistic regression. **Result and Discussion.** The results stated that the variable influencing the case of GTS in tobacco farmers was the work period OR = 2,944, (CI 1,127-7,693) smoking status OR = 18,083 (CI 6.815-47,984) dermatosis complaints OR = 3,876 (CI = 1,238-12,138) and nutritional status was assessed with a BMI, OR = 2.643 (CI = 1.038-6.733). Farmers with a working period of working 18 years have a risk of 2,944 times GTS compared to farmers with a work period of <18 years. Farmers with smoking status have a risk of 18,083 times GTS compared to non-smoking farmers. Farmers who have dermatoses have a risk of 1,355 times GTS compared to farmers who do not have complaints of dermatosis. Farmers with an abnormal (overweight) BMI have a risk of 2,643 times GTS compared to farmers with a normal BMI. **Conclusion.** Factors that influence the GTS are age, sex, smoking status, complaints of dermatosis, nutritional status, and years of service. The findings of this study suggest that integrated promotive and preventive measures from both agricultural owners and first-rate health care providers need in the form of providing self-help to reduce direct contact with wet tobacco, healthy living behavior without smoking and maintaining nutritional status.

Keywords: work-related diseases, green tobacco sickness, tobacco farmers.

Introduction

Green Tobacco Sickness (GTS) is an acute nicotine poisoning that occurs through absorption through the skin⁽¹⁾. GTS occurs in the population of workers or tobacco farmers, especially when planting and harvesting tobacco⁽²⁾⁽³⁾. Some previous studies have suggested that GTS characterize by the main symptoms of dizziness, nausea, vomiting headaches, and excessive salivary secretion sometimes accompanied by decreased consciousness. The risk of nicotine poisoning increases when mixed with wet conditions due to rain, dew, or sweat⁽⁴⁾.

GTS describes as occurring in several tobacco-producing countries throughout the world, in Brazil, Korea, Thailand, and several other countries^{(5) (6) (7)}. In Brazilia, the prevalence of GTS in men is 6.6%, and

in women, 11.9% occurs during the harvest season and results in workers having to take leave⁽⁵⁾. The incidence of GTS in Korea is 15 people among 40 people (37,5). Based on gender, the incidence of GTS in women (55%) was higher than in men (20%), and this difference was significant. However, if it is distinguished by age, there is no difference in the age group towards the occurrence of GTS. The incidence of GTS was high in the nonsmokers (57,5%) compared to the smokers' group (0%), and this difference was significant ($p < 0,01$)⁽⁶⁾. A study in Malaysia states that farmers who use personal protection experience GTS complaints more often than those who do not use personal protection. GTS complaints are more common than complaints of pesticide poisoning⁽⁸⁾. Tobacco farmers are groups of working populations that are vulnerable to work-related diseases. In Indonesia, research on GTS as work-related disease or occupational

illness has not been widely revealed. This study aims to identify what factors influence the occurrence of GTS in tobacco farmers. From the results of this research, it is expected that prevention programs work-related diseases can run effectively and efficiently.

Material and Method

Research design.

The study observed the variables, then carried out an analysis of risk factors or causal factors for the events to be studied. The research design used was Case Control.

Location and time of research.

The study was conducted on farmers in Jember Regency. The first consideration is that some health risks to tobacco farmers show that tobacco farmers in Jember Regency have a history that leads to work-related diseases. The second consideration is that initial research has been conducted on the health risks of tobacco farmers. The study was conducted for six months starting in May 2018-October 2018.

Population and Samples.

The study population was all tobacco farmers who met the inclusion criteria and exclusion criteria. Inclusion criteria are having age between 18-55 years, working at least five years as a tobacco farmer, being involved in the process in tobacco farming for at least the last three months, and willing to engage in research by signing informed consent. Exclusion criteria for respondents who were pregnant or sick had a history of pulmonary disease and skin disease.

Sample size. The sample size is taken using the following formula ⁽⁹⁾

$$P_2 = 0.31, \text{ Proportion of Exposure to the group that is not sick }^{(10)}$$

$$P_1 = \text{Exposure proportion in the sick group}$$

$$\text{Odds Ratio} = 2.31, \text{ Odds ratio in previous studies }^{(11)}$$

$$Z_{1-\alpha/2} = \text{value in the standard normal distribution which is equal to the significance level}$$

$$\alpha = 0.05, \text{ so the value of } Z = 1.96$$

$$Z_{1-\beta} = \text{value in the standard normal distribution equal to power by 90\%, value 1.28.}$$

From the formula for calculating the sample above, the

sample size is 129 (≈ 130). Sample of 25 people was added, so the number of samples became 155 people.

Research variable

The variables examined in this study were individual variables in the form of age, sex, education, smoking status, passive smoking, nutritional status, individual hygiene, personal protective use, dermatosis complaints. While the work variables studied are the main work, workload during work, length of work, and length of rest.

Instrument

In this study, respondents with GTS, cases were defined as people who tested positive for urine cotinine and experienced some significant clinical symptoms, namely dizziness, headache, nausea, vomiting, decreased consciousness. Urine Cotinine is measured using the COT Rapid Test Cotinine Cassette Right sign which is capable of detecting cotinine up to 200 ng/ml and can detect cotinine 2-3 days after exposure. Other data was taken through interviews with questionnaires.

Data analysis

The collected data were analyzed using the backward binary logistic regression test. The level of significance was determined from the value of $p < 0,05$. Interval Confidence (CI) values are classified into two groups if $CI > 1$ is a risk factor, and if $CI < 1$ is a protective factor. Whereas if CI passes number 1, it means that the variable is not meaningful.

Finding

Result and Discussion

In general, the work process in the tobacco processing industry is divided into two, namely upstream industry and downstream industry. In this study, it is limited to the upstream industry. Each stage of tobacco processing contains health risks.

The first stage is processing land, including irrigation, eradicating pests, planting seeds, and providing fertilizer. Risks that arise are exposure to solar heat, contact with chemicals and unnatural work postures. The next stage is harvest. At this harvest stage the biggest risk is direct contact with nicotine tobacco. At this stage many workers experience complaints of dizziness, nausea, headaches and itching. After harvest,

the next stage is sorting and drying tobacco leaves. The health risks that appear at this stage are itching of the palms and feet, coughing and complaints of joints.

The binary logistic regression analysis of individual factors and GTS obtained results of individual variables related to GTS were gender, smoking status, passive smoking, and nutritional status. In detail, they are presented in Table 1.

Table 1. Individual Risk Factors of Green Tobacco Sickness

No.	Variables	B	Sig	Exp (B)	95% CI
1.	Age a. ≥45 years old b. <45 years old	-0,868	0,078	0,420	0,160-1,102
2.	Sex a. Male b. Female	1,669	0,000	5,308	2,517-11,193*
3.	Education a. High b. Low	0,065	0,922	1,068	0,289-3,944
4.	Smoking status a. Aktif smoker b. Not smoker	2,895	0,000	18,083	6,815-47,984*
5.	Pasif Smoker Status a. Pasif smoker status b. Not pasof smoker	0,773	0,032	0,462	1,070-4,384*
6.	Nutrition status a. Normal b. Overweight, obesitas, malnutrition	0,972	0,042	2,643	1,038-6,733*
7.	Individual hygiene a. Good b. Poor	0,828	0,117	2,289	0,813-6,445
8.	Personal Protective Equipment using a. Good b. Poor	0,133	0,816	1,142	0,372-3,502
9.	Dermatosis reported it self a. No complaint b. Complaint	1,355	0,020	3,876	1,238-12,138*

From the results of the logistic regression test showed that tobacco farmers with age <45 years had a risk of 0.42 times being affected by GTS compared to age ≥45 years. Young age is a protective factor of GTS. Similar to a study conducted by Saleoon (7). Unlike Fassa et al. (5), the prevalence of GTS at a younger age is more than that of old age. Based on gender, tobacco workers are dominated by female sex. The condition is because the characteristics of work in tobacco farming require patience. From the results of the above research, it is seen that the risk of the female sex is 5,308 times as significantly as GTS compared to men. This condition is consistent with the GTS study in Korea that the incidence of GTS in women was higher (55%) compared to men (20%) (6). The prevalence of GTS is also higher in women compared to men. GTS occurs more in the female population compared to men (12).

Tobacco farmers who have low education have a risk of 1,068 times experiencing GTS compared to low education. Education about occupational health is essential for farmers and owners to be able to reduce the risk of GTS. The education in question covers the symptoms and prevention of GTS (13).

Tobacco farmers who have a smoking habit have a risk of 18,083 times experiencing GTS compared to tobacco farmers who do not smoke. Smoking causes a decrease in body defense immunity, making it easy to experience pain. In field observations, it was found that farmers who smoke often experience GTS complaints less. The condition might occur because of the mechanism of nicotine intolerance. However, McBride et al. Stated that smoking is not a protection factor for GTS (14). The status of tobacco farmers as passive smokers is statistically significant for the occurrence of

GTS. Farmers with passive smoking status have a risk of 0,773 for GTS compared to farmers who are passive smokers. Non-smoking status is a protection factor for GTS.

Based on nutritional status, farmers who have poor nutritional status have a risk of 2,643 times experiencing GTS compared to farmers with proper or healthy nutrition. This risk is statistically significant. Farmers with functional nutritional status will have active self-defense against physical work activities, not quickly tired, not easily sick, so high work productivity.

Farmers with poor individual hygiene are at risk of developing GTS 2,289 times compared to farmers with good individual hygiene. The habit of using bad personal protective risks is 1,142 times the occurrence of GTS compared to those who regularly use personal protection. The use of personal protection for tobacco farmers in addition to preventing the risk of GTS also protects from contact with pesticides (15).

Farmers who complain of dermatosis have a risk of 3,876 times the occurrence of GTS compared to farmers who do not complain of dermatosis. The same thing happened to tobacco farmers in North Carolina. Farmers who reported subjective rash complaints were more at risk of having GTS with OR 3,3 (95% CI 2.17-5.02) (11). Nicotine in tobacco leaves more easily enters through the skin. In the skin that has a rash, wounds, nicotine will be more easily absorbed.

Based on the analysis of occupational factor, and the incidence of GTS, the results of the working period variables were significantly associated with GTS and in detail, presented in Table 2.

Table 2. Job Risk Factors of Green Tobacco Sickness

No.	Variables	B	Sig	Exp (B)	95% CI
1.	The main job a. Landowners and farmers b. Farm workers	0,158	0,767	1,171	0,413-3,322
2.	Workload a. High risk b. Low risk	0,364	0,496	1,439	0,505-4,102

Cont.. Table 2. Job Risk Factors of Green Tobacco Sickness

No.	Variables	B	Sig	Exp (B)	95% CI
3.	Life time working a. < 15 years b. ≥ 15 years	1,080	0,028	2,944	1,127-7,693*
4.	Length of working time/day a. ≥8 hours/day b. <8 hours/day	-0,326	0,555	0,772	0,244-2,132
5.	Length of working rest a. <1 hours/hari b. ≥1 hours/hari	-1,352	0,105	0,259	0,050-1,329

Farmers are at risk of experiencing GTS by 1,171 times compared to landowners and farmers. Farm workers do almost all stages of the upstream tobacco industry, so contact with tobacco is higher than the landowner.

High workloads are at risk of experiencing GTS of 1.439 times compared to low workloads. High workloads indicate the type of activity carried out varies and with varying frequency. Hoang Van Minh expressed a similar thing that farmers who cultivated tobacco 3.5 times had health problems compared to those who did not cultivate tobacco ⁽¹⁶⁾.

Long working period means greater exposure to hazard exposures. Tobacco farmers with a working period of ≥ 15 years risk 2,944 times experiencing GTS compared to farmers with a working period of <15 years and statistically significant. The working period is related to the length of exposure to the hazard received. Long-term exposure can affect the somatosensory sensory system and the central process of sensory information ⁽¹⁷⁾.

Working time <8 hours is a protection factor for farmers with long working hours <8 hours will protect from GTS. Long rest more than 1 hour is a protection factor. Farmers with longer breaks of more than 1 hour will protect from GTS.

Conclusion

The findings of this study indicate that female sex, farmers with smoking status and passive smoking, poor nutritional status, having a subjective complaint of dermatoses, and a work period of more than 18 years are risk factors for GTS.

Conflict of Interest: There is no conflict of interest

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