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Research Article

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Cardiovascular Complications in Hospitalized Patients with Chronic Kidney Disease During the Period January 2015 - December 2020.

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Abstract

Introduction: *Chronic Kidney Disease is nothing more than the progressive and irreversible deterioration of kidney function. It is considered chronic when it exceeds 3 months.*

Methods: *A retrospective descriptive study of "case groups" was carried out in order to determine the most common cardiovascular complications in patients with Chronic Kidney Disease who were treated at the Hospital General Plaza de la Salud during the 2015-2020 period.*

Results: *In this study, for the non-probabilistic sample of the total volume of patients from 2015-2020, a total of 120 patients were taken who met the inclusion criteria, which were the following: patients with Chronic Kidney Disease, Hypertensive patients, Obese or Diabetics who suffer from Chronic Kidney Disease, patients of both sexes, age is not discriminated and patients 20 years of age and older. Of this sample, 59% correspond to the male sex group that consists of 70 patients, while 41% correspond to the female sex whose group is consists of 50 patients.*

Regarding the most predominant age range, we found that 53% of the patients were between 61-80 years of age. The result of the study showed that the main Cardiovascular Complications in patients with Chronic Kidney Disease were: Hypertension, Heart Failure and Arrhythmias, with Hypertension being the most common complication, being present in 49% of the patients included in this study.

Introduction

Chronic Kidney Disease is nothing more than the progressive and irreversible deterioration of renal function. It is considered chronic when it exceeds 3 months. Among the risk factors are obesity, smoking, cardiovascular disease, diabetes, hypertension, race, and a family history of kidney disease [1]. According to an article published in the national newspaper on March 12, 2020, 10% of the Dominican population suffers from chronic kidney disease [2].

Kidney disease affects the body in different ways, for example: it affects the body's ability to clean the blood, filtration capacity, and regulation of blood pressure. It also affects the metabolism of vitamin D and the production of red blood cells. Kidney impairment causes waste and fluids to accumulate in the body, leading to a wide variety of systemic signs and symptoms [1].

As mentioned earlier, this is a progressive and irreversible disease that becomes life-threatening for the patient over time. The causes of chronic kidney disease include Glomerulonephritis, Polycystic Kidney Disease, Diabetic Nephropathy, Hypertensive Nephrosclerosis, Ischemic Nephropathy, HIV Nephropathy, Interstitial Nephropathy, and/or chronic rejection, Vesicoureteral Reflux, Pyelonephritis, and persistent renal obstruction [1].

Chronic Kidney Disease is classified according to the decrease in estimated glomerular filtration rate and structural kidney damage. It has been shown in various epidemiological studies

that Chronic Kidney Disease, even in its early stages, is a major cardiovascular risk factor. Most patients with Chronic Kidney Disease will not receive renal replacement therapy because they will die before reaching dialysis due to cardiovascular causes in most cases.

This is considered a public health problem as it meets the following criteria: it is a burden on society and continues to increase despite efforts to prevent it, certain groups are more affected than others, preventive measures are not promoted [3].

A recent retrospective study conducted in France showed that the incidence of atherosclerotic disease (heart attack or stroke) was three times higher in a population of 748 patients with kidney failure than in the general population. The age of onset of the first atherosclerotic event was similar in pre-dialysis patients compared to patients on hemodialysis [4].

Chronic Kidney Disease causes systemic complications, including pulmonary edema, hyperkalemia, anemia, cardiovascular disease, bone weakness and increased risk of fractures, decreased libido, erectile dysfunction, seizures, and complications during pregnancy. In the end-stage, the patient will depend on dialysis or a kidney transplant [3].

According to the World Health Organization (WHO), Chronic Kidney Disease affects about 10% of the global population. It can be prevented but not cured, and it tends to be progressive, silent, and symptomless until advanced stages when solutions such as dialysis and kidney transplantation become highly invasive and costly. Many countries lack sufficient resources to acquire the necessary equipment or cover these treatments for all people in need. The availability of specialists is also insufficient [5].

There are already many studies that talk about Chronic Kidney Disease and how it is a "death sentence". What most people don't know is that the number one cause of death in this population is Cardiovascular Disease, which highlights the importance of this study. Its purpose is to identify the most common cardiovascular complications in this population. Once these pathologies are identified, early intervention can be chosen to decrease the mortality rate.

Materials & Methods

Context

Considering Cardiovascular Disease as the leading cause of death in patients with Chronic Kidney Disease, it is important to identify the most common ones in order to detect the condition at an early age before it worsens and to treat the disease and attempt to reduce the mortality rate caused by it. This study was conducted at the General Plaza de la Salud Hospital during the period of January 2015 to December 2020. The hospital is located on Ortega y Gasset Avenue, Ensanche La Fe, Santo Domingo, Distrito Nacional, Dominican Republic.

Study Type & Design

The following research was conducted as a research project to identify the most common Cardiovascular Complications in patients with Chronic Kidney Disease who were treated at the General Plaza de la Salud Hospital during the period of January 2015 to December 2020.

This study is descriptive, retrospective, and a "case series" since it focuses on a specific population (cases of patients with a history of Chronic Kidney Disease) and it is descriptive because we will be discussing the cardiovascular complications that these patients may present.

Data Collection Instruments

For data collection, a form with direct questions was developed. This form contains information related to the personal data of the patients who were selected to participate in this study. The form was filled out based on the information found in the clinical records in the files, through the Nephrology department's database.

Ethical Considerations

The ethical considerations considered in respecting the rights and confidentiality of the patient consisted of maintaining the patient's identity anonymous. The data collection form did not include a section for the patient's name in order to keep the patient anonymous. Another factor to consider is that the patient's information was never shared or discussed with anyone not involved in the research. The study protocol and the instruments designed for it were submitted for review to the UNIBE Research Ethics Committee, as well as to the Research Management of Plaza de la Salud General Hospital, whose approval was a requirement for the start of the data collection and verification process, under the code CEI2022-94.

Population & Sample

Patients with Chronic Kidney Disease, who were treated at the General Hospital Plaza de la Salud. Through the use of non-probabilistic convenience sampling technique for the study, the sample in question consisted of a total of 120 patients diagnosed with Chronic Kidney Disease who met the inclusion criteria of the General Hospital Plaza de la Salud during January 2015 - December 2020.

Inclusion & Exclusion Criteria

Inclusion criteria includes patients with chronic kidney disease. Hypertensive, obese, or diabetic patients with chronic kidney disease. Patients of both sexes, age not discriminated. Patients aged 20 and above.

Exclusion criteria includes patients with chronic kidney disease who have not developed cardiovascular complications. Patients who do not meet the inclusion criteria.

Results

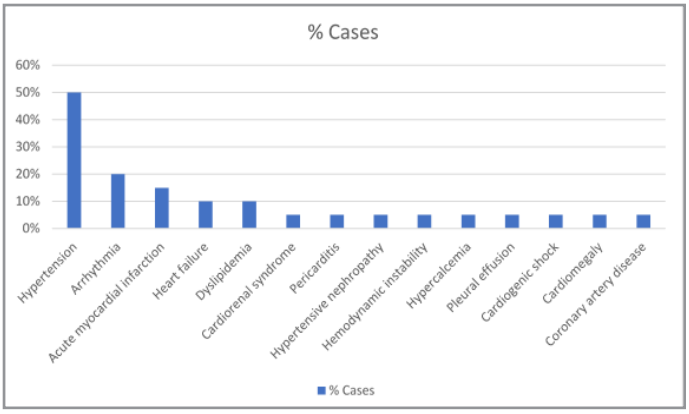

Figure 1: Distribution of patients in 2015 according to cardiovascular complications. General Hospital Plaza de la Salud.

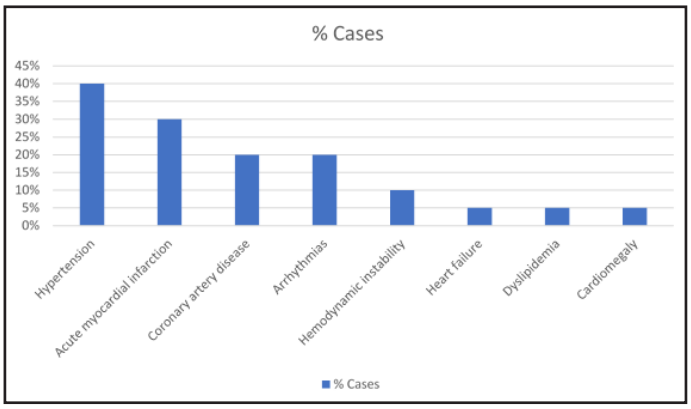

Figure 2: Distribution of patients in 2016 according to cardiovascular complications. General Hospital Plaza de la Salud.

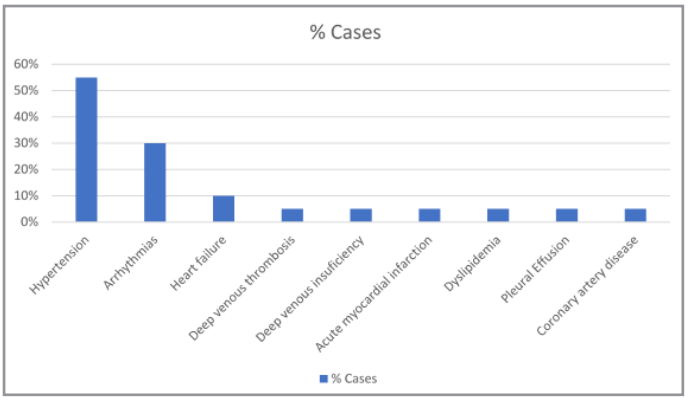

Figure 3: Distribution of patients in 2017 according to cardiovascular complications. General Hospital Plaza de la Salud.

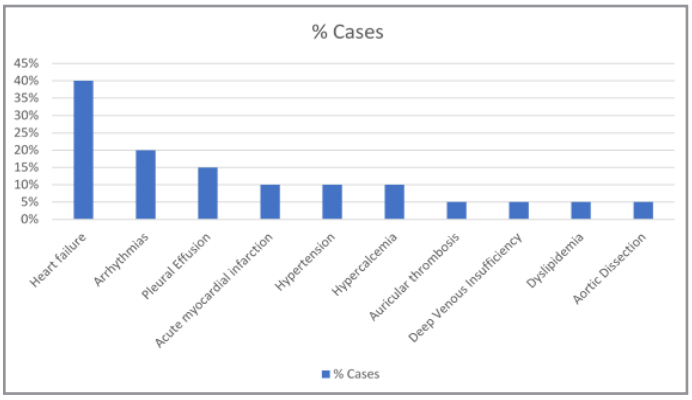

Figure 4: Distribution of patients in 2018 according to cardiovascular complications. General Hospital Plaza de la Salud.

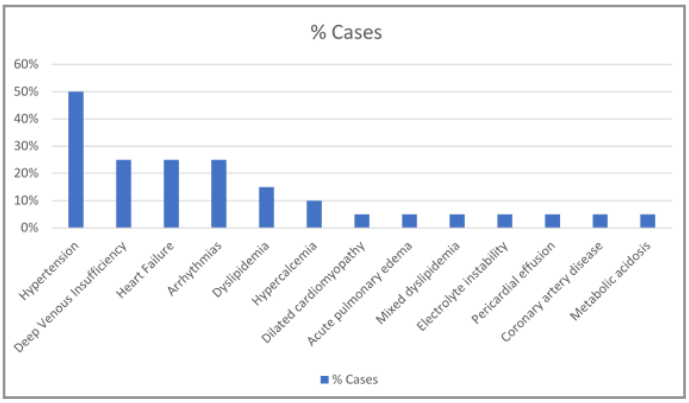

Figure 5: Distribution of patients in 2019 according to cardiovascular complications. General Hospital Plaza de la Salud.

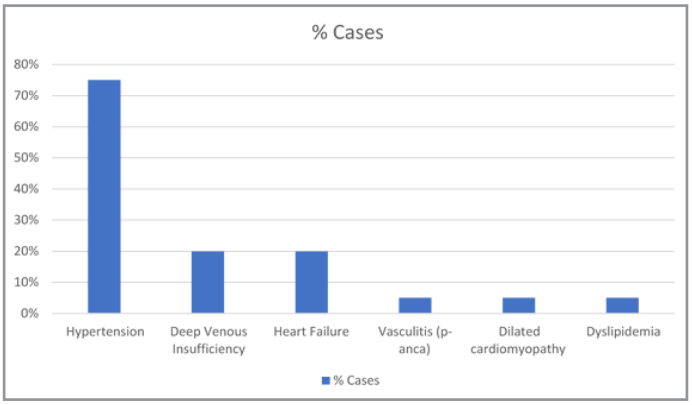

Figure 6: Distribution of patients in 2020 according to cardiovascular complications. General Hospital Plaza de la Salud.

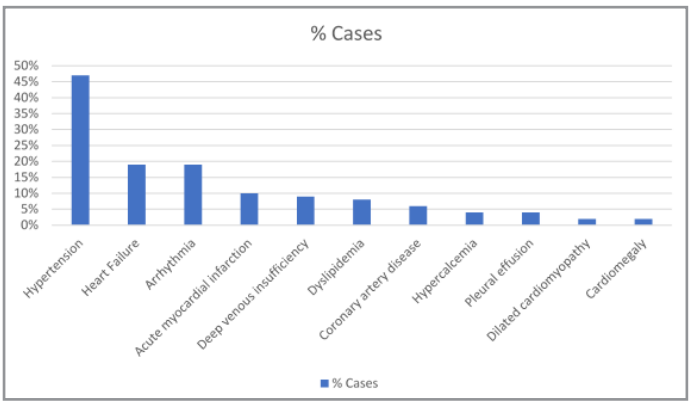

Figure 7: Distribution of patients from 2015-2020 according to cardiovascular complications. General Hospital Plaza de la Salud.

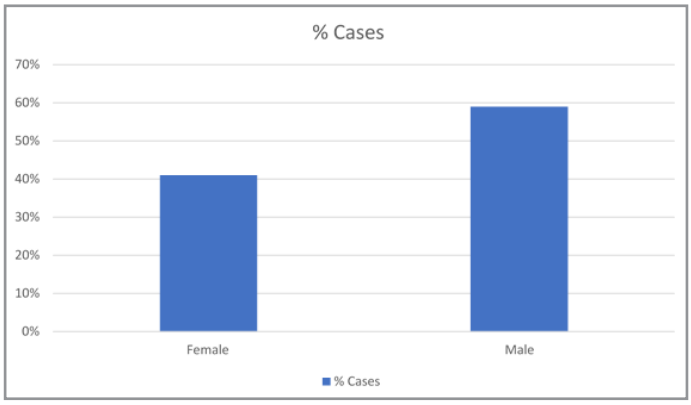

Figure 8: Distribution of patients from 2015-2020 according to gender. General Hospital Plaza de la Salud.

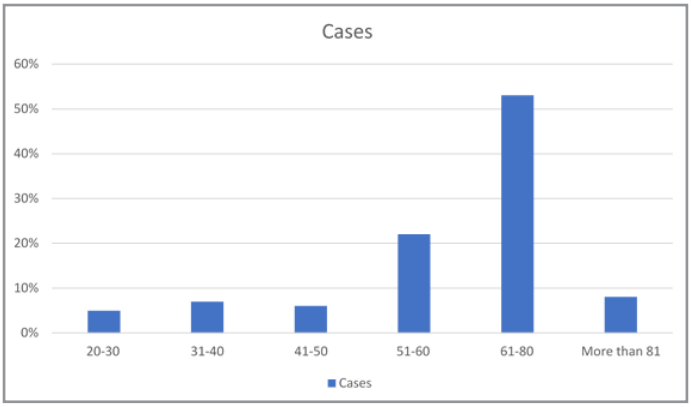

Figure 9: Distribution of patients according to age. General Hospital Plaza de la Salud

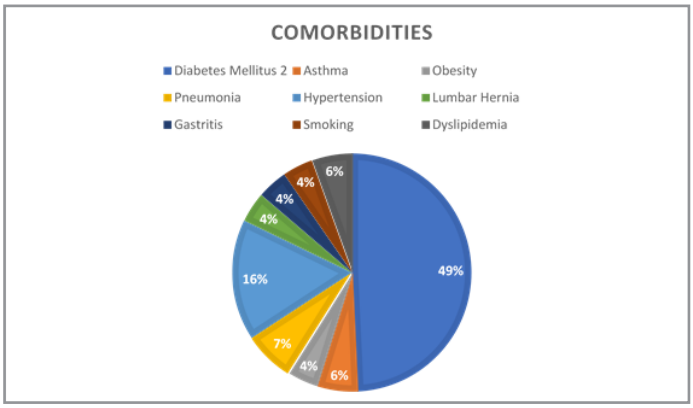

Figure 10: Distribution of patients from 2015 to 2020 according to Morbid Antecedents (Excluding Chronic Kidney Disease). Plaza de la Salud General Hospital.

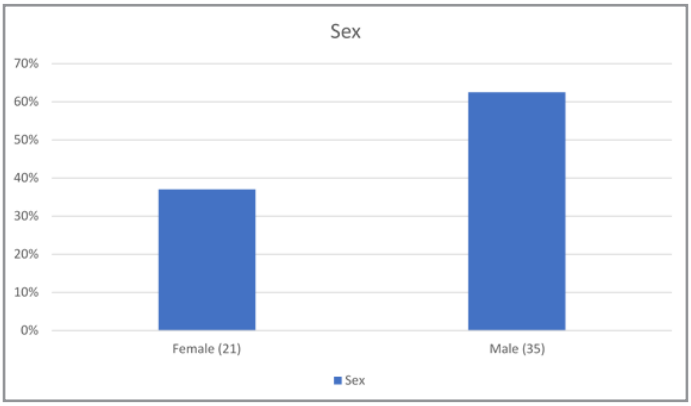

Figure 11: Relationship between Sex and Cardiovascular Complication: Hypertension. Plaza de la Salud General Hospital.

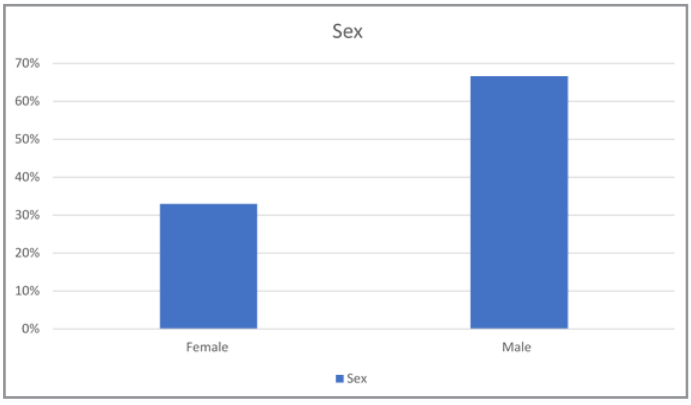

Figure 12: Relationship between Sex and Cardiovascular Complication: Hypertension. Plaza de la Salud General Hospital.

Discussion & Conclusion

Chronic Kidney Disease is a global public health problem, largely explained by epidemiological and demographic transformations that our planet has undergone in recent decades, leading to an increase in the incidence and prevalence of non-communicable chronic diseases, such as Chronic Kidney Disease. This has also generated a significant impact on the costs of global health programs. According to an article published in the national newspaper on March 12, 2020, 10% of the Dominican population suffers from chronic kidney disease [2].

In Chronic Kidney Disease, concentrations of creatinine and urea begin to increase hyperbolically to such a level that it reduces the Glomerular Filtration Rate. These changes are usually insignificant at the beginning of the disease. When the Glomerular Filtration Rate falls below 15 mL/min/1.73 m^2 (normal > 90 mL/min/1.73 m^2), concentrations of creatinine and urea increase immediately and are associated with clinical manifestations such as urea [6].

There are 5 types of Cardio-Renal Syndrome, namely: CRS1, CRS2, CRS3, CRS4, and CRS5. CRS1 is "Acute Cardio-Renal," which refers to acute cardiac dysfunction causing acute kidney injury (Acute infarction, Arrhythmias, Cardiogenic shock, Cardiac tamponade). Followed by CRS2, which is the chronic type, causing chronic cardiac dysfunction leading to Chronic Kidney Disease (Coronary artery disease, Dilated cardiomyopathy, Valvulopathy). On the other hand, there is Acute Reno-Cardiac causing acute heart failure, which is CRS3 (Fluid overload, Primary glomerulonephritis, Renovascular hypertension).

The SRC4 is titled "Chronic Reno cardiac, which is when Chronic Kidney Disease Causes Chronic Heart Failure (Chronic Kidney Disease (uremia, fluid overload, hypertension). Finally, there is the SCR5, which is nothing more than the systemic condition that causes acute or chronic renal and cardiac dysfunction (Sepsis, Hepatic Cirrhosis, DM, Amyloidosis) [7]. In this study, a total of 120 patients who met the inclusion criteria were taken from the non-probabilistic sample of the total volume of patients from 2015-2020. The inclusion criteria were as follows: patients with chronic kidney disease, hypertensive patients, obese or diabetic patients suffering from chronic kidney disease, patients of both sexes, no age discrimination, and patients 20 years and older. Of this sample, 59% corresponded to males, a group composed of 70 patients, while 41% corresponded to females, a group composed of 50 patients. Regarding the most predominant age range, we found that 53% of the patients were between 61-80 years old.

An important fact is that hypertension remained as the #1 complication each year, except in 2018, where the most common complication was Heart Failure. It is important to highlight that in our study, the most prevalent morbid antecedent was Diabetes Mellitus, representing 66.07%.

The result of the study showed that the main Cardiovascular Complications in patients with Chronic Kidney Disease were hypertension, heart failure, and arrhythmias, with hypertension being the most common complication, present in 49% of the patients included in this study.

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The relationship between Chronic Kidney Disease and Hypertension is based on the fact that the kidneys are responsible for regulating blood pressure, and if they fail, it will lead to uncontrolled elevation of blood pressure. It is important to consider that when Kidney Disease causes hypertension, it accelerates the progression of kidney failure. Another reason why Chronic Kidney Disease causes hypertension is due to sodium retention resulting from kidney insufficiency [8].

On the other hand, a study conducted by Dr. David Arroyo, a member of the Spanish Society of Cardiology, determined that the decrease in filtration and albuminuria observed in patients with Chronic Kidney Disease increased the risk of developing Heart Failure. It is worth noting that heart failure is the most common cause of death in individuals diagnosed with renal failure and already undergoing dialysis. Studies have shown that 49% of patients with heart failure have a history of Renal Insufficiency, which further increases the mortality rate [7].

Supra-Ventricular and Ventricular Arrhythmias are common in renal patients, especially during hemodialysis sessions. Arrhythmias are a cause of sudden death in this population. It is worth noting that they are more frequent in patients undergoing hemodialysis than in patients undergoing peritoneal dialysis [9].

Patients with arrhythmia may experience symptoms such as palpitations, chest pain, hemodynamic instability, and alterations in consciousness. Preventive measures that can be taken to reduce the risk include avoiding excessive weight gain, excessive potassium intake, and high calcium concentrations [9].

According to the journal "Nephrology Today," Atrial Fibrillation is the most common chronic arrhythmia in patients with Chronic Kidney Disease, ranging from 16% to 21% in non-dialysis CKD patients and from 15% to 40% in dialysis patients. If a symptomatic arrhythmia occurs during a hemodialysis session, it should be interrupted, and a central venous access and vascular access should be maintained. Subsequently, cardiac rhythm should be monitored. In severe cases, cardiology assistance is recommended [9].

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