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Urine Analysis Based on Sampling Time in Tramadol Abusers

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ABSTRACT

Background: Tramadol misuse may lead to addiction and numerous health problems. Urine testing using the immunochromatographic approach is one of the techniques used to identify tramadol. The timing of urine collection plays a crucial role, as it is related to the absorption, metabolism, and elimination phases of the drug. **Objective:** The aim of this research was to assess urine test results according to collection time among tramadol abusers using the immunochromatographic technique. **Research Methods:** This research used an experimental design combined with a descriptive method. The sample comprised urine from six tramadol abusers who met the inclusion criteria. Urine specimens were collected at one, two, four, and six hours after tramadol consumption, giving a total of 24 test units. The examination was carried out using a rapid tramadol test based on the immunochromatography technique. The data were assessed descriptively and presented in frequency distribution tables. **Research Results:** All urine specimens gave positive results at every sampling time. At 1, 2, 4, and 6 hours after tramadol administration, all 6 samples (100%) tested positive at each respective sampling time. No negative results were found. **Conclusion:** Tramadol was found in every urine sample collected 1 to 6 hours after administration. The immunochromatographic test gave positive results throughout the entire sampling period.

Keywords: Tramadol, urine, sampling time, immunochromatography, drug abuse

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Introduction

Tramadol is an analgesic used to relieve pain. Improper use can lead to abuse and dependence. Urine analysis can be used to detect the presence of drugs or their metabolites and is one of the specimens used in toxicological examinations.

The timing of urine sampling is very important because it relates to how drugs are absorbed, distributed, metabolized, and excreted by the body. Fluctuations in the concentration of drugs and their metabolites in the body can affect the detectability of the substance being tested. Thus, sampling time is a crucial factor in urine analysis for tramadol users.

The immunochromatography method is a qualitative, or screening, examination method because the steps are quite easy and the results can be obtained in a short time. In this study, testing was carried out to check tramadol at several times after consumption. This study was carried out to understand the results of urine analysis based on sampling time in tramadol users using immunochromatography, with urine collected 1 hour, 2 hours, 4 hours, and 6 hours after use.

Research Methods

The research was carried out in May 2026 in Batukliang District, Central Lombok Regency. The study used a completely randomized design with examination time as the treatment, namely 1 hour, 2 hours, 4 hours, and 6 hours after tramadol consumption. The research sample was urine from 6 tramadol abusers. Based on the research design, the total number of examination units was 24.

Sample collection was carried out with a short interview to obtain information about the last time tramadol was used. Urine was collected at the 1st, 2nd, 4th, and 6th hours after use and then coded according to the respondents.

The examination was carried out using a tramadol rapid test with the immunochromatography method. The test kit and urine samples were allowed to reach room temperature. The test strip was dipped into a container of urine, or 3–5 drops of urine were dripped into the sample well, according to the kit instructions. The reaction results were read after 5–10 minutes.

Positive results were determined based on the line pattern on the test device according to the kit instructions. The test result data were recorded based on sample code and sampling time. The data were then grouped according to collection time, and the number and percentage of positive and negative results were calculated at each sampling time.

Results and Discussion

Urine samples were obtained from 6 tramadol abusers and collected at four times after intake, namely 1 hour, 2 hours, 4 hours, and 6 hours after consumption. Each sample was examined qualitatively using the immunochromatographic method.

Table 1. Urine Test Results

NO	Sample Code	Examination Results			
		1 hour	2 hours	4 hours	6 hours
1	S1	Positive (+)	Positive (+)	Positive (+)	Positive (+)
2	S2	Positive (+)	Positive (+)	Positive (+)	Positive (+)
3	S3	Positive (+)	Positive (+)	Positive (+)	Positive (+)
4	S4	Positive (+)	Positive (+)	Positive (+)	Positive (+)
5	S5	Positive (+)	Positive (+)	Positive (+)	Positive (+)
6	S6	Positive (+)	Positive (+)	Positive (+)	Positive (+)

The results of the analysis indicated that all six respondents gave positive results at each sampling time. Therefore, out of a total of 24 units examined, all showed positive results.

Table 2. Distribution of Urine Test Results Based on Sampling Time

Sampling Time	Positive	Negative	Percentage
1 hour	6	0	100%
2 hours	6	0	100%
4 hours	6	0	100%
6 hours	6	0	100%

Table 2 shows that all urine samples were positive at each sampling time, i.e., 1 hour, 2 hours, 4 hours, and 6 hours, giving a positive percentage of 100% at each time. No negative results were found.

The results showed that the target analyte could still be detected at all observed sampling times. Positive results at 1 hour showed that the test had already given positive reactions in all respondents at that time. Positive results at 2, 4, and 6 hours showed that, throughout the observation period, tramadol metabolites detected by the rapid test could still produce positive reactions. Sampling time is related to the pharmacokinetic processes of drugs, namely absorption, distribution, metabolism, and excretion. Changes in these processes can alter the concentration of metabolites in urine. However, in this study, the change in time from 1 hour to 6 hours did not change the category of the test results because all samples still showed positive results.

Conclusion

A. Conclusion

Based on the results of the study on urine analysis based on sampling time in tramadol abusers, it can be concluded that:

1. Tramadol metabolites were detected positive in all urine samples (100%) examined 1 hour after tramadol use.
2. Tramadol metabolites were detected positive in all urine samples (100%) examined 2 hours after tramadol use.
3. Tramadol metabolites were detected positive in all urine samples (100%) examined 4 hours after tramadol use.
4. Tramadol metabolites were detected positive in all urine samples (100%) examined 6 hours after tramadol use.

B. Suggestions

1. *For academics:* the results of this study are expected to serve as an additional scientific reference, especially in the field of toxicology and drug testing using urine samples.
2. *For future researchers:* researchers are advised to conduct a study with a sampling time shorter than 1 hour after tramadol use, in order to determine the earliest time at which tramadol metabolites can be detected in urine.

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