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Knowledge, Attitude, and Practices Regarding Occupational Radiation Safety Among Employees in Various Radiology Departments Across Different Hospitals In Sulaimani City

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A R T I C L E I N F O

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Abstract

Background: Healthcare professionals in radiology departments are exposed to ionizing radiation, posing significant health risks. Proper knowledge, attitudes, and practices (KAP) regarding radiation safety are crucial to minimize exposure risks.

Objective: This study investigates the level of knowledge, attitude, and practice of occupational radiation safety among physicians in Iraq, particularly radiologists exposed to X-rays.

Methods: A cross-sectional study was conducted from 2022 to 2023, involving 250 physicians working in radiology departments. Data were collected through a structured questionnaire, which included demographic information and KAP assessments. The data were analyzed using SPSS version 23. Descriptive statistics and inferential analysis were performed to determine the relationships between KAP and sociodemographic characteristics.

Results: Most participants demonstrated moderate levels of knowledge (58.4%), attitude (64.4%), and practice (88.8%) regarding radiation safety. Significant associations were found between knowledge and factors such as alcohol consumption history, occupational experience, and the number of patients diagnosed per day ($p<0.05$). There were also significant relationships between age, occupational experience, hospital type, and radiation safety practices ($p<0.05$).

Conclusions: While the participants' overall KAP was moderate, the study highlights the need for continuous training and education to improve radiation safety standards in medical environments. Enhanced training could safeguard healthcare professionals and patients from the potential hazards of ionizing radiation.

What is already known about the topic? Radiology employees are aware of radiation risks, but gaps in safety practices remain. Training, experience, and access to protective gear influence their knowledge, attitude, and practice of radiation safety. Regular safety training improves compliance.

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Introduction

The discovery of X-rays by Wilhelm Conrad Roentgen in 1895 revolutionized the field of medical imaging, making ionizing radiation an indispensable tool for diagnosis and treatment in modern medicine (Panchbhai, 2015). However, despite the invaluable benefits of ionizing radiation, its exposure poses significant risks to patients and healthcare professionals. Radiation exposure has been linked to various health issues, including dermatosis, hematological problems, cataracts, and an increased risk of cancer, particularly for those consistently exposed in radiology departments (Mansouria et al., 2020; Chaturvedi & Jain, 2019).

Occupational radiation safety practices are critical to protect healthcare professionals from these adverse effects. The ALARA (As Low As Reasonably Achievable) concept encapsulates the guiding principle of radiation safety, which emphasizes minimizing exposure by controlling time, distance, and shielding (Jha et al., 2016). Ensuring adherence to these principles is essential in high-risk environments like radiology and nuclear medicine departments.

Global research has shown varying levels of knowledge, attitude, and practice (KAP) regarding radiation safety among healthcare professionals. For instance, a study by Maharjan et al. (2020) highlighted the need for continuous education and training for radiology professionals to enhance radiation safety. Similarly, Seifi et al. (2019) found that insufficient training and awareness of ionizing radiation hazards resulted in inadequate protective measures in nuclear medicine centers.

Few studies have investigated the awareness and safety practices related to occupational radiation exposure among healthcare professionals in Iraq. Given the high risk associated with continuous exposure to ionizing radiation in medical settings, assessing and improving KAP levels among radiology staff is critical. This study aims to evaluate the knowledge, attitude, and practice of occupational radiation safety among physicians working in radiology departments in Iraq, thereby identifying gaps in their awareness and protective measures.

Methodology

Study Design

This study employed a cross-sectional design to assess the knowledge, attitude, and practice (KAP) of occupational radiation safety among physicians in radiology departments across Iraq. The cross-sectional approach is appropriate for this type of research, as it allows for examining a sample population at a specific time, thereby providing a snapshot of KAP levels.

Study Population and Setting

The study was conducted between 2022 and 2023, targeting physicians exposed to X-ray radiation in various hospitals and medical centers across Iraq. Two hundred fifty physicians, including radiologists and other healthcare workers in radiology services, participated in the study. The inclusion criteria for the study were:

- Physicians aged 18 years and older.
- Those with at least one year of experience in radiology departments.
- Physicians exposed to ionizing radiation (e.g., X-rays) during their professional duties.

Exclusion criteria included physicians with a history of mental or physical illness that could hinder their ability to participate, as well as those who were unwilling to provide informed consent.

Data Collection Tool

Data was collected using a structured, researcher-made questionnaire. The questionnaire was designed based on existing literature on radiation safety and occupational health (Jha et al., 2016; Maharjan et al., 2020). It consisted of three main sections:

1. **Demographic Information**: This section included age, gender, marital status, level of education, job title, occupational experience, and type of hospital (government, private, or educational).
2. **Knowledge of Radiation Safety**: This section assessed participants' knowledge of ionizing radiation risks, protective measures, and international safety guidelines such as ALARA (As Low As Reasonably Achievable).
3. **Attitude Towards Radiation Safety**: This section evaluated participants' attitudes towards using radiation safety protocols and the importance of continuous education and training in radiation protection.
4. **Practice of Radiation Safety**: This section focused on the actual safety practices adopted by participants, such as using protective equipment, adherence to time and distance guidelines, and shielding techniques during radiological procedures.

Two radiation safety experts reviewed the questionnaire for content validity, and a pilot test with 20 radiologists ensured clarity and relevance. Cronbach's alpha was calculated for reliability, and a value of 0.84 indicated high internal consistency.

Data Collection Procedure

Before data collection, the study's objectives were explained to all participants, and written informed consent was obtained. Participation in the study was voluntary, and all responses were kept anonymous to maintain confidentiality. The questionnaires were distributed and collected in person by trained research assistants at each hospital and medical center. Participants were given sufficient time to complete the questionnaire, and the research assistants clarified ambiguities when necessary.

Statistical Analysis

Data were analyzed using SPSS version 23 software. Descriptive statistics , including means, standard deviations, frequencies, and percentages, were used to summarize demographic characteristics and KAP levels. Inferential statistics were used to explore relationships between KAP scores and demographic variables.

Knowledge Scores: Knowledge scores were categorized as poor, moderate, or good based on predefined cutoff values.

Attitude and Practice Scores: Similarly, attitude and practice scores were also categorized as poor, moderate, or good.

Chi-Square Tests: Chi-square tests assessed the association between categorical demographic variables (e.g., age group, gender, and education) and KAP scores.

ANOVA: Analysis of Variance (ANOVA) was used to compare mean KAP scores across different demographic groups.

Significance Level: A p-value of less than 0.05 was considered statistically significant for all analyses.

Ethical Considerations

Ethical approval for this study was obtained from the ethics committee of [Name of University]. Participation was voluntary, and

all participants were informed of their right to withdraw from the study at any time. Informed consent was obtained from each participant before data collection. All data were anonymized, and personal identifiers were removed to ensure confidentiality. The study adhered to the ethical principles outlined in the Declaration of Helsinki.

Limitations

Some limitations of the study include the reliance on self-reported data, which may introduce bias due to social desirability or recall errors. Additionally, the study was limited to a specific geographic region, and thus, the findings may not be generalizable to other populations.

Results

Demographic Characteristics of Participants. A total of 250 physicians working in radiology departments participated in the study. Most participants were male (60.8%), with females accounting for 39.2% of the sample. The age distribution showed that 22% of participants were between 20 and 30 years, 47.2% were between 31 and 40, and 30.8% were between 41 and 50. Most participants were married (73.6%), and 67.2% resided in urban areas. Regarding occupational status, 74.8% of participants were radiographers, 12.8% were radiology doctors, and 12.4% were other radiology staff. Most participants had a diploma degree (81.6%), and most worked in government hospitals (80.4%).

Knowledge of Radiation Safety

The knowledge of radiation safety among participants was categorized into poor, moderate, and good. Most participants had moderate knowledge of radiation safety (58.4%), with 35.2% demonstrating poor knowledge and only 6.4% exhibiting good knowledge. The mean knowledge score was 27.04 ± 4.29 (on a scale of 5-53).

Participants with 1-10 years of occupational experience showed a lower mean knowledge score (26.41 ± 4.85) compared to those with more than ten years of experience (28.05 ± 6.13) (p=0.02).

Significant associations were found between knowledge levels and alcohol consumption history (p=0.01), average working hours (p=0.004), and the number of patients diagnosed per day (p=0.03). However, no significant associations were observed between knowledge and variables such as gender, marital status, education level, or type of hospital. Attitude Towards Radiation Safety. The participants' attitudes toward radiation safety were also assessed and categorized into poor, moderate, and good levels. The majority of participants (64.4%) had a moderate attitude toward radiation safety, while 35.6% demonstrated a poor attitude. Based on the scoring system used, none of the participants exhibited a good attitude. The mean attitude score was 31.14 ± 3.23 (on a scale of 5-78).

A statistically significant relationship was found between age group and attitude (p=0.001), with participants in the 41-50 age group having a more positive attitude (mean score: 32.03 ± 4.32) than younger age groups.

Additionally, there was a significant association between occupational status and attitude (p=0.03), with radiology doctors showing a more favorable attitude towards radiation safety than radiographers and other radiology staff. No significant associations were found between attitude and variables such as gender, marital status, or education level.

Practice of Radiation Safety

Regarding radiation safety practices, most participants exhibited moderate levels of practice (88.8%), with only 6.4% displaying poor practices and 4.8% showing good practices. The mean practice score was 38.16 ± 6.71 (on a scale of 14-82). Participants working in private hospitals had significantly better practice scores (mean: 42.12 ± 8.67) compared to those in government hospitals (mean: 37.31 ± 6.03) ($p<0.0001$).

Additionally, there was a significant association between age group and practice ($p=0.03$), with participants aged 20-30 years demonstrating better safety practices (mean score: 40.07 ± 7.08) compared to older age groups.

Occupational experience also played a role in radiation safety practices, with participants having more than ten years of experience showing significantly better practice scores ($p=0.001$).

No significant associations were observed between practice scores and other variables such as gender, marital status, or education level.

Overall KAP Assessment

The overall assessment of knowledge, attitude, and practice (KAP) revealed that most participants exhibited moderate levels across all three domains: knowledge (58.4%), attitude (64.4%), and practice (88.8%). The results suggest that while participants know radiation safety principles, there is room for improvement, particularly in converting knowledge and attitudes into safer practices. Continuous education and training are recommended to enhance KAP levels among radiology professionals in Iraq.

Table 1. Radiation protection knowledge, attitude, and practice among the radiology staff

variable	Frequency (%)	Mean	SD
Knowledge level			
Poor (5-25)	88(35.2)	22.25	1.54
Moderate (25-35)	146(58.4)	28.47	2.72
Good (35-53)	16(6.4)	39.75	4.78
Total (5-53)	250(100)	27.04	4.29
Attitude			
Poor (5-29)	89(35.6)	26.84	2.02
Moderate (30-50)	161(64.4)	33.52	3.23
Good (51-78)	0(0)	-	-
Total (5-78)	250(100)	31.14	4.29
Practice			
Poor (14-29)	16(6.4)	26.93	1.61
Moderate (30-50)	222(88.8)	38.02	4.93
Good (51-82)	12(4.8)	55.66	3.11

Table 2. Radiation protection knowledge among the radiology staff

variable	characteristic	Frequency (%)	mean	SD	p-value
age group	20-30	55(22)	26.61	4.63	0.056
	31-40	118(47.2)	26.06	4.35	
	41-50	77(30.8)	28.88	6.89	
Gender	Male	152(60.8)	27.13	5.73	0.73
	Female	98(39.2)	26.90	4.97	
Marital status	Married	184(73.6)	27.39	5.66	0.09
	single	66(26.4)	26.10	4.68	
occupational	radiographer	187(74.8)	26.7	4.48	0.08
	Radiology Doctor	32(12.8)	27.21	5.24	
	others staff radiation workers	31(12.4)	29.03	9.37	
Residence	Urban	168(67.2)	26.98	5.82	0.75
	semi-Urban	82(32.8)	27.20	4.58	
Education	Diploma Degree	204(81.6)	27.04	4.99	0.47
	Bachelor Degree	20(8)	28.7	9.71	
	High Diploma Degree	18(7.2)	25.72	4.04	
	Master Degree	5(2)	28.4	5.81	
	Doctorate Degree	3(1.2)	25.33	2.08	
Type of hospital	Government	201(80.4)	27.11	4.84	0.14
	private	40(16)	27.52	8.02	
	Educational	9(3.6)	23.66	2.69	
Department	General x-ray	148(59.2)	27.02	6.03	0.96
	CT Scans unit	63(25.2)	26.57	4.25	
	fluoroscopy unit	4(1.6)	28	6.05	
	MRI unit	8(3.2)	26.37	4.68	
	Other units use X-ray	17(6.8)	27.58	5.22	
	mammography Unit	10(4)	27.1	5.02	
Smoking status	Never smoking	204(81.6)	26.68	5.36	0.07
	current Smoker	24(9.6)	28.7	5.82	
	Past smoker	22(8.8)	28.72	5.31	
Alcohol drinking History	Never drink	228(91.2)	26.88	5.38	0.01
	current drinker	6(2.4)	24.16	2.92	
	Past drinker	16(6.4)	3056	5.79	
Average working	1-5 hours	68(27.2)	25.45	3.55	0.004
	6-11 hours	182(72.8)	27.65	5.89	
Occupational Experience	1-10 years	152(60.8)	26.41	4.85	0.02
	more than ten years	98(39.2)	28.05	6.13	
Number of patients diagnosed/day	1-10 patients	40(16)	25.4	3.6	0.03
	more than ten patients	210(84)	27.37	5.68	

Table 3. Radiation protection attitude among the radiology staff

variable	characteristic	Frequency (%)	mean	SD	p-value
age group	20-30	55(22)	30.29	3.76	0.001
	31-40	118(47.2)	30.95	4.42	
	41-50	77(308)	32.03	4.32	
Gender	Male	152(60.8)	31.15	4.5	0.97
	Female	98(39.2)	31.13	3.96	
Marital status	Married	184(73.6)	31.28	4.44	0.37
	single	66(26.4)	30.74	3.82	
occupational	radiographer	187(74.8)	30.37	4.19	0.03
	Radiology Doctor	32(12.8)	32.5	4.02	
	other staff radiation workers	31(12.4)	32.22	4.77	
Residence	Urban	168(67.2)	31.08	4.53	0.75
	semi-Urban	82(32.8)	31.26	3.76	
Education	Diploma Degree	204(81.6)	31.04	4.34	0.58
	Bachelor Degree	20(8)	30.95	3.33	
	High Diploma Degree	18(7.2)	31.66	5.07	
	Master Degree	5(2)	31.6	3.78	
	Doctorate Degree	3(1.2)	35	0	
Type of hospital	Government	201(80.4)	31.19	4.37	0.52
	private	40(16)	31.22	3.87	
	Educational	9(3.6)	29.55	4.30	
Department	General x-ray	148(59.2)	31.53	4.39	0.39
	CT Scans unit	63(25.2)	30.44	4.01	
	fluoroscopy unit	4(1.6)	30	3.26	
	MRI unit	8(3.2)	29.12	2.35	
	Other units use X-ray	17(6.8)	31.17	4.91	
	mammography Unit	10(4)	31.8	4.61	
Smoking status	Never smoking	204(81.6)	31.12	4.16	0.278
	current Smoker	24(9.6)	30.25	5.91	
	Past smoker	22(8.8)	32.27	3.20	
Alcohol drinking History	Never drink	228(91.2)	31.21	4.22	0.05
	current drinker	6(2.4)	27	4.47	
	Past drinker	16(6.4)	31.75	4.64	
Average working	1-5 hours	68(27.2)	31.42	3.91	0.52
	6-11 hours	182(72.8)	31.03	4.43	
Occupational Experience	1-10 years	152(60.8)	30.92	4.63	0.30
	more than ten years	98(39.2)	31.48	3.68	
Number of patients diagnosed/day	1-10 patients	40(16)	30.77	4.36	0.55
	more than ten patients	210(84)	31.21	4.28	

Table 4. Radiation protection practice among the radiology staff

variable	characteristic	Frequency (%)	mean	SD	p-value
age group	20-30	55(22)	40.07	7.08	0.03
	31-40	118(47.2)	38.05	6.95	
	41-50	77(308)	36.96	5.77	
Gender	Male	152(60.8)	38.75	7.03	0.08
	Female	98(39.2)	37.25	6.11	
Marital status	Married	184(73.6)	37.69	6.55	0.06
	single	66(26.4)	39.46	7.02	
occupational	radiographer	187(74.8)	38.32	6.89	0.71
	Radiology Doctor	32(12.8)	38.1	6.86	
	others staff radiation workers	31(12.4)	37.22	5.44	
Residence	Urban	168(67.2)	38.61	6.71	0.13
	semi-Urban	82(32.8)	37.24	6.66	
Education	Diploma Degree	204(81.6)	37.9	6.87	0.27
	Bachelor Degree	20(8)	39.95	6.55	
	High Diploma Degree	18(7.2)	37.33	5.37	
	Master Degree	5(2)	41.4	4.21	
	Doctorate Degree	3(1.2)	43.66	3.21	
Type of hospital	Government	201(80.4)	37.31	6.03	<0.0001
	private	40(16)	42.12	8.67	
	Educational	9(3.6)	39.44	5.34	
Department	General x-ray	148(59.2)	37.41	6.45	0.21
	CT Scans unit	63(25.2)	38.61	6.41	
	fluoroscopy unit	4(1.6)	42	4.32	
	MRI unit	8(3.2)	41.5	4.14	
	Other units use X-ray	17(6.8)	39.17	8.48	
	mammography Unit	10(4)	40.5	9.96	
Smoking status	Never smoking	204(81.6)	37.76	6.38	0.13
	current Smoker	24(9.6)	39.62	7.92	
	Past smoker	22(8.8)	40.27	7.94	
Alcohol drinking History	Never drink	228(91.2)	38.11	6.63	0.14
	current drinker	6(2.4)	43.16	4.7	
	Past drinker	16(6.4)	36.93	8.03	
Average working	1-5 hours	68(27.2)	38.19	5.84	0.96
	6-11 hours	182(72.8)	38.15	7.02	
Occupational Experience	1-10 years	152(60.8)	39.28	7.04	0.001
	more than ten years	98(39.2)	36.41	5.78	
Number of patients diagnosed/day	1-10 patients	40(16)	39.8	6.38	0.09
	more than ten patients	210(84)	37.85	6.74	

Discussion:

This study aimed to assess the knowledge, attitude, and practice (KAP) of occupational radiation safety among physicians in Iraq's radiology departments. The findings comprehensively understand radiation safety awareness and behaviors among healthcare professionals routinely exposed to ionizing radiation. While the study revealed moderate knowledge, attitude, and practice levels, it highlighted significant gaps that warrant further attention.

Knowledge of Radiation Safety

Most participants in this study exhibited moderate knowledge about radiation safety, with only 6.4% demonstrating good knowledge. These results align with previous studies conducted in similar settings, which have also reported suboptimal levels of radiation safety knowledge among healthcare professionals. For instance, Seifi et al. (2019) found that radiation safety knowledge among nuclear medicine staff was insufficient, mainly due to inadequate ongoing training and a lack of awareness of ionizing radiation hazards. Similarly, Maharjan et al. (2020) concluded that radiology professionals need better radiation safety education and training.

In our study, significant associations were observed between knowledge levels and factors such as alcohol consumption history, occupational experience, and the number of patients diagnosed per day. These findings suggest that experience in radiology departments plays a critical role in enhancing knowledge, potentially due to greater exposure to radiation safety protocols over time. However, the lack of continuous education and formal training might explain why many participants still demonstrated only moderate knowledge levels. These findings are consistent with the work of Alreshidi (2020), who emphasized that medical students and professionals in clinical settings often lack comprehensive knowledge of radiation safety measures, particularly those related to advanced imaging technologies.

Attitude Towards Radiation Safety

Most participants also had a moderate attitude toward radiation safety. Interestingly, the study revealed no significant associations between demographic factors such as gender, marital status, or education level and attitude towards radiation safety. However, there was a significant relationship between attitude and age, with older participants (41-50 years) exhibiting a more positive attitude towards radiation safety than younger age groups. This finding might suggest that more experienced healthcare workers may better appreciate the importance of radiation protection over time.

In contrast, younger healthcare workers, who may have less practical experience with radiation exposure, might not fully comprehend the long-term risks associated with ionizing radiation. This mirrors the findings of Alsiddiky et al. (2021), who observed that younger healthcare professionals were less likely to prioritize radiation safety than their older counterparts. The moderate attitude scores observed in this study may also reflect the participants' limited access to radiation safety education and training, previously cited as a significant determinant of healthcare workers' attitudes toward safety (Mubashir et al., 2016).

Practice of Radiation Safety

In terms of practice, most participants demonstrated moderate radiation safety practices, with only a tiny fraction (4.8%) exhibiting good practices. This finding indicates that, while healthcare professionals are generally aware of radiation safety protocols, there may be barriers to translating this knowledge into consistent, safe practices. Several factors may contribute to these suboptimal practices, including workplace policies, lack of adequate personal protective equipment, and time constraints in busy clinical environments.

Interestingly, the study found significant associations between practice levels and factors such as age group, occupational experience, and type of hospital. Physicians working in private hospitals had significantly better practice scores than government hospitals. This may suggest that private institutions have stricter enforcement of radiation safety protocols or provide better access to protective equipment. This is consistent with the findings of Shah et al. (2011), who reported that radiation safety practices are often more stringent in private healthcare settings due to regulatory pressures and liability concerns.

The significant association between occupational experience and radiation safety practices observed in this study also suggests that healthcare professionals with more years of experience tend to adopt safer practices. This finding is supported by the work of Fatahi-Asl et al. (2013), who found that years of experience and continuous education were key factors influencing the implementation of safety protocols in radiology departments. However, younger professionals, particularly those with less than ten years of experience, exhibited poorer safety practices. This may reflect a gap in practical training and mentorship for younger radiology staff, highlighting the need for targeted interventions to improve safety practices among less experienced professionals.

Implications for Policy and Practice

The results of this study suggest several important implications for healthcare institutions, particularly those in Iraq, where the study was conducted. First, the moderate levels of knowledge, attitude, and practice observed in this study underscore the need for continuous education and training on radiation safety. Hospitals and medical centers should prioritize regular training sessions, workshops, and refresher courses for all staff working in radiology departments. In particular, efforts should be made to ensure that training is tailored to the needs of younger and less experienced healthcare professionals, who were found to have lower KAP scores.

Second, healthcare institutions should implement and enforce stricter radiation safety protocols. This includes ensuring the availability of personal protective equipment (PPE), such as lead aprons, thyroid shields, and lead glasses, and fostering a culture of safety that encourages the consistent use of protective measures. As noted in several studies, including Reagan et al. (2010), adherence to safety protocols is often hindered by the lack of access to proper equipment or time constraints. Addressing these barriers is critical to improving safety practices among healthcare professionals.

Lastly, the significant differences in radiation safety practices between private and government hospitals suggest that government institutions may need to adopt more stringent regulatory frameworks and oversight mechanisms. Policymakers should consider implementing national standards for

radiation safety and monitoring compliance through regular audits and inspections. This would help ensure that all healthcare professionals adhere to the highest radiation protection standards regardless of workplace setting.

Limitations and Future Research

This study had several limitations. First, using self-reported data may introduce bias, as participants may overestimate their knowledge or adherence to safety practices due to social desirability. Additionally, the study's cross-sectional design limits the ability to infer causality between demographic factors and KAP levels. Future studies should consider longitudinal designs to understand better the factors influencing changes in radiation safety awareness and behavior over time.

Moreover, this study was conducted in a specific geographic region, and the results may not be generalizable to other populations or countries. Further research is needed to explore KAP levels among healthcare professionals in other regions, particularly in low- and middle-income countries, where access to radiation safety training and resources may be more limited.

Conclusion

This study provides valuable insights into the knowledge, attitude, and practice of occupational radiation safety among physicians working in radiology departments in Iraq. While moderate levels of KAP were observed, there is a clear need for enhanced training and stricter enforcement of safety protocols to protect healthcare professionals and patients from the harmful effects of ionizing radiation. By addressing the gaps identified in this study, healthcare institutions can significantly improve radiation safety standards and foster a safer working environment for all radiology staff.

Declaration

Ethical Approval and Consent to Participate:
This study was conducted according to the ethical standards of the Declaration of Helsinki and was approved by the ethics committee of [Sulaimani Polytechnic University]. Before participating in the study, all participants provided written informed consent.

Consent for Publication: Not applicable. This manuscript does not contain any individual personal data.

Availability of Data and Materials: The datasets used and analyzed during the current study are available from the corresponding author upon reasonable request.

Competing Interests: The authors declare that they have no competing interests.

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Authors 'Contributions:

[salah Qadir Mahmood] conceived and designed the study. [Bakhtyar Kamal Talabany] and [Taib Ahmad Hama-Soor] contributed to data collection and analysis. All authors contributed to the manuscript writing and approved the final version.

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