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Assessment of Pharmacist Knowledge on Drugs That Cause Change in Urine Color

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Abstract

Background: Urine changes can be caused by a number of things, but they often involve changes to the urine's color, consistency, or smell. Medication or diet might cause these changes, which are usually harmless.
Aims of study: Assess the pharmacist knowledge toward drugs change urine color and find the relationship between demographic data with the pharmacist knowledge toward drugs change urine color.
Methodology: This was a cross-sectional study involving pharmacists in Baghdad, Iraq. It was performed from 1st November 2025 until the end of 30th January 2026 and Included pharmacists in the government health sector (AL Yarmouk teaching hospital and Al Khadhimia teaching hospital) and pharmacists working in private pharmacies at Baghdad. Only 166 pharmacists responded with the questionnaire as they were given a choice to participate. All pharmacists signed the consent form and willing to participate were included in this study.
Results: Pharmacists Knowledge toward drugs that change urine color, the mean pharmacists that were know the right answer 52.1, the mean pharmacists that were wrong answer is 55.7 while the mean pharmacists that were don't know the answer is 57.5.
Conclusion: We conclude that pharmacist knowledge about drugs that cause change in urine color were fair, the sample were have good knowledge about drugs such as Phenazopyridine, Amitriptyline, Metronidazole, Iron supplement but they have bad knowledge about these drugs: Phenytoin, Metoclopramide, Isoniazid, Cimetidine. Factors such as gender, level of education and pharmacists working are affecting the knowledge of pharmacists.

Keywords

Pharmacists' Knowledge, Urine Color, Drugs Induce Discoloration, Phenazopyridine, Medication Safety

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INTRODUCTION

(Up to the 1960s, prescriptions were filled in a medicine room using little cards that included the patient's specific pharmaceutical information.) Large medication bottles were used to administer medication into little paper cups together with the corresponding cards (Singh *et al.,* 2014). A single tray held all of the patients' prescriptions. This antiquated structure offered several chances for mistakes to happen. A better way to secure, store, prepare, and administer drugs to patients was made possible with the advent of unit-dose pharmaceutical packaging and the usage of medication carts with drawers for each patient. This helped to lower the number of medication mistakes (Carpenito & Kurtz, 2017)

Definition

Urine alterations can occur for a variety of causes, but they usually entail modifications to the urine's color, consistency, or smell. These alterations, which are frequently benign, can be brought about by medicine or food. On the other hand, diseases including kidney stones, liver failure, and urinary tract infections can also result in changes in urine (Reisfield *et al.,* 2017).

Drugs Change Urine Color to Orange / Red

Phenazopyridine (Pyridium), Rifampin, Nitrofurantoin, Senna, Warfarin and Phenytoin change urine color to orange/red (McKenney *et al.,* 2011).

Urine is commonly recognized to alter color when exposed to phenazopyridine (Pyridium), giving urine a characteristic orange-red or reddish hue. Because phenazopyridine is a dye that is eliminated through the urine, there is no need to be concerned about this change in color (Bowling *et al.,* 2014).

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The urine color usually changes shortly after taking the medicine and can continue for many days even after discontinuing it. The dose and each person's metabolism may have an impact on the color's intensity (Bodenham *et al.,* 2007).

Urine color is changing due to Rifampin, an antibiotic that is frequently used to treat bacterial infections, including TB. Rifampin gives urine a characteristic orange-red, reddish-brown, or even pink hue. For tuberculosis patients, this can take several months. Rifampin can also change the color of other bodily fluids, such as sweat, which can turn it orange or reddish-brown, tears, which can turn them red, and saliva, which can turn it pink or orange. The color change in urine usually occurs shortly after starting the medication and can last the entire course of treatment (Tonseth *et al.,* 2017).

It's common for nitrofurantoin to cause urine to become brown or dark yellow. The discolouration is a common side effect of nitrofurantoin and normally goes away within a few days of starting the medicine. Each person will experience the color differently, and the urine should revert to normal a few days after stopping the prescription (Nates *et al.,* 2012)

Senna also has the unintended side effect of turning urine reddish-brown, however this is usually thought to be safe. Sennosides, which are found in senna, stimulate and induce the intestines to contract. These substances can be eliminated from the body by urine excretion after being partially broken down by the body. This hue shift is harmless and should go away when senna is stopped. While the length of the hue shift varies, it usually lasts for a few days after ceasing to use senna (Grant *et al.,* 2015)

In Urine color changes are a common side effect of warfarin, but it's important to know the difference between these side effects and other warning indications of a major problem. The usual side effect is as follows: Reddish-brown or orange peel: This is a quite typical adverse effect of warfarin and normally doesn't need to be immediately addressed. It happens as a result of the drug's breakdown components being eliminated the urine. After quitting the drug, this normally slight coloring should go away in a few days (Basu *et al.,* 2018).

However, as blood in the urine can be a major adverse effect of warfarin, it's crucial to be aware of potential indicators of this condition: Red or pink pee: This may be an indication of blood in the urine, which might be brought on by a number of things, such as: Minor bleeding: Conditions including kidney stones, urinary tract infections, and intense activity can cause this. More severe hemorrhage Internal bleeding in the kidneys, bladder, or urinary system might be the source of this. severe discomfort in the side, belly, or backhaving trouble urinating thrombi in urine, chills or fever (Ghosh *et al.,* 2019).

Drugs Change Urine Color to Blue /Green

Amitriptyline (Elavil), Indomethacin (Indocin), Methylene blue and Propofol change urine color to blue / green. Tricyclic antidepressants like amitriptyline are used to treat depression symptoms and also cause color changes in the urine. It is one of numerous drugs that can produce green or blue urine. This is a typical side effect that is not dangerous. Although the change in urine color is not harmful, it's Crucial to be aware of other possible amitriptyline side effects, including constipation, dry mouth, drowsiness, and dizziness (Snider & Farer, 2012).

Like amitriptyline, indomethacin can occasionally result in blue or green urine. This is the most frequent adverse effect linked to indomethacin and is usually regarded as harmless. The medication's effects on the body are what cause it, and if you stop taking it, the color should return to normal. Additional color variations: Indomethacin may, less commonly, result in darker or redder urine. This may indicate more severe side effects, such as issues with the kidneys or liver (Gulseth, 2016). The most frequent side effect of propofol is that it can turn urine green. This is especially true after extended usage.

It is typically not harmful and is brought on by the drug's metabolites. Pink or murky urine is less common but still possible. Although the exact process is unknown, it most likely includes

breakdown products, such as white urine, which is uncommon but occasionally recorded. It is believed to be caused by the fat emulsion vehicle used to administer propofol (Chan & Evans, 2015).

Drugs Change Urine Color to Brown

High dose riboflavin (vitamin B2) and certain laxatives that containing cascara sagrada can change urine color to brown or purple. Vitamin B2, commonly referred to as riboflavin, is frequently responsible for altering the color of urine. B2 can give urine an intense, nearly fluorescent yellow hue. The adverse effect of water solubility of vitamin B2 is well-known and safe. When a patient consumes more than their body requires, their kidneys remove the extra. Urine seems brighter in color because B2 is naturally yellow in color (Fleisher, 2008).

Drugs Change Urine Color to Black

Levodopa/ Carbidopa (Sinemet) and methocarbamol (Robaxin) can change urine color to black coloration. Methocarbamol might cause urine to become dark, which is the most frequent alteration is a darker urine color, varying from blue-green to greenish-brown. This occurs as a result of the drug being broken down by the body and the metabolites being eliminated in the urine. Other, less common alterations include the possibility of crimson or even black urine. These are extremely uncommon, though, and may point to more severe adverse consequences (Clark *et al.,* 2006).

Aim of the study

The aims of the study was to assess the pharmacist knowledge toward drugs change urine color and find the relationship between demographic data with the pharmacist knowledge toward drugs change urine color.

METHODOLOGY

Study designs

This was a cross-sectional study involving pharmacists in Baghdad, Iraq.

Study time

It was performed from 1st November 2025 until the end of 30th January 2026 and

Study area

Included pharmacists in the government health sector (AL Yarmouk teaching hospital and Al Khadhimia teaching hospital) and pharmacists working in private pharmacies at Baghdad.

Study sample

Only 166 pharmacists responded with the questionnaire as they were given a choice to participate. All pharmacists signed the consent form and willing to participate were included in this study. They are divided into two groups: group A: Private pharmacists(N=91) and group B: hospital pharmacists (N= 75).

Exclusion Criteria

The exclusion criteria included pharmacists who did not complete the survey responses.

Study Questionnaires

Therefore, a standardized, 7-items, self-administered questionnaire designed and developed to evaluate pharmacist knowledge when generating pharmaceutical waste in pharmacies.

The questionnaire was developed depending on information drawn from the literature, and a number of questions were adapted and modified from other studies regarding pharmacist knowledge toward drugs that change urine color.

Validation was performed to determine whether the study tool measured the intended goal of this study.

The questionnaire was reviewed by three pharmacists who were faculty members with good experience in research. The suggested modifications included rephrasing questions and clarifying them. Readability testing was performed by using Microsoft Word to enhance the questionnaire's readability.

The questionnaire was readable by respondents and was pretested on a convenient sample of 166 participants. Participants were able to answer the questions within 5 min. The questionnaire was valid and reliable for the evaluation of

pharmacists' knowledge regarding medication that changes urine color.

The Questionnaire Contains Questions, Which Included the Following Information

- **Section 1:** Participants demographic data, which included age, gender, degree, duration of experience.
- **Section 2:** Participants knowledge toward drugs cause change urine color.

Statistical Analyses

The collected data had been analyzed using SPSS (version 18.0) software package (SPSS Inc., Chicago, IL, USA). Almost all questions had been calculated as proportions and percentages as they are categorical variables.

RESULTS

Data were collected from 166 pharmacist, 134 (80.7%) were 20-29 years age group, 23 (13.9%) were 30-39 years age group and 9 (5.4%) were more than or equal 40 years as shown in table 1.

Table 1: *Sample Distribution According to Age Group*

Age Group	Frequency	Percentage
20-29	134	80.7%
30-39	23	13.9%
≥ 40	9	5.4%

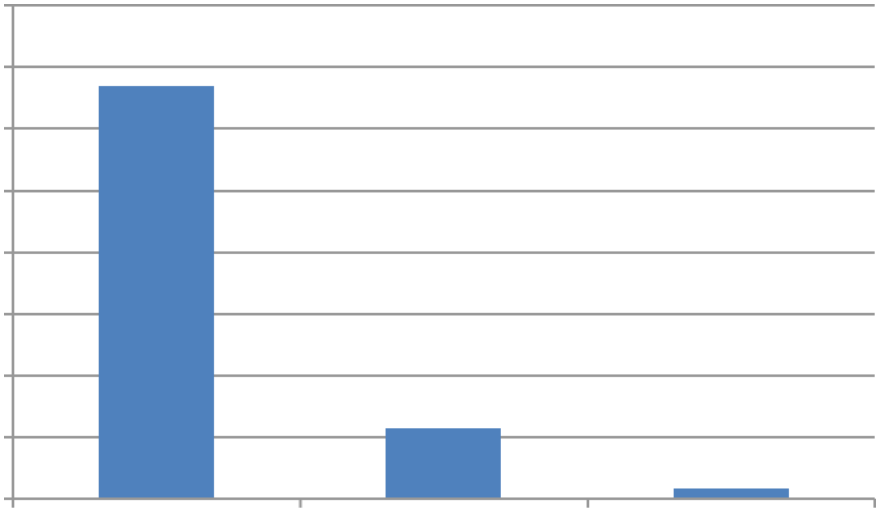

Figure 1. *Sample Distribution According to Age Group*

Table 2 show the distribution of gender through the sample, The major of the sample were female 103 (62%) of the sample while the male were 63 (38%) of the sample.

Table 2: *Gender Distribution Through Sample*

Gender	Frequency	percentage
Male	63	38%
Female	103	62%

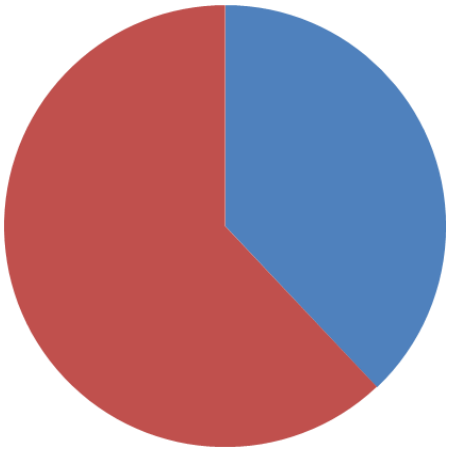

Figure 2. *Gender Distribution Through Sample*

Table 3 show the sample distribution according to degree of pharmacists, 3 (1.8%) were diploma degree, 151 (90.9%) were bachelor's degree. 8 (4.8%) were master's degree and 4 (2.4%) were doctorate degree.

Table 3: *Sample Distribution According to Degree*

Degree	Frequency	Percentage
Diploma	3	1.8%
Bachelor	151	90.9%
Master	8	4.8%
Doctorate	4	2.4%

Table 4 show the experience of pharmacists, 1-5 years age group were 127 (76.5%), 6-10 age group were 17(10.2%) and 22 (13.3%) were more than 10 years.

Table 4: *Experience of Pharmacists of The Samples*

Duration of Experiences	Frequency	Percentage
1-5	127	76.5%
6-10	17	10.2%
≥ 11	22	13.3%

About the distribution of sample according to pharmacists working, 91 (54.8%) were Private pharmacists while 75(45.2%) were Hospital pharmacists as shown in table 5.

Table 5: *Distribution of Sample According to Pharmacists Working*

Working	Frequency	Percentage
Private Pharmacist	91	54.8%
Hospital Pharmacist	75	45.2%

Table 6 show the Pharmacists Knowledge toward drugs that change urine color, the mean pharmacists that were know the right answer 52.1, the mean pharmacists that were wrong answer is 55.7 while the mean pharmacists that were don't know the answer is 57.5.

Table 6: *Pharmacists Knowledge toward Drugs that Change Urine Color*

Drug	Right Answer		Wrong Answer		I don't know	
	Group A	Group B	Group A	Group B	Group A	Group B
Phenazopyridine	65	49	13	20	4	5
Levodopa	35	27	27	31	19	27
Sulfasalazine	27	26	21	28	28	36
Cimetidine	19	12	28	31	76	
Amitriptyline	49	37	17	26	21	26
Nitrofurantoin	27	13	25	41	27	31
Phenytoin	7	6	32	49	29	43
Warfarin	24	17	21	28	30	36
Rifampin	28	21	24	39	21	33
Metronidazole	33	41	13	19	21	29
Iron supplement	45	31	20	33	16	21
Isoniazid	20	9	21	38	33	45
Indomethacin	21	17	22	33	33	40
Metoclopramide	11	10	24	36	31	44

Table 7: *Pharmacists Knowledge According to Demographic Data*

Demographic Data	Right Answer	Wrong Answer	Don't Know	P Value
Gender				
Male	30.4	24.1	22.7	0.03
Female	21.7	31.6	34.8	
Age Group				
20-29 Years	28.6	36.7	41.4	0.62
30-39 Years	15.3	15.8	16.1	
≥40 Years	8.2	3.2	0	
Level Of Education				
Diploma Degree	3.1	5.4	7.2	0.02
Bachelor's Degree	34.7	46.5	47.9	
Master Degree	6.8	2.3	2,4	
Doctorate Degree	7.5	1.5	0	
Pharmacist Working				
Private Pharmacist	32.4	16.5	27.9	0.01
Hospital Pharmacist	19.7	39.2	29.6	

DISCUSSION

A number of studies have brought attention to the possibility of medication-related problems (MRPs), one of which is sub-therapeutic dosage, which is the practice of giving a dose that is less than what is necessary. Pharmacists are an invaluable resource for both prescribers and individuals seeking information. As a result, they must to be qualified to counsel patients and knowledgeable on a range of treatment-related topics, such as medication interactions and patient health. Research has demonstrated that people who get education on medications utilize them more effectively and manage their negative effects (Shukla *et al.,* 2017).

Moreover, pharmacists may be the first to identify illnesses that require immediate physician consultation.

This study clarifies a significant problem affecting patient safety and healthcare outcomes in the nation about medications that, to the knowledge of pharmacists, modify the color of urine.

In our study, we found that the majority of the sample were 20-29 years this may be due to the older pharmacist present in hospitals management. In our study we found that the majority of the sample were female and this may be due to that female more acceptable to pharmacies college and the community culture see that pharmacies college are more suitable for female as a job. About the duration of experience of included sample were the majority between 1-5 years and this is normal result due to the majority of sample were 20-29 years age group.

In our study we found there were no relationship between age group and pharmacist knowledge toward drugs that cause change in urine color which the p value were 0.62 (more than 0.05).

A study done in Karbala in 2019 by Albaroodi (2019) about the pharmacist's knowledge regarding drugs disposal found that their strong relationship between age and pharmacist knowledge. We found there were relationship between gender and pharmacist knowledge toward drugs that cause change in urine color which the p value were 0.03 (less than 0.05) which male were more knowledge than female and this may be due to that male working in private pharmacies more than female.

This agree with study done in Jeddah at Saudi Arabia in 2023 by Alorfi (2023), found that male are more knowledge than female.

We found there were relationship between level of educations and pharmacist knowledge toward drugs that cause change in urine color which the p value were 0.02 (less than than 0.05) and this is normal due to education is seen as the process of acquiring knowledge, and knowledge is seen as the product of education.

This agrees with study done in united Arab emirate done by Fahmy *et al.* (2020), which found the high educational level increase the knowledge and attitude and perceptions to drugs and herbal products.

In our study, we found the Pharmacists Knowledge toward drugs that change urine color; the mean pharmacists that were know the right answer 52.1, the mean pharmacists that were wrong answer is 55.7 while the mean pharmacists that were don't know the answer is 57.5.

The sample were having good knowledge about drugs such as Phenazopyridine, Amitriptyline, Metronidazole, Iron supplement but they have bad knowledge about these drugs: Phenytoin, Metoclopramide, Isoniazid, Cimetidine.

We found there were strong significant relationship between pharmacist working and pharmacist knowledge toward drugs that cause change in urine color which the p value were 0.01 (less than 0.05) which private pharmacists were more knowledge about drugs that cause change in urine color than hospital pharmacist knowledge.

CONCLUSION

We conclude that pharmacist knowledge about drugs that cause change in urine color were fair, the sample were have good knowledge about

drugs such as Phenazopyridine, Amitriptyline, Metronidazole, Iron supplement but they have bad knowledge about these drugs: Phenytoin, Metoclopramide, Isoniazid, Cimetidine. Factors such as gender, level of education and pharmacists working are affecting the knowledge of pharmacists.

Recommendations

We advise that a study of a comparable nature be carried out to cover a larger population in the various governments. 2-We advise planning training sessions and/or seminars in conjunction with the Ministry of Health. As a result, training will increase pharmacists' knowledge and fill any knowledge gaps in areas. 3-Continuous educational programs and workshops can help maintain updated knowledge after graduation

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