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"STATUS OF SOME BIOCHEMICAL PARAMETERS AMONGWORKERS IN THE RADIOLOGY UNIT IN IMO STATE, NIGERIA."

STATUS OF SOME BIOCHEMICAL PARAMETERS AMONGWORKERS IN THE RADIOLOGY UNIT IN IMO STATE, NIGERIA.

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ABSTRACT

Background: Medical workers in the radiology unit are frequently exposed to ionizing radiation, raising concerns about its potential impact on renal and electrolyte balance.

Objective: This research was a cross-sectional study aimed at determining the levels of some biochemical parameters among workers in the radiology unit, in Imo State, Nigeria.

Method: This study was carried out at three major hospitals in Imo State (Federal Teaching Hospital, Imo specialist hospital, Owerri and Imo State Teaching Hospital Orlu). A total of 40 individuals which comprised of 40 workers exposed to radiation and 40 non-radiation workers were recruited for the study. Informed consent was obtained from each patient, and questionnaires were administered, after which blood sample was collected. The procedure was carried out at the hospital laboratory using standard laboratory procedures. The data were analyzed using SPSS version 27.

Results: There was a significant increase in the mean values of creatinine (1.23±0.51)mg/dl and urea (42.86±9.56)mg/dl in workers exposed to radiation when compared to controls

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(0.84±0.45)mg/dl and (28.82±5.23)mg/dl (p=0.001 and p=0.000), anda significant decrease in the mean value of potassium in those exposed (3.83±0.56)mmol/l when compared to controls (4.37±0.49)mmol/l(p=0.000).During 3-10 years of exposure, Creatinnie (0.97±0.46)mg/dl, Urea (36.72±11.37)mg/dl and Chloride (99.58±1.55) mmd/l showed no significant difference when compared to 11-18years (1.15±0.43)mg/dl, (43.58±8.47)mg/dl, and (99.94±1.46) mmd/l and >18years exposure (1.59±0.61)mg/dl, (46.64±5.67) mg/dl and (100.39±4.36)mmd/l (f=3.68; p=0.055; f= 3.11, p=00.57; and f=0.28, p=0.756). Sodium (139.43±8.61) mmd/l during 11 year of exposure showed no significant increase when compared to 3-10 years(135.75± 4.12) and > 18 years of exposure (138.61±7.04) mm/dl (f=0.91, p=0.414). Bicarbonate (27.79±4.33) mmol/l during >18years exposure showed no significant increase when compared to 3-10years (26.29±5.50)mmd/l and 11-18years (25.10±5.04)mmol/l respectively (f=0.77, p=0.471).There was a non-significant difference in the mean values of creatinnine (1.25±0.52) mg/dl, potassium (3.84±0.59) mmol/l and bicarbonate (26.44±5.26) mmol/l in male workers exposed to radiation when compared to females (1.14±0.59) mg/dl, (3.66±0.40)mmol/l, (22.9±2.43) mmol/l respectively (t=1.05, p=0.492; t=0.42, p=0.080 and t=0.51, p=0.521).The mean values of Urea (42.46±9.94)mg/dl, Sodium (137.89±6.70) mmo/l and Chloride (99.76±2.10)mmol/l in males were insignificantly lower when compared to females (45.66±6.38)mg/dl, (140.66±10.96)mmol/l and (101.66±2.97) mmo/l(t=0.44, p=0.126; t=1.45, p=0.542; t=1.43,p=0.810; t=2.22, p=0.432; t1.07,p=0.518, and t=0.48, p=0.151).The mean values of potassium (3.84±0.61)mmol/l, chloride (99.87±1.73)mmol/l and bicarbonate (23.66±3.44)mmol/l in workers exposed to radiation of ages (35-50)yrs were non-significantly raised when compared to those of ages >50 yrs (3.76±0.51) mmol/l, (99.48±3.37) mmol/l and (22.07±1.58) mmol/l (t=0.65, p=0.674; t = 1.79, p = 0.632, and t=4.89 p=0.612), while that of Creatinine (1.17±0.48) mg/dl, Urea (40.60±10.46) mg/dl and Sodium (137.45±6.68) mmol/l, in workers exposed to radiation of ages (35-50) yrs were not significantly lowered when compared to those of ages, >50yrs (1.35±0.59)mg/dl,(47.40±4.94)mg/dl and (140.05±8.13)mmol/l (t=0.43, p=0.301; t=0.69 , p=0.321 and t=0.79, p=0.290).

Conclusion: This study has shown that radiation alters the levels of creatinine, urea and potassium, but no significant effect on sodium, potassium, chloride and bicarbonate.These findings underscore the importance of routine renal function assessments for those exposed to radiation in the radiology unit.

Keywords: Urea, Creatinine, Electrolytes, Radiation.

1. INTRODUCTION

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Medical workers in the radiology unit are routinely exposed to ionizing radiation, which may have deleterious effects on various biochemical and physiological parameters. Chronic exposure to low-dose radiation has been associated with oxidative stress, DNA damage, and alterations in cellular metabolism (1,2). Among the biochemical parameters that may be affected are urea, creatinine, and electrolytes, which are critical for kidney function and overall homeostasis (3,4). In Nigeria, where radiation safety regulations may not always be strictly enforced, radiographers working in diagnostic imaging centers may face significant occupational exposure risks (5).

Ionizing radiation generates reactive oxygen species (ROS) that can damage cellular components, including lipids, proteins, and nucleic acids (6). The kidneys, being highly vascularized organs, are particularly susceptible to oxidative stress, which may lead to alterations in renal function markers such as urea and creatinine (7). Elevated serum urea and creatinine levels often indicate impaired renal filtration capacity, which may be exacerbated by chronic radiation exposure (8). Furthermore, radiation-induced nephrotoxicity has been reported in individuals

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exposed to both low and high doses of radiation, suggesting that even occupational exposure may have long-term health implications (9).

Electrolytes, including sodium (Na^+), potassium (K^+), and chloride (Cl^-), play essential roles in maintaining osmotic balance, nerve transmission, and muscle function (10). Disruptions in electrolyte homeostasis can lead to severe physiological consequences such as hypertension, arrhythmias, and neuromuscular dysfunction (11). Studies have shown that exposure to radiation may alter electrolyte balance by affecting the function of ion transporters and renal reabsorption processes (12). For instance, research on radiation-exposed workers in nuclear facilities has demonstrated significant variations in serum sodium and potassium levels, potentially due to radiation-induced damage to renal tubules and endocrine regulation mechanisms (13).

Despite the growing body of evidence on radiation-induced biochemical changes, there is limited data on how occupational radiation exposure affects medical workers exposed to radiation in Nigeria. Imo State, located in southeastern Nigeria, has a high concentration of diagnostic imaging centers, increasing the likelihood of

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cumulative radiation exposure among workers exposed to radiation (14). However, the extent to which this exposure influences renal function and electrolyte balance remains unclear. This study aims to evaluate the biochemical status of urea, creatinine, sodium, potassium, and chloride in medical workers exposed to radiation in Imo State. The findings will contribute to understanding the occupational health risks associated with diagnostic radiation exposure and may inform policies to enhance radiation safety practices in Nigeria.

2. MATERIALS AND METHODS

2.1 Study Area

The study wasconducted at the Federal Teaching Hospital,Imo Specialist Hospital. Owerri, and Imo State University Teaching, Hospital (IMSUTH) Orlu, Imo State.

2.2 Study Design

This research was a cross-sectional study carried out at three major hospitals in Imo State (Federal University Teaching Hospital, Owerri, Imo specialist hospital, Umuguma, Owerri and Imo State Teaching Hospital, Orlu). A total of 40

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individuals which comprised of 40 workers exposed to radiation and 40 non - radiation workers were recruited for the study. Informed consent and questionnaires were administered before sample collection, and five milliliters of venous blood was collected from each subject, and dispensed into plain container, for the estimation of the electrolytes. The procedure was carried out using standard laboratory procedures, and results of the tests were analyzed using SPSS version 27

2.3 Method of Recruitment

Medical workers exposed to radiation between the ages of 30 - 60yrs who were working with the three hospitals and gave their informed consents were recruited for the study. Age-matched non-exposed subjects served as controls. Strict confidentiality was maintained.

2.4 Study Population

A total of forty (40) workers exposed to radiation and an equivalent number of age - matched non-exposed subjects consisted the study population.

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2.5 Ethical Approval

Ethical approval was obtained from the ethics committee of Federal Teaching Hospital, Owerri, Imo state Teaching Hospital, Orlu and Imo state Specialist Hospital Umuguma. All study participants who gave their informed consent were enrolled in the study before sample collection.

2.6Laboratory Analysis

The determination of Urea was determined using Abbott Architect c16000, which uses the chemiluminescent microparticle immunoassay (CMIS). The resulting chemiluminescent reaction is measured as a relative light unit (RLU). Creatinine was also determined using Abbott Architect c1 6000, while **the electrolytes** were determined using the audicom (AC9803) electrolyte analyzer.

2.7 Statistical Analysis

The statistical analysis was carried out using SPSS version 27 (statistical packages for social sciences). All values were expressed as mean± standard deviation. The student-t-test and Pearson correlation were used to determine the differences in the

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experimental variables. The tests with a probability P≤0.05 were considered statistically significant.

3.RESULTS

Table 1: Mean Values of Creatinine, Urea, Sodium, Potassium, Chloride and Bicarbonate in workers Exposed to Radiation (Test) and Non-exposed Subjects (Control). (Mean ±SD).

There was a significant increase in the mean values of creatinine (1.23±0.51)mg/dl and urea (42.86±9.56)mg/dl in workers exposed to radiation when compared to controls (0.84±0.45)mg/dl and (28.82±5.23)mg/dl(t=3.54,p=0.001 andt=7.12, p=0.000)

Potassium levels in those exposed(3.83±0.56)mmol/l were significantly lowered when compared to controls (4.37±0.49)mmol/l(t= 4.50 ,p=0.000). There was no si.89±2.17)mmol/l and bicarbonate (26.07±5.15)mmol/l in workers exposed to radiation when compared to controls (136.62±7.77)mmol/l, (99.75±1.95)mmol/l and a significant difference in the mean values of sodium (138.49±7.15)mmol/l, chloride (996.02±5.22)mmol/l(t= 1.12 ,p=0.265,t=0.31 , p=0.758 andt=0.48, p=0.633).

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Parameter	Test	Control	t-value	p-value
Creatinine (mg/dl)	1.23±0.51	0.84±0.45	3.54	0.001*
Urea (mg/dl)	42.86±9.56	28.82±5.23	7.12	0.000*
Sodium (mmol/L)	138.49±7.15	136.62±7.77	1.12	0.265
Potassium (mmol/L)	3.83±0.56	4.37±0.49	4.50	0.000*
Chloride (mmol/L)	99.89±2.17	99.75±1.95	0.31	0.758
Bicarbonate (mmol/L)	26.07±5.15	26.02±5.22	0.48	0.633

KEY:

*: Significant p value

Table 2: Comparison of the Mean Levels of Creatinine, Urea, Sodium, Potassium, Chloride and Bicarbonate in Workers exposed to Radiation based on Duration of Exposure (Mean±SD).

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During 3-10 years of exposure, Creatinine(0.97±0.46)mg/dl, Urea(36.72±11.37)mg/dl and Chloride (99.58±1.55) mmd/l showed no significant difference when compared to 11-18years(1.15±0.43)mg/dl, (43.58±8.47)mg/dl, and (99.94±1.46) mmd/l and>18years exposure (1.59±0.61)mg/dl, (46.64±5.67)mg/dl and (100.39±4.36)mmd/l (f=3.68; p=0.055; f= 3.11, p=00.57; and f=0.28, p=0.756).Sodium(139.43±8.61) mmd/l during 11 year of exposure showed no significant increase when compared to 3-10 years(135.75± 4.12) and > 18 years of exposure (138.61±7.04)mm/dl(f=0.91, p=0.414)

Bicarbonate(27.79±4.33) mmol/l during >18years exposure showed no significant increase when compared to 3-10years(26.29±5.50)mmd/l and 11-18years(25.10±5.04)mmol/l respectively (f=0.77, p=0.471).

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Parameter	(3-10)yrs	(11-18)yrs	(>18)yrs	f-value	p-value
Creatinine (mg/dl)	0.97±0.46	1.15±0.43	1.59±0.61	3.68	0.055
Urea (mg/dl)	36.72±11.37	43.58±8.47	46.64±5.67	3.11	0.057
Sodium (mmol/L)	135.75±4.12	139.43±8.61	138.61±7.04	0.91	0.414
Potassium (mmol/L)	4.12±0.66	3.78±0.41	3.69±0.54	1.97	0.154
Chloride (mmol/L)	99.58±1.55	99.94±1.46	100.39±4.36	0.28	0.756
Bicarbonate (mmol/L)	26.29±5.50	25.10±5.04	27.79±4.33	0.77	0.471

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Table 3: Comparison of the Mean Levels of Creatinine, Urea, Sodium, Potassium, Chloride and Bicarbonate in Workers Exposed to Radiation based on Sex.

There was a non-significant difference in the mean values of creatinine (1.25±0.52)mg/dl, potassium (3.84±0.59)mmol/l and bicarbonate (26.44±5.26)mmol/l in male workers exposed to Radiation when compared to females(1.14±0.59)mg/dl, (3.66±0.40)mmol/l, (22.9±2.43) mmol/l respectively (t=1.05, p=0.492; t=0.42, p=0.080 andt=0.51, p=0.521).

The mean values of Urea(42.46±9.94)mg/dl, Sodium(137.89±6.70)mmo/l and Chloride(99.76±2.10)mmol/lin males were insignificantly lower when compared to females (45.66±6.38)mg/dl, (140.66±10.96)mmol/l and (101.66±2.97) mmo/l(t=0.44, p=0.126; t=1.45, p=0.542; t=1.43,p=0.810; t=2.22, p=0.432; t1.07,p=0.518, and t=0.48, p=0.151).

Parameter	Male	Female	t-value	p-value

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Creatinine (mg/dl)	1.25±0.52	1.14±0.59	1.05	0.492
Urea (mg/dl)	42.46±9.94	45.66±6.36	2.22	0.432
Sodium (mmol/L)	137.89±6.70	140.66±10.96	1.07	0.518
Potassium (mmol/L)	3.84±0.59	3.66±0.40	0.42	0.080
Chloride (mmol/L)	99.76±2.10	101.66±2.97	0.48	0.151
Bicarbonate (mmol/L)	26.44±5.26	22.91±2.43	0.51	0.521

Table 4: Mean Values of Creatinine, Urea, Sodium, Potassium, Chloride and Bicarbonate based on Age.

The mean values of potassium (3.84±0.61)mmol/l, chloride (99.87±1.73)mmol/l and bicarbonate (23.66±3.44)mmol/l inworkers exposed to radiation of ages (35-50)yrs were non-significantly raised when compared to those of ages>50 yrs (3.76±0.51)mmol/l, (99.48±3.37)mmol/l and (22.07±1.58)mmol/l (t=0.65, p=0.674; t = 1.79, p = 0.632, and t=4.89 p=0.612), while that of Creatinine (1.17±0.48)mg/dl, Urea (40.60±10.46)mg/dl and Sodium (137.45±6.68)mmol/l, in the exposed of ages (35-50)yrs were not significantly lowered when compared tothose exposed ofages,>50yrs(1.35±0.59)mg/dl,(47.40±4.94)mg/dl and (140.05±8.13)mmol/l (t=0.43, p=0.301; t=0.69 , p=0.321 and t=0.79, p=0.290).

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Parameter	(35-50)yrs	>50 yrs	t-value	p-value
Creatinine (mg/dl)	1.17±0.48	1.35±0.59	0.43	0.301
Urea (mg/dl)	40.60±10.46	47.40±4.94	0.69	0.321
Sodium (mmol/L)	137.45±6.68	140.05±8.13	0.79	0.290
Potassium (mmol/L)	3.84±0.61	3.76±0.51	0.65	0.674
Chloride (mmol/L)	99.87±1.73	99.48±3.37	1.79	0.632
Bicarbonate (mmol/L)	23.66±3.44	22.07±1.58	4.89	0.612

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4. DISCUSSION

The findings of this study indicate that medical workers exposed to ionizing radiation in Imo State, Nigeria, had significantly higher urea levels compared to thenon-exposed. This suggests potential radiation-induced alterations in renal function, as urea is a key marker of kidney filtration efficiency. Previous studies have reported similar findings, where prolonged occupational exposure to ionizing radiation was associated with elevated urea levels, possibly due to subclinical nephrotoxicity and oxidative stress affecting renal tissues (15,16). Radiation exposure generates reactive oxygen species (ROS), which can damage renal cells and impair glomerular function, leading to reduced urea clearance and subsequent accumulation in the bloodstream (17).

Conversely, potassium levels were significantly lower in those exposed to radiation than in the control group. This finding is in agreement with research by Prasad et al. (18), who observed hypokalemia in radiation-exposed workers, likely due to radiation-induced damage to renal tubular cells that regulate potassium reabsorption. Ionizing radiation has been reported to influence the activity of

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Na^+ /K^+ -ATPase pumps, which plays a crucial role in maintaining intracellular and extracellular potassium balance (19). Moreover, studies on radiation-exposed populations have shown alterations in potassium levels due to potential effects on the endocrine system, particularly the adrenal glands, which regulate potassium homeostasis through aldosterone secretion (20).

In contrast, sodium, chloride, and bicarbonate levels did not differ significantly between those exposed and the non-exposed. These findings are consistent with those of Kadhim et al. (21), who reported no significant variations in these electrolytes among occupationally exposed individuals. This may indicate that radiation exposure at the observed levels does not significantly impair sodium and chloride homeostasis, possibly due to compensatory mechanisms in the kidneys that maintain electrolyte balance despite radiation-induced stress. However, some studies have found contradictory results, with reports of sodium retention and chloride imbalances in radiation workers, suggesting that individual susceptibility and exposure dose may influence these biochemical outcomes (22).

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When the biochemical parameters were analyzed based on the duration of radiation exposure, no significant differences were observed between those exposed with 3–10 years, 11–18 years, and more than 18 years of experience. This contrasts with previous studies that have demonstrated cumulative radiation effects over time, leading to progressive biochemical alterations (23). The lack of significant differences in this study may be attributed to variations in individual radiation protection practices, differences in exposure levels across workplaces, and the potential for adaptive physiological responses that mitigate long-term effects (24).

Similarly, no significant differences were found when comparing biochemical parameters based on age groups (35–50 years and >50 years). This aligns with findings from Kumar et al. (25), who reported that renal and electrolyte function remained relatively stable across different age groups of radiation workers, provided that exposure levels were within occupational safety limits. However, some studies suggest that older individuals may be more susceptible to radiation-induced nephrotoxicity due to age-related decline in renal function and reduced antioxidant capacity (26). The absence of such findings in this study suggests that

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occupational exposure levels may not be sufficient to cause age-dependent biochemical alterations or that radiographers adopt adequate protective measures that minimize age-related susceptibility.

Furthermore, there were no significant sex-based differences in biochemical parameters among workers exposed to radiation. This is in agreement with studies by Chang et al. (27) and Nuraeni et al. (28), who found that sex did not significantly influence renal and electrolyte parameters in radiation-exposed workers. While some research has indicated that hormonal differences between males and females might influence susceptibility to radiation-induced oxidative stress (29), the lack of significant sex-related variations in this study suggests that both male and female workers exposed to radiation may experience similar exposure effects and physiological responses.

Overall, the findings of this study suggest that while radiation exposure may impact renal function by elevating urea levels and reducing potassium levels, the effects on other biochemical parameters remain minimal. The absence of significant differences based on exposure duration, age, or sex suggests that either

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the exposure levels are within tolerable limits or that individual adaptive mechanisms mitigate potential damage. However, further longitudinal studies with larger sample sizes and detailed radiation dose assessments are necessary to confirm these findings and establish long-term occupational health risks among medical workers exposed to radiation in Nigeria

5. CONCLUSION

This study found significantly elevated creatinine and urea levels and decreased potassium levels in medical workers exposed to radiation compared to controls, suggesting a possible impact of chronic low-dose radiation exposure on renal function and electrolyte balance. However, sodium, chloride, and bicarbonate levels remained unchanged. These findings underscore the importance of routine renal function assessments for workers exposed and further research into the long-term effects of occupational radiation exposure. Implementing preventive measures and early detection strategies could help mitigate potential health risks associated with prolonged radiation exposure in medical imaging professionals.

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REFERENCES

1. Hall EJ, Giaccia AJ. Radiobiology for the Radiologist. 7th ed. Philadelphia: Lippincott Williams & Wilkins; 2012.

2. Mettler FA, Upton AC. Medical Effects of Ionizing Radiation. 3rd ed. Saunders Elsevier; 2008.

3. Raza SK, Naqvi SA, Rehman AU. Effects of ionizing radiation on kidney function parameters in radiology workers. Int J Radiat Res. 2020;18(4):789-95.

4. Al-Hussaini M, Al-Nimer M, Al-Khazraji B. Assessment of renal function and electrolytes in radiation workers. J Occup Med Toxicol. 2016;11(1):23

5. Akpochafor MO, Uduma-Olugu NI, Adeneye SO. Radiation protection practices among radiographers in Nigeria: A survey. Radiography. 2019;25(3):e86-91.

6. Yamada T, Makita Y, Nagai Y. Oxidative stress and renal dysfunction in radiation-exposed workers. Free Radic Biol Med. 2018;115:83-9.

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7. Kumar S, Venkatesh P, Kulkarni S. Renal biomarkers in radiation workers: A study on oxidative damage. J Nephrol. 2017;30(4):563-70.

8. Prasad V, Mohammad A, Kumar R. Radiation nephropathy and biochemical alterations: A clinical evaluation. Int J Nephrol. 2015;2015:567920.

9. Kadhim M, Salih T, Al-Tameemi R. Chronic exposure to ionizing radiation and renal function impairment: A meta-analysis. J Environ Radioact. 2020;221:106336.

10. Guyton AC, Hall JE. Textbook of Medical Physiology. 13th ed. Philadelphia: Elsevier; 2016.

11. Abdulhakeem M, Oduwole O, Adeniyi S. Radiation exposure and electrolyte imbalances among healthcare workers. Med Phys. 2019;46(5):1256-62.

12. Chang H, Lee M, Kim S. Ionizing radiation and its effect on serum electrolytes in occupationally exposed workers. Radiat Res. 2017;188(3):356-64.

13. Nuraeni W, Setiawan D, Rahman F. Electrolyte disturbances in radiation workers: A cross-sectional study. J Occup Health. 2021;63(1):e12238.

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(ISSN: 2814-2098) Nnadozie Agatha C [1*]

https://ijojournals.com/ Volume 08 || Issue 05 || May, 2025 ||

14. Eze CU, Okoye GC, Agwu KK. Radiation protection awareness among radiographers in southeastern Nigeria. Niger J Clin Pract. 2018;21(2):208-14.

15. Yamada T, Makita Y, Nagai Y. Oxidative stress and renal dysfunction in radiation-exposed workers. Free Radic Biol Med. 2018;115:83-9.

16. Raza SK, Naqvi SA, Rehman AU. Effects of ionizing radiation on kidney function parameters in radiology workers. Int J Radiat Res. 2020;18(4):789-95.

17. Hall EJ, Giaccia AJ. Radiobiology for the Radiologist. 7th ed. Philadelphia: Lippincott Williams & Wilkins; 2012.

18. Prasad V, Mohammad A, Kumar R. Radiation nephropathy and biochemical alterations: A clinical evaluation. Int J Nephrol. 2015;2015:567920.

19. Al-Hussaini M, Al-Nimer M, Al-Khazraji B. Assessment of renal function and electrolytes in radiation workers. J Occup Med Toxicol. 2016;11(1):23.

20. Abdulhakeem M, Oduwole O, Adeniyi S. Radiation exposure and electrolyte imbalances among healthcare workers. Med Phys. 2019;46(5):1256-62.

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https://ijojournals.com/ Volume 08 || Issue 05 || May, 2025 ||

21. Kadhim M, Salih T, Al-Tameemi R. Chronic exposure to ionizing radiation and renal function impairment: A meta-analysis. J Environ Radioact. 2020;221:106336.

22. Nuraeni W, Setiawan D, Rahman F. Electrolyte disturbances in radiation workers: A cross-sectional study. J Occup Health. 2021;63(1):e12238.

23. Eze CU, Okoye GC, Agwu KK. Radiation protection awareness among radiographers in southeastern Nigeria. Niger J Clin Pract. 2018;21(2):208-14.

24. Mettler FA, Upton AC. Medical Effects of Ionizing Radiation. 3rd ed. Saunders Elsevier; 2008.

25. Kumar S, Venkatesh P, Kulkarni S. Renal biomarkers in radiation workers: A study on oxidative damage. J Nephrol. 2017;30(4):563-70.

26. Chang H, Lee M, Kim S. Ionizing radiation and its effect on serum electrolytes in occupationally exposed workers. Radiat Res. 2017;188(3):356-64.

IJO - INTERNATIONAL JOURNAL OF HEALTH SCIENCES AND NURSING

(ISSN: 2814-2098) Nnadozie Agatha C [1]*

https://ijojournals.com/ Volume 08 || Issue 05 || May, 2025 ||

27. Guyton AC, Hall JE. Textbook of Medical Physiology. 13th ed. Philadelphia: Elsevier; 2016.

28. Nuraeni W, Setiawan D, Rahman F. Gender differences in radiation-induced biochemical alterations: A comparative study. J Radiat Biol. 2022;98(1):45-53.

29. Umegbolu EI, Onwukwe OS, Agbaedeng TA. Gender-based susceptibility to radiation effects: A review of hormonal influences. J Biomed Sci. 2020;27(1):14.