

## A cross-sectional study about Anaesthetic drugs complication in patients with chronic kidney diseases in Tripoli. Libya

Aisha Ashammam<sup>1</sup>, Emhamed Boras<sup>2</sup>, Omro A. Aburas<sup>1\*</sup>

1. Higher Institute of Science and Medical Technology, Pharmacy Department, Tripoli/Abusalim.
2. Libyan Academy of postgraduate Studies, Life Science Department, Tripoli/ Janzor

### ABSTRACT

Chronic diseases are long-term health conditions that last a long time. They include conditions such as heart disease, cancer, diabetes, and chronic respiratory diseases. These diseases often develop slowly over time and can have a significant impact on quality of life. The seriousness of chronic diseases is exacerbated by their complex and multifactorial nature. according to international health reports such as those of the World Health Organization. At the global level, and through the results of epidemiological studies, it is estimated that about 10% of the world's adult population may suffer from some form of chronic kidney disease. The aim of this study appears to investigate the demographics and kidney disease history of patients with chronic kidney disease to examine the anesthesia management practices for patients with kidney disease, including the type of anesthesia used to gather opinions from general physicians on physiological response differences in renal failure patients and anesthetic considerations.

**Material and methods.** A cross-sectional study was conducted at at Tripoli medical center hospital, Tripoli central hospital and Tripoli center hospital for dialysis in Tripoli, Libya. The study consisted of two groups: 25 patients with chronic kidney disease or kidney failure who had undergone surgery requiring anesthesia. 25 anesthesia Physicians who manage patients with kidney failure. The results of this study is shown all patients in this sample have a formal diagnosis of chronic kidney disease or kidney failure, indicating that the sample consists entirely of patients with a confirmed diagnosis. The majority of patients (52%) have been recently diagnosed with kidney disease, while about a third (32%) have been living with the condition for an extended period. All patients in this sample have undergone surgery requiring anesthesia since being diagnosed with kidney disease, indicating that surgery is a common experience among patients with kidney disease.

**In Conclusion,** we concluded that the results for the ages of patients ranged from 20 to 89 years, and we note that the age group between 50 to 59 years is the most susceptible to kidney failure, and males had a much higher rate of kidney failure compared to females at 56.0%, where the majority of patients were diagnosed with kidney disease recently, where about a third had been suffering from kidney disease for a long time, and the patients underwent surgery that required anesthesia, either general anesthesia, spinal anesthesia, or local anesthesia.

**KEYWORDS:** *Anesthetic drugs, Inhalational anesthetic, compliance, kidney disease*

## INTRODUCTION

Chronic diseases, long-term health conditions often develop slowly over time and can have a significant impact on quality of life [1]. The seriousness of chronic diseases is exacerbated by their complex and multifactorial nature [2]. Addressing this major public health challenge requires a comprehensive, evidence-based approach that focuses on prevention, early detection, effective management, and innovation in care delivery. Chronic diseases are very serious and concerning, and continued research, policy interventions, and increased focus on chronic disease management are critical to reducing the devastating individual and societal impacts of these widespread and life-altering conditions [3]. In this research, we will discuss a study on kidney failure Kidney failure patients and how to deal with them. Also, regarding anesthesia, kidney patients may be subjected to some surgical operations and may need anesthesia. It is important to know the effect of anesthesia on them, how to deal with them, and the appropriate doses for them. Among these diseases, we will talk about chronic kidney failure and how to deal with patients during operations, according to international health reports such as those of the World Health Organization. At the global level, and through the results of epidemiological studies, it is estimated that about 10% of the world's adult population may suffer from some form of chronic kidney disease. However, these numbers can change based on new factors and data, and one of the things that patients with kidney failure suffer from is problems with anesthesia [4]. Chronic kidney disease affects the lives of many individuals around the world, and may increase the risk and complexity of surgical procedures that require anesthesia. Anesthesia, whether general or local, carries special risks for this group of patients due to limited kidney function that impairs their ability to filter drugs and maintain fluid and electrolyte balance. The main problem regarding the effect of anesthetic drugs on chronic kidney disease (CKD) is the altered pharmacokinetics and Pharmacodynamics of these drugs in the CKD population [5]. The kidneys are a pair of vital organs located in the lower back, just above the waist. These bean-shaped organs are responsible for a wide range of basic functions These functions include filtration, reabsorption, excretion, regulation of fluid and electrolyte balance, regulation of blood pressure, hormone production, and acid-base balance to maintain overall body health and balance [1], [6]. Healthy kidneys filter about a half cup of blood every minute, removing wastes and extra water to make urine. The urine flows from the kidneys to the bladder through two thin tubes of muscle called ureters, one on each side of your bladder. and the kidney participates in the control of the volume of various body fluids, fluid osmolality, acid-base balance, various electrolyte concentrations, and removal of toxins [7]. Each kidney consists of an outer cortex and an inner medulla. The functional units of the kidney are called nephrons, and there are more than one million nephrons in each kidney. Each nephron consists of a glomerulus, a network of small blood vessels, and a renal tubule. The medulla contains renal

pyramids, which are groups of ducts that drain urine into the renal pelvis, the renal pelvis then directs urine through the ureters to the bladder for storage and eventual excretion from the body [1], [8]. is a disorder resulting from the dysfunction of the kidneys. The normal, healthy kidney works as a vital filter for the body, maintains the balance of body fluids, chemicals and blood acidity, and produces hormones that control the production of red blood cells and bone growth. Kidney failure leads to It leads to the accumulation of waste products in various body tissues, and it affects all age groups, especially the elderly. Diabetes: Diabetic nephropathy is the leading cause of kidney failure. Hypertension: Uncontrolled high blood pressure can damage the kidneys over time. Glomerulonephritis: Inflammation of the glomeruli, the filtering units of the kidney Polycystic kidney disease: A genetic disorder characterized by the growth of cysts in the kidneys chronic kidney disease: Progressive and irreversible loss of kidney function [4], [9]. Fatigue and weakness, Decreased urine output or no urine output, Swelling in the legs, ankles, and feet, Nausea and vomiting, Loss of appetite, Confusion and difficulty concentrating, Muscle cramps and bone pain [5], [10]. Dialysis: Hemodialysis: Filtering the blood through a machine - Peritoneal dialysis: Using the lining of the abdomen to filter the blood. Kidney transplantation: Replacing the failed kidney with a healthy one from a donor. Conservative management: Controlling symptoms and slowing the progression of kidney diseases Effective management of kidney failure aims to improve the patient's quality of life and prevent further deterioration of kidney function [11]. Anesthesia is a medical procedure that induces a state of temporary unconsciousness, insensitivity to pain, and muscle relaxation The primary purpose of anesthesia is to prevent patients from feeling pain and discomfort during surgical, obstetric, or other medical procedures [6]. This type of anesthesia induces a complete loss of consciousness, where the patient is unaware of their surroundings and unable to respond to stimuli [7]. Regional anesthesia involves the injection of anesthetic drugs near a specific group of nerves to numb a particular area of the body [8]. Nerve blocks: injecting anesthetic near specific nerves Epidural Anesthesia: An anesthetic is injected into the epidural space of the spinal column, commonly used during childbirth and lower limb surgeries [9]. Spinal Anesthesia: Involves injecting anesthetic into the cerebrospinal fluid in the spinal canal, typically used for lower abdominal, pelvic, and lower limb surgeries [10]. Local anesthesia is the numbing of a small, specific area of the body, such as the skin or a specific muscle group [11]. involves the disruption of pain signal transmission from the site of injury or surgical intervention to the brain The specific mechanisms of action vary depending on the type of anesthesia [6]. It is important to note that the effect of anesthesia on chronic diseases can be complex and may vary depending on the specific patient, the surgical procedure, and the anesthetic management. A thorough preoperative assessment, close monitoring during the preoperative period, and

individualized anesthetic management are crucial to minimize the risks and optimize the outcomes for patients with chronic diseases. In patients with kidney dysfunction, the reduced GFR and impaired renal clearance can lead to the accumulation of anesthetic drugs and their metabolites. This can result in prolonged duration of action and increased risk of adverse effects, requiring careful dose adjustments [12].

**MATERIALS AND METHODS**

**PLACE OF STUDY**

A cross-sectional study was conducted at Tripoli medical center hospital, Tripoli central hospital and Tripoli center hospital for dialysis in Tripoli, Libya.

**STUDY POPULATION**

The study consisted of two groups: 25 patients with chronic kidney disease or kidney failure who had undergone surgery requiring anesthesia and 25 anesthesia Physicians who manage patients with kidney failure.

**TIME LIMITS**

This study lasted for a period of three months, starting from the end of April 2024 to June 2024, during which data were collected.

**DATA COLLECTION**

Two questionnaires were designed and administered: Patient questionnaire: This questionnaire was used to collect demographic information, kidney disease history, anaesthesia experience, and post-operative care data from patients. Anaesthesia questionnaire: This questionnaire was used to gather opinions from Anaesthesia physicians on anaesthesia management in patients with kidney failure, including physiological response differences, Tramadol use, inhalational anaesthetic selection, and the importance of renal status in anaesthesia planning.

**Sampling Technique**

Convenient sampling was used to select 25 patients and 25 Anaesthesia physicians from multiple hospitals in Tripoli, Libya.

**ETHICAL CONSIDERATIONS**

The study protocol was approved by the ethics committee of the participating hospitals. Informed consent was obtained from all participants before administering the questionnaires.

**DATA ANALYSIS**

Descriptive statistics (frequencies and percentages) were used to summarize the demographic characteristics of patients and Anaesthesia physicians. The data were analysed using statistical software SPSS version 25.

**RESULTS**

**DEMOGRAPHIC PARTICIPANTS**

**CHARACTERISTIC**

**OF**

A total of 25 patients participated in the study with chronic kidney disease at Tripoli medical center hospital, Tripoli central hospital and Tripoli center hospital for dialysis in Tripoli, Libya.

**Gender**

The gender distribution shows that the majority of patients (56.0%) are male, while females make up a significant minority (44.0%). as showed in figure 1.

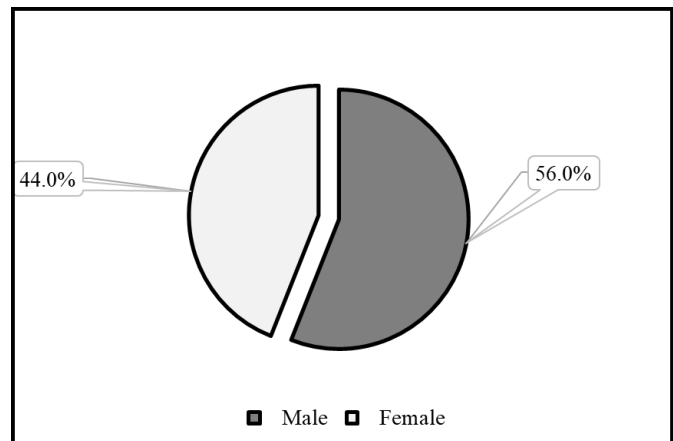


Figure 1: Distribution of patients according to their gender.

**AGE**

The age distribution shows that the majority of patients (28.0%) fall in the 50-59 age group, followed by the 60-69 age group (24.0%). The youngest age group (20-39) and the oldest age group (70-89) each account for about one-sixth of the patients (16.0%) as showed in Figure 2.

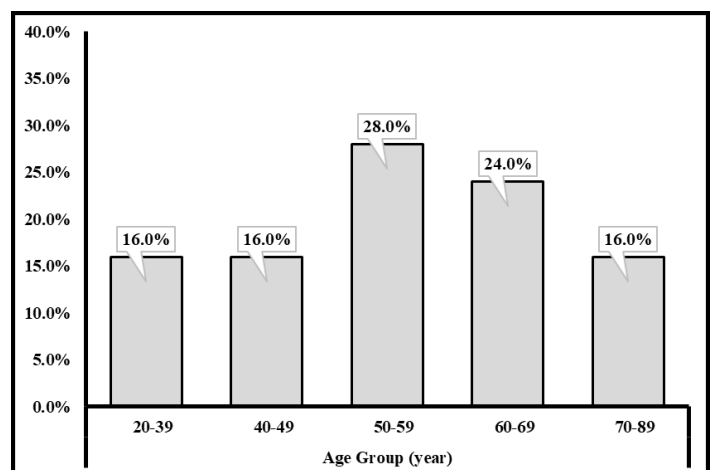


Figure 2: Distribution of patients according to age group.

**DURATION OF KIDNEY DISEASE**

The majority of patients (52%) have been recently diagnosed with kidney disease, while about a third (32%) have been living with the condition for an extended period. A smaller proportion (16%) have had kidney disease since birth as showed in figure 3.

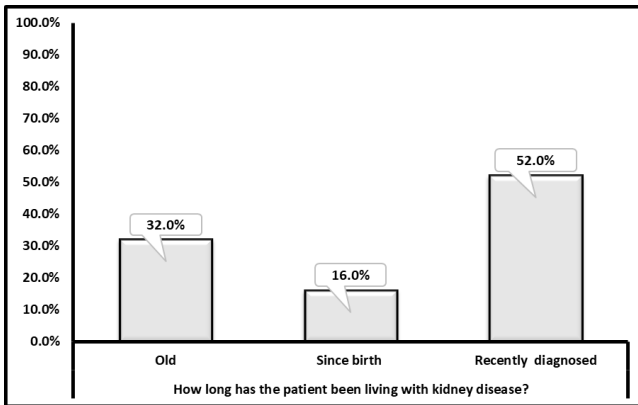


Figure 3: Distribution of patients according to kidney disease.

**ANESTHESIA HISTORY**

All patients in this study have undergone surgery requiring anesthesia since being diagnosed with kidney disease, indicating that surgery is a common experience among patients with kidney disease as shown in table 1.

Table 1: Surgery and Anesthesia

Question	Frequency	percent (%)
Has the patient undergone surgery requiring anesthesia since being diagnosed with kidney disease (kidney failure)?		
Yes	25	100.0%
No	0	0.0%
Total	25	100.0%

**TYPE OF ANESTHESIA**

The majority of patients (44%) received general anesthesia, followed closely by local anesthesia (32%), and then regional anesthesia (24%). This suggests that general anesthesia is the most commonly used type of anesthesia for patients with kidney disease undergoing surgery, but local and regional anesthesia are also significant options as shown in table 2.

Table 2: Type of Anesthesia

Question	Frequency	Percent (%)
What type of anesthesia did the patient receive?		
General Anesthesia	11	44.0%
Local Anesthesia	8	32.0%
Regional Anesthesia	6	24.0%
Total	25	100.0%

**ANESTHESIA SIDE EFFECTS AMONG PATIENTS**

The majority of patients (56.0%) experienced side effects or complications due to anesthesia, which is a significant proportion

Table 3: Anesthesia side effects among patients

Question	Frequency	Percent (%)
Did the patient experience any side effects or complications due to anesthesia?		
Yes	14	56.0%
No	11	44.0%
Total	25	100.0%

**MEDICATION REGIMEN CHANGES**

A clear majority of patients (60.0%) experienced changes to their medication regimen related to kidney health or pain management after surgery, while a significant minority (40.0%) did not as show in figure 4.

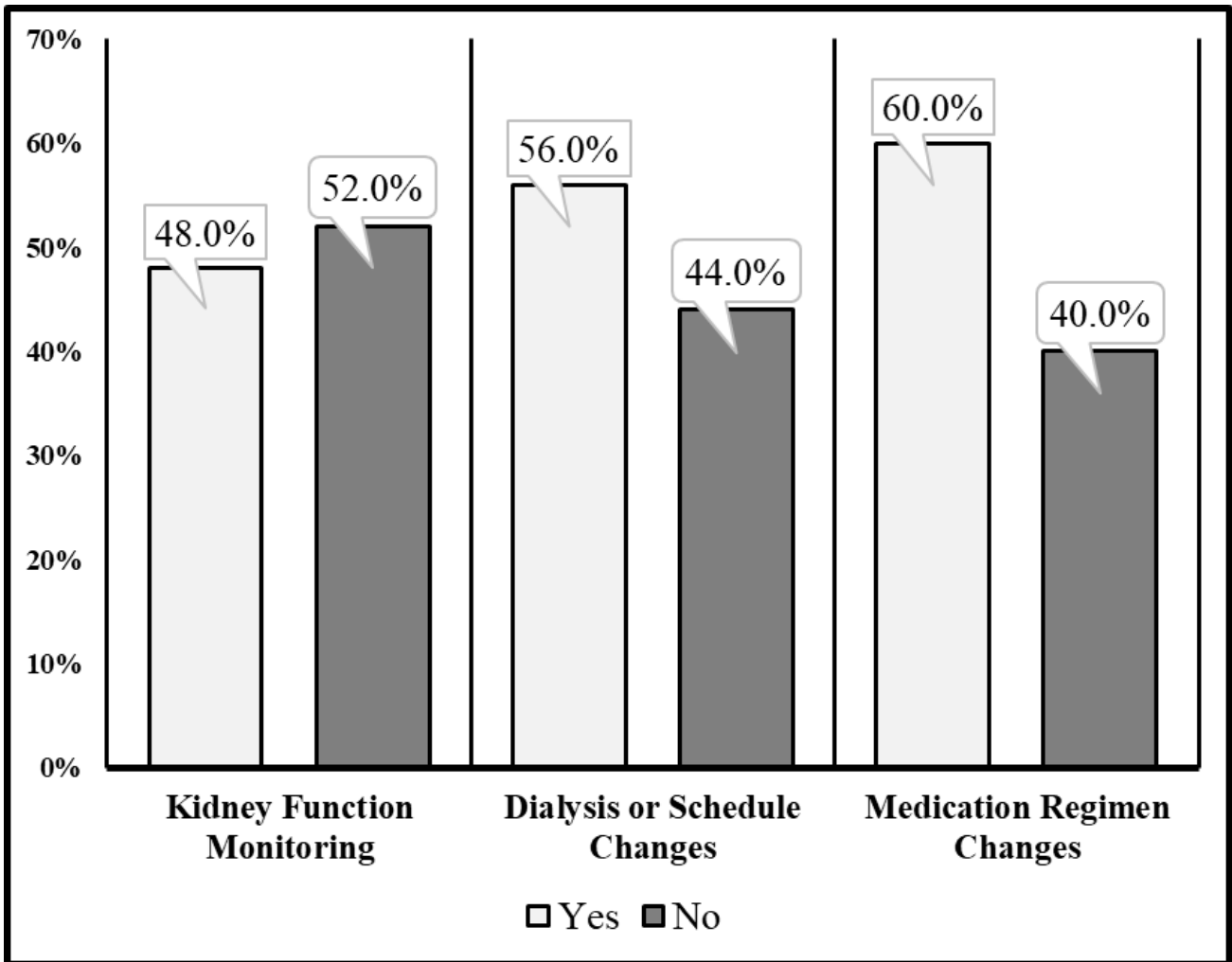


Figure 4: Distribution of patients according to medication regimen changes.

**INHALATIONAL ANESTHETIC SELECTION AND RENAL STATUS: A CRITICAL CONSIDERATION**

An overwhelming majority (92%) of respondents believe that propofol is commonly used for anesthesia in patients with kidney failure. A majority (60%) of respondents believe that Isoflurane is the most suitable inhalational

anesthetic for patients with kidney failure. An overwhelming majority (80%) of respondents believe that the patient's renal status is an important factor when planning anesthesia as shown in figure 5.

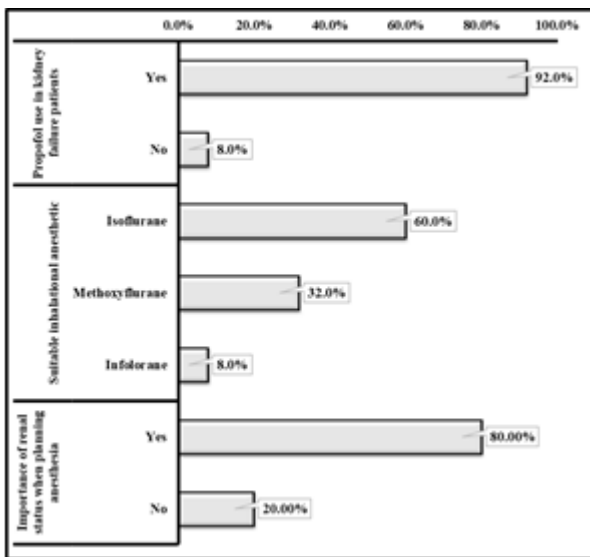


Figure 5: Inhalational anesthetic selection and renal status: a critical consideration.

### COMMON SIDE EFFECTS ASSOCIATED WITH ANESTHESIA IN RENAL FAILURE PATIENTS

Common side effects associated with anesthesia in renal failure patients include nausea, which was reported by 48% of respondents, followed by vomiting (32%), and vertigo (20%). These findings highlight the importance of careful anesthetic selection as shown in figure 6

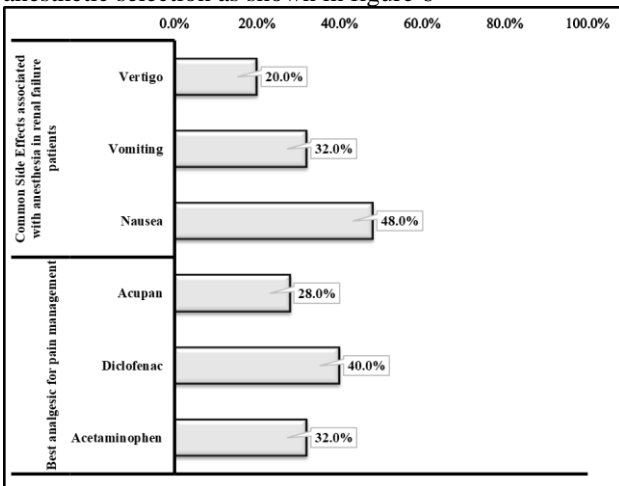


Figure 6: Anesthesia management in renal failure patients.

### DISCUSSION

The results of this study showed that comparison of ages in (50) sample therefore cases over 50 years of age were 28% for all cases over 50 years. The gender distribution shows that the majority of patients (56.0%) are male, while females make up a significant minority (44.0%). All patients in this sample have a formal diagnosis of chronic kidney disease or kidney failure, indicating that the sample consists entirely of patients with a confirmed diagnosis. The majority of patients (52%) have been recently diagnosed with kidney disease, while about a third (32%) have been

living with the condition for an extended period. A smaller proportion (16%) have had kidney disease since birth. The majority of patients (44%) received general anesthesia, followed closely by local anesthesia (32%), and then regional anesthesia (24%). This suggests that general anesthesia is the most commonly used type of anesthesia for patients with kidney disease undergoing surgery, but local and regional anesthesia are also significant options. Only about half of the patients (52.0%) had their anesthesia approach tailored to their kidney function, while nearly half (48.0%) did not. The majority of patients (56.0%) experienced side effects or complications due to anesthesia, which is a significant proportion. Only about half of the patients (48.0%) had their kidney function monitored before and after surgery, while a slight majority (52.0%) did. A majority of patients (56.0%) required dialysis or changes to their dialysis schedule after surgery, while a significant proportion (44.0%) did not. This highlights the importance of careful postoperative management for patients with kidney disease. An overwhelming majority (80%) of respondents believe that the patient's renal status is an important factor when planning anesthesia. In terms of pain management, the preferred analgesic for patients with renal failure is Diclofenac [2]. A majority (60%) of respondents believe that Isoflurane is the most suitable inhalational anesthetic for patients with kidney failure. At the end of this research, we reached a very important result, which is the effect of anesthesia on kidney diseases and kidney failure, which is represented by the patient being exposed to monitoring kidney functions through dialysis, changing the treatment regimen, and suffering from acute kidney failure after the operation. The objectives of the study were consistent with the results of this study. We note that the current study is consistent with previous studies in its main topic, which is kidney diseases. We differed from the first study in terms of objectives, as we had a set of objectives in our current study, and the previous study had one objective, which was to study the protective effects of omega-3 acids on kidney function [4]. We differed in the method of conducting the study. The method of conducting our current study was by using a questionnaire that was distributed to 50 samples. The questionnaire was divided into two groups, between 25 patients and 25 doctors. The method of the first previous study was through a double randomized trial on 500 patients in stages 3-4 of chronic kidney disease [4]. There was a difference in the results. The results of our current study showed that there was an age comparison in 50 samples, and that the majority of patients were males. All patients had an official diagnosis of the disease.

### CONCLUSION

In this study, we concluded that the results for the ages of patients ranged from 20 to 89 years, and we note that the age group between 50 to 59 years is the most susceptible to kidney failure, and the rate of kidney failure in males was much higher than in females at 56.0%, as the majority of patients were diagnosed with kidney disease recently, as



about a third had been suffering from kidney disease for a long time, and patients underwent surgical procedures that required anesthesia, either general anesthesia, spinal anesthesia, or local anesthesia. Kidney function was monitored for about half of the patients (48%), as the majority of patients received general anesthesia at a rate of (44%), which is the largest percentage, and the majority of patients at (56%) suffered from side effects and complications due to anesthesia, and a large majority of patients (60%) experienced clear changes in their medication regimen. There are also changes in the physiological response to anesthetic drugs between patients who have undergone anesthesia and those who have not. Most anesthesiologists (92%) agreed that propofol is usually used in patients with renal failure, while 60% of anesthesiologists preferred isoflurane gas in terms of inhaled anesthetic gases.

## REFERENCES

- [1].Buron, W. F., and Boulbayeb, E. L. (2017). *Medical Physiology* (3rd ed.). Elsevier.
- [2].- Eladari, D., Chambrey, R., Achard, J. M., & Fernandes, S. Guyton, A.C., & Hall, J.E. (2016). *\*Textbook of Medical Physiology\**. Elsevier. Johnson, R.J., & Feehally, J. (2011). *\*Comprehensive Clinical Nephrology\**. Elsevier.
- [3]. KDIGO 2012 Clinical Practice Guideline for the Evaluation and Management of Chronic Kidney Disease. KDIGO 2012 CKD Guideline.
- [4]. National Kidney Foundation<sup>1</sup>. (2022). "Kidney Disease: A Guide for Patients." [National Kidney Foundation.
- [5].Amro, A., Waldum, B., Dammen, T., Miaskowski, C., & Os, I. (2014). Symptom clusters in patients on maintenance hemodialysis. *Journal of Renal Care*, 40(4), 265-272.
- [6].Butterworth, J. F., Mackey, D. C., & Wasnick, J. D. (2018). *Morgan and Mikhail's Clinical Anesthesiology* (6th ed.). McGraw-Hill Education.
- [7]. Hemmings, H. C., & Egan, T. D. (2013). *Pharmacology and Physiology for Anesthesia: Foundations and Clinical Application*. Elsevier Health Sciences.
- [8].Mulroy, M. F. (2002). *Regional Anesthesia: An Illustrated Procedural Guide* (3rd ed.). Lippincott Williams & Wilkins.
- [9].Barash, P. G., Cullen, B. F., & Stoelting, R. K. (2017). *\*Clinical Anesthesia\** (8th ed.). Lippincott Williams & Wilkins.
- [10]. Moore, J. E., & Williams, J. D. (2011). "Regional Anesthesia: A Comprehensive Review." *\*Anesthesia & Analgesia\**, 113(5), 1122-1135.
- [11].Malamed, S. F. (2020). *Handbook of Local Anesthesia* (7th ed.). Elsevier.
- [12].Toner, A. J., & Finucane, B. T. (2020). Anesthesia for patients with renal disease. *Canadian Journal of Anesthesia/Journal canadien d'anesthésie*, 67(2), 174-188.