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Awareness and Knowledge of Drug-Laboratory Test Interferences among Medical Laboratory Technologists in Yemen

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ABSTRACT

Background: Drug-laboratory test interactions (DLTIs) can mislead the health care professionals and provide incorrect information regarding the patient's health status. To date there are no specific courses in medical laboratory science curricula in Yemen that specialize in this topic.
Objective: This study aims to reveal the knowledge about DLTIs among laboratory technologists in Yemen.
Methods: A cross-sectional study was conducted in 11 governorates in Yemen to evaluate the awareness about DLTIs among laboratory technologists. An electronic questionnaire was distributed, and responses were analyzed.
Results: A total of 396 laboratory technologists participated in this study. The majority of respondents (96.4%) reported that certain medications can affect laboratory test results, and 89.4% of participants showed knowledge about common medication interferences, but specific drug class awareness varied considerably. Only 53 (13.3%) had received formal training on drug-laboratory test interference and scored the highest in the knowledge questions.
Conclusion: Formal training on DLTIs is important to ensure accurate laboratory test results.

Keywords: Awareness, knowledge, interference, medical laboratory tests, drugs, medications, technologists.

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INTRODUCTION

Laboratory tests play a major role in the health care system. About 60-70% of decisions in the medical practice depend on the results of these laboratory tests (1-3). Therefore, care should be taken by laboratory technologists to ensure accurate and precise results. Most errors in laboratory test results are due to pre-analytical factors that include drug and food supplement administration, test requests, collection of specimens, handling of specimens, and others (4-6). Many laboratory technologists lack the knowledge regarding these factors (7,8).

Among these factors, the drug's interference with laboratory tests is the most important factor to be highlighted (9), especially in our country, since there are no specific courses addressing this issue. DLTIs were first introduced by Caraway in 1962 (10). Drugs can interfere with the test results by four mechanisms: physical, chemical, pharmacological, and drug-drug interactions. In physical interaction, the drug interferes with colorimetric analysis. In chemical interaction, the drug may be similar in molecular structure to the analyte, therefore causing interference. In pharmacological interaction, a drug's pharmacological or toxic effect interferes with test results. For example, sodium warfarin causes an increase in prothrombin time. Drug-drug interaction may cause significant changes in test results (11). There are more than 40,000 drug interactions reported (12,13). Thus, data about drug intake for the last 10 days before specimen collection should be provided to the laboratory professionals (14).

DLTIs are a worldwide problem, causing improper diagnosis and treatment because they can cause false increases or false decreases in laboratory results (15). Knowledge about DLTIs is important in the interpretation of test results (13).In Yemen, many drugs are used without prescription, especially antibiotics (16). Therefore, awareness about DLTIs is essential (17). On the other hand, there are no academic courses that aim to provide the knowledge needed about this problem. This study was conducted to measure the laboratory technologists' awareness about DLTIs in Yemen. To overcome this problem, continuous education and training for laboratory technologists and other health care workers is important (8,18,19).

METHODS

Study Design and Subjects

A cross-sectional study was conducted by distributing an electronic questionnaire to laboratory technologists in Yemen from March 2025 to April 2025. The questionnaire was made of 30 questions and presented in Arabic and English. It consisted of four sections. Section 1 was about demographic information, section 2 measured knowledge, section 3 measured practice, and section 4 was about challenges and recommendations about the problem. The sample size was chosen according to a similar study in Saudi Arabia (20). Laboratory technicians from all governorates having different levels of education were included. Participants from microbiology and science faculties were excluded.

Inclusion Criteria

Any medical laboratory technologist in Yemen, and consent to participate in the study.

Exclusion Criteria

Any non-medical laboratory technologists in Yemen, and incomplete responses to the survey questionnaire.

Data Analysis

The data was analyzed by SPSS version 21. The chi-square test was used to analyze the data. In all statistical tests, a P-value < 0.05 was considered statistically significant.

RESULTS

This cross-sectional survey was conducted on 396 (Medical Laboratory Technologist) MLTs from 11 governorates in Yemen. Their demographic data are shown in Table 1.

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Table1: Demographic data of Participants.

Variable		N (%)
Sex	Male	137 (34.6)
	Female	259 (65.4)
Age Group	20-30 years	268 (67.7)
	31-40 years	79 (19.9)
	41-50 years	36 (9.1)
	More than 50 years	13 (3.3)
Level of Education	Diploma	93 (23.5)
	Bechelor's	249 (62.9)
	Master's	50 (12.6)
	PHD	4 (1.0)
Experience	< 2 years	154 (38.9)
	2-5 years	113 (28.5)
	6-10 years	47 (11.9)
	>10 years	82 (20.7)
Governorate	Taiz	231 (58.3)
	Sanaa	54 (13.6)
	Aden	30 (7.6)
	Alhodaida	13 (3.3)
	Ibb	31 (7.8)
	Hadramout	5 (1.3)
	Dhamar	2 (0.5)
	Lahj	5 (1.3)
	Maarib	4 (1.0)
	Hajja	2 (0.5)
	Not specified	18 (4.5)
Had Formal Training on DLTIs	Yes	53 (13.4)
	No	343 (86.6)

This study showed that the majority of participants (96.4%) were aware that some drugs can affect laboratory test results, and 83.8% understand the importance of identifying medications that patients are taking before performing laboratory tests. 74.5% reported that they regularly ask about patients' medication history. 89.4% of participants are knowledgeable about common medication interferences, but specific drug class awareness varied considerably: only 55.8% recognized antibiotic interference with liver function tests, compared to 94.4% for anticoagulants' effect on coagulation tests. Knowledge gaps were particularly evident regarding psychiatric medications (41.9% awareness) and non-steroidal anti-inflammatory drugs (NSAIDs) (49.5%). The results above are illustrated in Table 2.

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Table 2: Results of Knowledge Section in the Questionnaire

Awareness of Drug Interference in Laboratory Tests	Agree %	Disagree %
I am aware that certain drugs can alter laboratory test results.	96.4	3.6
I understand the importance of identifying medications that patients are taking before conducting laboratory tests.	83.8	16.2
I regularly ask patients about their medication history before performing laboratory tests.	74.5	25.5
I am knowledgeable about common medications (e.g., antibiotics, antihypertensives, anticoagulants) can affect laboratory test outcomes	89.4	10.6
I know that antibiotics (e.g., rifampin, tetracycline) can cause false results in liver function tests.	55.8	44.1
I am aware that anticoagulants (e.g., warfarin, heparin) can interfere with coagulation and platelet function tests.	94.4	5.5
I understand that diuretics (e.g., furosemide, thiazides) can alter electrolyte levels, especially potassium and sodium.	79	20.9
I know that steroids and hormonal medications can influence glucose and lipid panel results	60.4	39.6
I am familiar with how psychiatric medications (e.g., lithium, SSRIs) can affect thyroid and renal function tests.	41.9	57.8
I know that NSAIDs (non-steroidal anti-inflammatory drugs) can affect kidneys function tests.	49.5	50.5
I am aware that anticonvulsant drugs (e.g., phenytoin, carbamazepine) can alter liver enzymes and hematologic parameters.	48.2	51.7

Regarding practice, 68.5% of MLTs in Yemen check the patient's medication list when interpreting abnormal test results, and 86.9% consult with physicians when test results are inconsistent with the patient's clinical condition. However, only 53% document suspected drug interference in reports (Table 3). 90.2% reported insufficient training for MLT on drug interferences, and 91.4% desired more detailed medication information from physicians. 94.4% recommended integration of this topic into university curricula.

Table 3: Results of Practice Section in the Questionnaire

Practices in Handling Drug-Laboratory Test Interference	Agree	Disagree
I check the patient's medication list when interpreting abnormal laboratory results.	68.5	31.6
I consult with physicians when laboratory results seem inconsistent with the patient's clinical condition.	86.9	11.1
I document suspected drug interferences in laboratory reports when necessary.	53	47

A statistically significant association was found between gender and training (p= .002) (Table 4).

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Table 4: Association between Demographic Variables and Having Training on DLTIs

		Had Formal Training on DLTIs		
Variable		**Yes**	**No**	**P value**
Gender	Male	29	108	0.001
	Female	24	235	
Age Group	20-30 years	35	233	0.992
	31-40 years	11	68	
	41-50 years	5	31	
	More than 50 years	2	11	
Level of Education	Diploma	15	78	0.227
	Bechelor's	27	222	
	Master's	10	40	
	PHD	1	3	
Experience	< 2 years	15	139	0.340
	2-5 years	19	94	
	6-10 years	6	41	
	>10 years	13	69	

Knowledge questions were computed as a score. For knowledge, a score of 0-25 was regarded as below average, 26-35 as average and 36-55 as know very well. All participants who had formal training on DLTIs had high scores in the knowledge questions. On the other hand, some participants who had not been trained on DLTIs had lower knowledge scores. This association between training and knowledge about DLTI is statically significant (p=0.001) (Table 5).

Table 5: Association between Having Training on DLTI and Participants' Level of Knowledge

		Knowledge About DLTIs			
		Below Average	**Average**	**Know very Well**	**P value**
Had Formal Training on DLTIs	Yes	0	0	53	0.018
	No	2	44	297	

The level of knowledge about DLTIs in the three major governorates is shown in Table 6.

Table 6: Level of Knowledge about DLTIs in Three Major Governorates.

		Knowledge About DLTIs		
		Below Average	**Average**	**Know very Well**
Governorate	Taiz	1	31	199
	Sana'a	0	2	52
	Aden	0	4	26

DISCUSSION

This study assessed the knowledge, practices, and perceptions of medical laboratory professionals in Yemen regarding DLTIs. The study found that the overall awareness about DLTIs was remarkably high (96.4%), which is similar to the findings reported in Saudi Arabia in 2021, which revealed 98.44% awareness (20). No similar studies were found on laboratory technologists assessing knowledge about DLTIs in other countries. The study showed

important gaps in both knowledge and practice. 83.8% of respondents understand the importance of identifying medications that patients are taking before conducting laboratory tests.

Knowledge about specific drug categories varied among participants. The majority of participants (94.4%) are aware that anticoagulants can interfere with coagulation and platelet function tests, but awareness is much lower for antibiotics (55.8%), psychiatric medications (41.9%), and NSAIDs (49.5%). A possible explanation for the higher knowledge about anticoagulant interference with test results is the presence of a course in the medical laboratory programs regarding this topic, unlike other drugs, which are not integrated into most programs. These findings suggest general awareness that does not translate into the specific knowledge required for accurate interpretation of test results.

This inconsistency also appears in reported practices. A majority of participants regularly ask patients about their medication history before performing laboratory tests (74.5%) and consult with physicians when laboratory results seem inconsistent with the patient's clinical condition (86.9%). Only 63.4% said they refer to laboratory guidelines to check for potential drug interferences before finalizing test reports. Moreover, just about half (53%) document suspected drug interferences in laboratory reports when necessary, indicating the need for standardized protocols in laboratories. Absence of clear policies and guidelines may explain this inconsistency in practice regarding DLTIs.

Perhaps the most important finding is the impact of formal training. Although only 13.3% of participants had received specific training on DLTIs, those who had scored significantly higher in knowledge, with statistical analysis confirming this association ($p = 0.001$). Additionally, a significant relationship was observed between gender and access to training ($p = 0.002$), raising questions about possible socio-cultural or institutional barriers that merit further study.

Limitations

The cross-sectional design of the study makes it unable to establish cause-and-effect relationships. Self-reported questionnaire bias and distribution bias could affect results. Questions regarding the type of laboratory the technologists work in were not included in the questionnaire, and the study duration was not enough to collect more data.

CONCLUSION

This study had identified the gap between general awareness about DLTIs and the specific knowledge needed to interpret abnormal test results and the proper laboratory practices. The relationship between formal training and higher knowledge scores suggests the importance of the implementation of DLTIs in the curricula and training programs. Further research might explore this topic among physicians and pharmacologists.

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Conflict of Interest

The authors declare that there is no conflict of interest.

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