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Effectiveness of Modified Truth or Dare Game in Improving Toxicology Knowledge of Workers at Tofu Factory X

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Abstract: There are 84,000 tofu producers in Indonesia, ranging from household industries with 5-8 workers to medium-sized industries with 50-100 workers. In a single tofu production process, additional chemicals such as CH3COOH and MgSO4 are used. These conditions pose potential safety and health hazards for workers, requiring control measures. This study employs a quantitative approach, using an experimental model with treatment in the form of a card game. Data was collected using primary data methods, such as questionnaire instruments and direct field observation. The questionnaire was compiled based on priority hazard assessment using HIRADC calculations and then tested for validity and reliability. The questionnaire results were tested using the Wilcoxon Signed Rank Test because the data were not normally distributed. The study results for worker respondents (0.027) and the public (0.000), or P value < 0.05, indicate that H0 is rejected, and Ha is accepted. The modified truth-or-dare card game method was found to have a significant impact on toxicology knowledge among workers and the general public.

Keywords: safety education; card games; safety & health promotion

INTRODUCTION

Tofu is a processed food product made from soybeans (Andarwulan et al., 2018). In Standard National Indonesia (SNI) 01-3142-1988, Tofu is a food product in the form of a soft solid made through a Glycine type soybean processing procedure using protein precipitation either by not adding or not adding other ingredients to the food. Soybean juice settles in acidic conditions when making soybeans. In one year, the need for soybeans for the tofu industry can reach 2.56 million tons. Based on the Center for Agricultural Data and Information Systems, Secretariat General of the Ministry of Agriculture, in 2021, tofu consumption in Indonesia will reach 7.86 kg/capita (Pertanian, 2022).

The number of tofu producers in Indonesia reaches 84,000, consisting of home industries (with 5-8 workers) to medium industries (with around 50-100 workers) (Prastawa & Negarawan, 2021). The tofu industrial scale is included in the informal industrial sector. Workers in this sector are included in a group vulnerable to the potential dangers of accidents and risk factors for work-related diseases (Penelitian et al., 2020). The danger is the possibility that a series of events can occur and cause material or non-material loss or damage, accidents, environmental damage, and loss of life (Ita et al., 2020). Besides raw materials, tools, and work environment, labor is an important asset for maintaining production operational processes. Therefore, it is necessary to implement good occupational safety and health procedures in every production process to protect the workforce and ensure that it continues to be productive.

From 2015, there were 75 small to medium-scale tofu production factories (Sugianti & Rois Fathoni, 2019). This research was conducted at the Tofu X Production Factory in Gunungpati District, Semarang City, an informal sector industry. This factory employs 11 people and can produce 30 - 40 barrels of tofu a day, or the equivalent of 400 - 500 kg of raw soybeans. Working hours start from 06.00 to 16.00 WIB for seven days a week. In one hour, this factory can produce 2 barrels of tofu or more than 500 pieces of tofu.

In the tofu production process, some activities use additional chemicals, such as CH3COOH and MgSO4 (Pertanian, 2022). On the other hand, tofu production also produces liquid waste in the form of ammonia (NH3) and carbon monoxide gas waste. These conditions have the potential to pose safety and health hazards for workers. Therefore, risk control and management are necessary. Exposure to the dangers of chemicals from waste produced by tofu factories can spread to the environment of residents who live around tofu factories. Therefore, residents around the tofu factory also have the potential for long-term health hazards.

One of the risk management steps is hazard identification. The hazard identification step is a series of risk assessment procedures used to establish control priorities for the risk of accidents or illnesses resulting from work or employment (Hirarc, 2018). One tool for identifying hazards in the work environment is the HIRADC method. HIRADC is a series of procedures for finding dangerous risks in routine or periodic activities (Purohit et al., 2018). The use of HIRADC aims to limit the risk of work accidents using specific, effective, and efficient controls. Using this method will make it easier to obtain risk priorities in a series of work processes so that appropriate interventions can be determined.

Based on the preliminary studies carried out previously, considering the availability of resources, it can be determined that the most likely intervention method in the tofu-making industry is implementing K3 (Occupational Health and Safety) education. Specifically, an initiative to enhance workers' knowledge and awareness of chemicals, particularly those used in tofu production at the factory. OHS education methods for workers can be carried out using various techniques, including game techniques (Cahyawati et al., 2023).

Several game methods can be applied with adjustments or modifications in safety education efforts. These types of games include cards, snakes and ladders, and puzzles. In research conducted by Priyono (2012), the game method can increase knowledge because it is creative, not monotonous, and directly involves objects actively and thoroughly. Therefore, this research was conducted to assess the effectiveness of the game method using cards as a medium for occupational safety and health education in toxicology for workers and residents who live around the X tofu factory.

METHODS

This research approach uses a quantitative approach. The data analysis technique used in this research is quantitative descriptive. The discussion in this research uses calculations represented in tabular form (Of et al., 2018). The targets of this research were eight workers at the X Tofu Factory and 30 people in the community around.

The data obtained in this research was processed using tools such as IBM SPSS software or Statistic Package For Social Science. The questionnaire instrument was tested using data validity and reliability tests. Data analysis in this research consists of two types, namely using data analysis prerequisite tests in the form of the Shapiro Wilk normality test and hypothesis testing Wilcoxon Signed Rank Test, a nonparametric test for paired data if the data is not normally distributed.

RESULT AND DISCUSSION

This research aims to prove whether the truth or dare game effectively increases toxicology knowledge for Tofu X Factory workers and the general public. Before playing the game truth-or-dare, Respondents took a pre-test to determine their initial level of knowledge. Then, the respondent plays truth or dare according to the researcher's direction and provides an understanding of industrial toxicology and the basics of K3. In the final stage, workers are given a post-test to find out whether there is an increase in the respondent's knowledge after playing truth or dare.

This study has two hypotheses: Ha (the truth or dare game is effective in increasing toxicological knowledge) and H0 (the truth or dare game is not effective in increasing toxicological knowledge). The results of this research were proven by comparing the pre-test and post-test results and using the Wilcoxon test with the SPSS 23 application as follows.

WORKERS

Pre-test and Post-test Values

The lowest pre-test score is 7, and the highest pre-test score is 13. Meanwhile, the lowest post-test score is 7, and the highest post-test score is 10. The average pre-test score is 10.75, and the post-test is 8.63.

Data processing

The pre-test and post-test data were then tested for normality to determine whether the data was normally distributed (Fahmeyzan et al., 2018). The number of samples used in this research was 8 workers at the Tofu X Factory, so the assessment was carried out using the Shapiro–Wilk Test (Iriyani & Faizin, 2024). The data results can be normally distributed if the P value is > 0.05. Based on Table 1 of the Shapiro–Wilk Normality Test Results, the pre-test P value <0.05 is 0.047, which is not normally distributed. Meanwhile, the post-test P value is > 0.05, which means it is normally distributed. If the results show that data is not normally distributed, then an alternative test, the Wilcoxon Test, must be used (Juni et al., 2020).

Table 1. Wilcoxon Test Result

	Post-test – Pre-test
Z	-2.209[b]
Asymp.Sig. (2-tailed)	.027

Based on table 1, P value <0.05, which is 0.027. Around the Ho is rejected, and Ha is accepted. Thus, it is proven that the modified truth or dare card game significantly influences the respondent's level of knowledge.

Table 2. Wilcoxon Test Results

		N	Mean Rank	Sum of Ranks
Post-test – Pre-test	Negative Ranks	1[a]	1.00	1.00
	Positive Ranks	6[b]	4.50	27.00
	Ties	1[c]		

Based on Table 2, the results obtained are: 1 worker had a post-test result lower than the pre-test (12.5%), 6 workers had a post-test result higher than the pre-test (75%), 1 worker had a post-test result the same as the pre-test result (12.5%). This shows that there has been an increase in toxicological knowledge in 75% of respondents from the tofu factory worker group, proving that the truth or dare game effectively increases the toxicological knowledge of workers at Tofu Factory X.

GENERAL PUBLIC

Pre-test and Post-test Values

The lowest pre-test score is 1, and the highest pre-test score is 15. Meanwhile, the lowest post-test score is 7, and the highest post-test score is 15. The average pre-test score is 9.13, and the post-test is 12.07.

Data Processing

The pre-test and post-test data were then tested for normality to find out whether the data was normally distributed or not. The number of samples used in this research was 30 residents around the tofu factory, so the assessment was carried out using the Shapiro–Wilk test. The data results can be normally distributed if the P value is > 0.05. Based on Table 3 about the results of the normality test in the appendix, the P value <0.05 is 0.020. So, the data obtained is not normally distributed. So, an alternative test must be used, namely the Wilcoxon Test.

Table 3. Wilcoxon Test Results

	Post-test – Pre-test
Z	-3.960[b]
Asymp.Sig. (2-tailed)	.000

Based on Table 4, the P Value <0.05 is 0.000. So Ho is rejected, and Ha is accepted. Thus, the truth or dare game significantly influences toxicology knowledge among general public respondents.

Table 6. Hasil Uji Wilcoxon

		N	Mean Rank	Sum of Ranks
Post-test – Pre-test	Negative Ranks	3[a]	4.00	12.00
	Positive Ranks	21[b]	13.71	288.00
	Ties	6[c]		

Based on table 6, the results obtained are: 3 people had post-test results lower than pre-test (10%), 21 people had post-test results higher than pre-test (70%), and 6 people had post-test results the same as pre-test results (20%).

Based on the results of the Wilcoxon test, there was an increase in knowledge in 70% of respondents. This proves that the K3 promotion method through the modified truth or dare card game effectively increases the workers' and the general public's understanding of toxicology at the Tofu X Factory.

CONCLUSION

The effectiveness of the modified truth or dare card game was carried out on workers and the general public at Tofu Factory X. This was proven through the Wilcoxson test based on the pre-test and post-test data obtained. The results demonstrate that the truth or dare card game can increase the knowledge of workers and the general public about toxicology at the Tofu X Factory. Thus, it can be concluded that the modified truth or dare card game effectively increases knowledge about toxicology at the X Tofu Factory.

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Appendix

WORKERS

Table 1. Results of the Shapiro – Wilk Normality Test

	Kolmogorov-Smirnov[a]			Shapiro - Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Pre-test	.189	8	.200*	.820	8	.047
Post-test	.284	8	.057	.906	8	.324

GENERAL PUBLIC

Table 4. Results of the Shapiro – Wilk Normality Test

	Kolmogorov-Smirnov[a]			Shapiro - Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Pre-test	.162	30	.042	.925	30	.037
Post-test	.186	30	.010	.915	30	.020