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Prevalence of Thyroid Dysfunction among Patients with Chronic Kidney Disease Attending Diagnostic Laboratory Services, Bulawayo, Zimbabwe

Prevalensi Disfungsi Tiroid di Antara Pasien dengan Penyakit Ginjal Kronis yang Hadir di Layanan Laboratorium Diagnostik, Bulawayo, Zimbabwe

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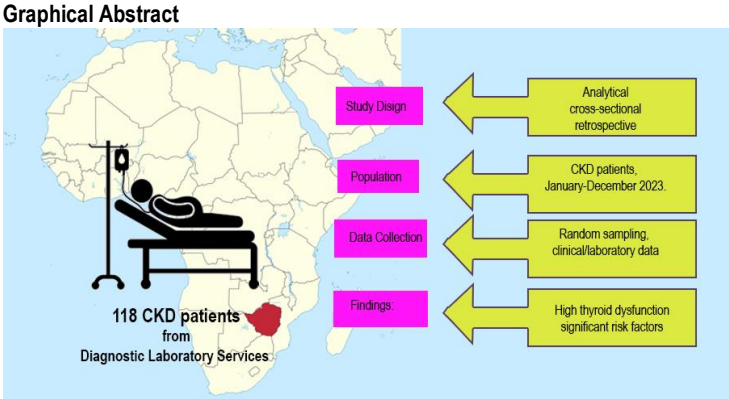
Abstract
Chronic kidney disease (CKD), can alter thyroid hormone production, distribution, and excretion. Thyroid dysfunctions like hypothyroidism, hyperthyroidism, and euthyroidism are identified in renal failure patients. This study aimed to determine thyroid dysfunction prevalence among CKD patients who attended Diagnostic Laboratory Services in Bulawayo from January to December 2023. The study was analytical cross-sectional and archival data collection methods were to gather information from 118 CKD patients who underwent both thyroid function tests and urea and electrolytes tests. A descriptive and analytical statistic test was used to determine the prevalence of thyroid dysfunction among CKD patients Chi square test was used to test association between thyroid's dysfunction in CKD setting with various risk factors, P< 0.05 was considered as statistically significant. Thyroid dysfunction (TD) prevalence was 53%, increasing with CKD severity, with stage 3B having a high prevalence of 37%. Major types include subclinical hypothyroidism (11%), overt hypothyroidism (16%), and subclinical hyperthyroidism (4.2%), with 36% of females presenting with thyroid dysfunction as compared to 31% of males. Prevalence of thyroid dysfunction increased with an increase in age Majors risk factor for CKD in TD setting were hypertension, diabetes, and heart failure. In conclusion, there was a high prevalence of thyroid dysfunction (53%) among chronic kidney disease patients.

Abstrak
Penyakit ginjal kronis (PGK), dapat mengubah produksi, distribusi, dan ekskresi hormon tiroid. Disfungsi tiroid seperti hipotiroidisme, hipertiroidisme, dan eutiroidisme diidentifikasi pada pasien gagal ginjal. Penelitian ini bertujuan untuk menentukan prevalensi disfungsi tiroid di antara pasien CKD yang menghadiri Layanan Laboratorium Diagnostik di Bulawayo dari Januari hingga Desember 2023. Penelitian ini bersifat analitik cross-sectional dan metode pengumpulan data arsip untuk mengumpulkan informasi dari 118 pasien PGK yang menjalani tes fungsi tiroid dan tes urea dan elektrolit. Uji statistik deskriptif dan analitik digunakan untuk menentukan prevalensi disfungsi tiroid di antara pasien PGK. Uji chi square digunakan untuk menguji hubungan antara disfungsi tiroid pada pasien PGK dengan berbagai faktor risiko, P<0,05 dianggap signifikan secara statistik. Prevalensi disfungsi tiroid adalah 53%, meningkat seiring dengan tingkat keparahan PGK, dengan stadium 3B memiliki prevalensi yang tinggi yaitu 37%. Jenis utama termasuk hipotiroidisme subklinis (11%), hipotiroidisme terbuka (16%), dan hipertiroidisme subklinis (4,2%), dengan 36% wanita mengalami disfungsi tiroid dibandingkan dengan 31% pria. Prevalensi disfungsi tiroid meningkat seiring dengan bertambahnya usia Faktor risiko utama PGK pada pasien dengan TD adalah diabetes hipertensi dan gagal jantung. Kesimpulannya, terdapat prevalensi disfungsi tiroid yang tinggi (53%) di antara pasien penyakit ginjal kronis.

Graphical Abstract



Keyword
hyperthyroidism; hypothyroidism; prevalence; renal insufficiency; thyroid diseases

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INTRODUCTION

Non-communicable diseases (NCDs) including Hormonal and cardiovascular diseases are main growing burden of morbidity and mortality in sub-Saharan Africa including Zimbabwe country Although majority of collected data on different risk factors vary with the methodologies of studies applied hence several methodological limitations (Mudie et al., 2019). The Zimbabwe National development efforts in the health sector are directed toward improving the welfare of the Zimbabwe Population. Likewise, its SDGs, the goal is towards a healthy Zimbabwe by 2030 with a target of reducing noncommunicable disease through global understanding of NCDs (and their risk factors) in future research, as well as policies. Thyroidal hormones influence the cardiovascular and renal systems through their effect on renal blood flow as it regulates the glomerular function, the tubular secretory and absorptive capacities including the electrolyte pumps and the kidney structure (Rhee, 2015; Rhee et al., 2015) CKD is a common disorder in most populations worldwide. The global burden of disease (GBD) study found that there were 698 million cases of CKD in 2017, with a 9% global prevalence rate among adults (Bikbov et al., 2020).

Several studies suggest that the progression of chronic kidney disease (CKD) is associated with several complications, including thyroid dysfunction, dyslipidaemia, and CVD (Thomas et al., 2008), CKD affects 2.6 million people of the global population and is a growing public health concern worldwide, as per a study by Yang et al. (2020). It is defined as irregularities in the structure or function of one's kidneys that persist for more than three months and pose health risks. CKD increases the risk of all-cause mortality, cardiovascular disease, and progression to end-stage renal disease (ESRD). Therefore, identifying the risk factors for CKD or a reduction in eGFR can aid in comprehending the mechanisms of CKD and developing new prevention techniques. Studies have shown that CKD is associated with a higher prevalence of primary hypothyroidism, both overt and subclinical Lv & Zhang (2019) estimated that approximately 13.4% of the general population worldwide may have some form of thyroid dysfunction.

Accumulating evidence has shown that there is a bi-directional relationship between thyroid dysfunction and kidney disorders (Narasaki et al., 2021), yet there are many remaining gaps in knowledge with regards to prevalence and risk factors. Previous studies revealed in general population subclinical hypothyroidism is more common than overt hypothyroidism among CKD patients, while non-dialysis dependent and dialysis-dependent CKD patients demonstrate a substantially higher prevalence of thyroid dysfunction as compared with the general population Multiple studies have shown that hypothyroidism is associated with higher all-cause mortality risk in both NDD-CKD and dialysis-dependent CKD patients (Lo et al., 2005).In the past two decades, several researchers have sought to simplify the significance of relationships between kidney illness and thyroid functioning (Srivastava et al., 2018). This knowledge is substantial because it anticipates a connection between two distinct entities. Left unattended, the phenomenon of the combination of two global public health issues can have a devastating effect on multiple sectors of the economy of any country.

Worldwide, the incidence of thyroid dysfunction is account for 30–40% for patients seen in an endocrine clinic While in Africa context in a study conducted in Egypt the prevalence of thyroid dysfunction was found to be 29.3% (Rashad & Samir, 2019) In Africa a global prevalence of chronic kidneys disease (CKD) of 13.4% was reported in the adults while in Zimbabwe the prevalence was the highest in the continent and estimated to be 30% .in Zimbabwe. In Zimbabwe, the prevalence of thyroid dysfunction has not been extensively studied, and there is limited data available on the specific prevalence rates and risk factors Although studies have been done in India, China, Europe and the United States of America, gaps still exist in the literature on the interventions that can be one where the problems exist, particularly in LMICs (Keunmoe et al., 2019). Previous studies were conducted in India by Kashif et al. (2023) which revealed Patients with CKD were at risk of thyroid hypofunction irrespective of their mode of treatment in addition it highlighted the clinically relevant interactions between renal and thyroid function. Previous study revealed a prevalence of CKD in Zimbabwe ranging between 3.1 and 30.2% dependent on the population studied and use of proteinuria or serum creatinine to identify renal impairment (Hunter-Dickson et al., 2023; Stöhr et al., 2008). It is against this background and Given the reduced thyroid function in CKD patients and the lack of data focussing on risk factors of thyroid dysfunction specific to CKD patients in the Bulawayo city we aimed to conduct this study. Up to now, far too little attention has been paid to chronic renal illness and thyroid dysfunction in Zimbabwe, in particular hence the present study objectives was to investigate the prevalence of thyroid dysfunction and associated risk factors among patients with chronic kidney disease attending diagnostic laboratory services from January to December 2023. Giving the interrelationship between kidney function and thyroid hormone status and their variability, this present study finding are vital for clinicians and health care policymakers to understand their correlation hence the outcome of this present study may help to understand the comorbid conditions associated with

Table 1
Biochemical Characteristics of Study Participants

Parameters	Age	Egfr	T3(mmol/l)	T4(mmol/l)	TSH (mmol/l)
Respondents	118	118	118	118	118
Mean	55.6	84.8	5.6	12.35	4.17
Std. Deviation	18.2	22.02	7.83	4.98	6.64
Minimum	4	33.3	0.4	0.8	0.003
Maximum	90	160	87	32.3	42.8
Physiological Ranges	n/a	>90	4.0 – 8.3	9.0 – 20.	0.25 – 5.

thyroid dysfunction in CKD setting in the context of Zimbabwe. We therefore hypotheses on the following: 1) there could be a strong association between subtype of thyroids dysfunction with all stage of CKD, 2) clinical and socio-demographic factors could be associated with thyroid dysfunction in CKD patients, 3) the prevalence of thyroid dysfunction in CKD in Zimbabwe setting may differ from global prevalence

METHODS

The study was analytical cross sectional in a retrospective manner. This study design was appropriate because it elicited information from reviewed records of patients who CKD presented to Diagnostic Laboratory Services for thyroid function tests. This study population comprised all chronic kidney disease patients who attended Diagnostic Laboratory Services from January 2023 to December 2023. To minimize bias and the effect of confounding variables we used random mechanism to select a sample from our target population.

The study excluded CKD patients without thyroid function tests. The study also excluded patients with documented laboratory evidences of chronic kidney disease patients on haemodialysis and those on drugs altering thyroid profile family history of goiter or thyroid dysfunction, and those receiving concurrent treatment for thyroid disease and drugs known to affect thyroid hormone indices like glucocorticoids, salicylates, heparin, lithium, amiodarone, sulphonylurea, or phenobarbitone radioactive iodine therapy, antithyroid drugs, and/or thyroid hormones and those with incomplete data. pregnant and lactating women as well as patients with nephrotic range proteinuria were excluded from the study. This study focused on CKD patients who were screened for thyroid function. The results were stratified according to the different stages of chronic kidney disease.

Thyroid dysfunction was considered if the patients thyroid hormones fell outside the physiological reference range; free T3 (4.0– 8.3 pmol/L), free T4 (9.0–20.0 pmol/L), and TSH (0.25–5 mIU/L). Euthyroid was considered if thyroid hormone levels fell within the reference range. Overt hypothyroidism was defined as TSH > 5 mIU/L free T3 < 4.0 pmol/L and free T4 < 9.0 pmol/L. Overt hyperthyroidism was defined as TSH <O.25 and free T3 and Free T4 above normal range. Subclinical hypothyroidism was considered if TSH > 5 mIU/L and free T3 and free T4 within reference range. Subclinical hyperthyroidism was defined as TSH < 0.25 mIU/L and free T3 and free T4 within reference range.

Chronic Kidney Disease we used in this study as documented evidence of CKD in the client s medical chart including parameter of having an e-GFR < 60 mL/ min/1.73m using Cockcroft Gault equations as indicator of CKD with a persistent abnormality in kidney structure or function (eg, glomerular filtration rate [GFR] <60 mL/min/1.73 m2 or albuminuria ≥30 mg per 24 hours) for more than 3 months. Chronic kidney disease stages were determined according to Kidney Disease Improving Global Outcomes (KDIGO). Staging of CKD: CKD1 eGFR > 90 ml/min and albuminuria, CKD 2 60-89 mil/min and albuminuria, CKD 3a 45-59ml/min, • CKD 3b 44-30ml/min, CKD 4 29 - 15 ml/min CKD 5< 15ml/min or dialysis (Levin & Stevens, 2014)

The study used the census methods through the total population sampling to get a sample size of 118 cases which represent all patients admitted during the year 2023 to Diagnostic Laboratory Services for a urea and electrolyte test panel simultaneously with complete thyroid function tests during the study period.

This study was conducted in a natural setting at Diagnostic Laboratory Services in the City of Bulawayo. The Laboratory Scientists from this hospital have the experience of conducting the tests for a large number of patients in Bulawayo. Therefore, it was easier to get an adequate sample from this setting. The data was retrieved without the inclusion of any patient names or personal information. The data collected included TFT test results, creatinine levels and eGFR, age, sex and patients' previous medical history such as existence of comorbidities such as Diabetes and cardiovascular disease (CVD).

Table 2
Distribution of Thyroid Dysfunction by Age

Age Range (Years)	Total (n)	% With TD	%Without TD
0 - 14	3	33	67
15 - 29	5	20	80
30 - 44	22	31	69
45 - 59	32	37	63
60 - 74	41	31	69
75 and above	15	46	54

The data was captured using Microsoft Excel and all statistical analyses was done using the Grap-Pad (Prism version 6) A descriptive statistic test of frequency was used to establish the prevalence of thyroid dysfunction among CKD patients. To minimize bias and the effect of confounding variables we used random mechanism to select a sample from our target population hence through randomization we ensured that each patient has an equal chance of being enrolled in the study, where we generate comparable comparison groups, which are alike in all the important aspects. Hence our independent variable values were randomized to eliminate the selection bias, balanced the groups with respect to many known and unknown confounding or prognostic variables, in addition we excluded or restricted those confounding variables (exclusion criteria).

Chi square test was used to test association between dependent and independent variables, at $P < 0.05$ and odd ratio and confidence interval were determined. Permission to conduct the study was sought from the Africa University Research Ethics Committee (AUREC) and Diagnostic Laboratory Services with letter number AU3104/24. Ethical principles of research which include autonomy, non-maleficence, beneficence, justice, advocacy and confidentiality were considered and maintained throughout the study. No harm was caused to the patient be it physical, emotional or mental damage.

RESULTS

Of the 118 CKD patients, all of them had complete thyroid profile tests, and the ones with one or no thyroid function tests at all were not included in the study. The mean and standard deviation were calculated to determine how the data collected varied from the average value of each variable studied. Table 1 presents the minimum, maximum, standard deviation, and average values for the variables utilized in this research. Most of the participants were elderly, with the mean age being 56. While the mean Egf was below the normal ranges stipulating CKD however the means for the biochemical parameters: T3, T4 and TSH were mostly within normal range.

A total of 118 urea and creatinine profile reports for subjects between the ages of 4 to 90 years were screened for thyroid dysfunction. Of this, 77% were female and 23% were male. More females (36%) than males (30%) had thyroid dysfunction. Table 3 below shows the distribution of thyroid dysfunction between males and females. The participants were aged between 4 and 90 years. The mean age was 55, the median was 58 and most participants were aged 68. The prevalence of thyroid dysfunction increased with an increase in age (See Table 2).

The prevalence of thyroid dysfunction was 53% (table3) and was found to increase with the severity of KD, with stage 3B having a high prevalence of 37 %. Stages of CKD are usually categorized from stage 1 to stage 5, with stage 1 being the mildest form and stage 5 being the most severe (Table 3). Of the study participants, none had stage 4 and stage 5 chronic kidney disease. The majority of the patients fell in Stages 1 and 2. However Chi square test show no statistical significance between CKD stages and TD (See Table 3).

Figure 1 illustrates the major types of thyroid dysfunction were Subclinical Hypothyroidism (13%), overt hypothyroidism (20%), overt Hyperthyroidism (3%), and subclinical Hyperthyroidism (5%). The most prevalent being Hypothyroidism. associated with thyroid dysfunction and to understand how they influence the development and progression of this condition. Heart failure, diabetes mellitus and Hypertension were the most dominant significant risk factors for Thyroids Disorders in CKD patients ($P< 0.05$) while others factors were not associated with TD (See Table 4).

DISCUSSION

Prevalence of thyroid dysfunction among chronic kidney disease patients

The prevalence of thyroid abnormalities in CKD has been estimated to range from 13% in early CKD to 70% in end-stage renal disease (ESRD), according to a few

Table 3
Chi square test for Association between TD and Stages of CKD

Stages of CKD	Egf	TD Cases	No TD cases	Total	% of TD	OR, 95 % CI	P Value
Stage 1	>90	15	35	50	30	0.69 (0.318-1.507	0.43
Stage 2	60-89	21	31	52	40	1.55 (0.72-3.34)	0.33
Stage 3a	45-59	2	6	8	25	0.6 (0.11-3.15)	0.54
Stage 3b	30-44	3	5	8	37	1.13 (0.25-5.0)	0.86

studies (Raj et al., 2023; Schultheiss et al., 2021) which fall within the scope of our present study. The prevalence of thyroid dysfunction in this study was found to be 53% Similar finding were reported by Apoorva Jain et al 2019 in India where his study enrolled 100 patients with CKD, and

It is important to identify the risk factors that are found 53 patients had thyroid dysfunction which accounted for 53% this similarity in finding could be related to similarity in sample size however at the opposite our finding revealed a higher stratified prevalence by stage of CKD of 37% for stage3B which increase with the severity of KD, with epidemiologic data show that there is a nearly five-fold higher prevalence of hypothyroidism in advanced chronic kidney disease (CKD) patients vs. those without CKD (Rhee, 2019). The major types of hypothyroidism in this study were Subclinical Hypothyroidism (13%), and overt hypothyroidism (20%), being the most prevalent form of thyroid dysfunction among the study participants. According to Shakya et al., (2023), the most prevalent thyroid condition detected in these patients is low T3 and subclinical hypothyroidism. Severe hypothyroidism can result in reduced cardiac function and lead to a gradual decline in kidney function. This means that thyroid dysfunction can aggravate the morbidity of patients with chronic kidney disease (CKD) and increase their risk of cardiovascular mortality. Our study found a prevalence of subclinical hypothyroidism of 13% which is lower than the prevalence of 17.9% found by Chonchol et al. (2008) which was attributed to GFR decreases from ≥90 mL/min to 60 mL/min.

Our study found a prevalence of overt hypothyroidism of 20% among CKD patients which is higher than the general population prevalence of 0.3% to 3.7% (Taylor et al., 2018) as well as the higher than that of europiean continent of 0.2% to 5.3% (McGrogan et al., , 2008; Stoian et al., 2020) and of the general population, Generally the prevalence of hyperthyroidism among patients with CKD is similar to the prevalence in the general population, around 1% (Stoian et al., 2019) however our study found a prevalence of Hyperthyroidism of (3%) this discrepancy could be attributed to our small sample size as well as the study design.

Figure 1
Stratified prevalence of all type of TD among CKD Patients

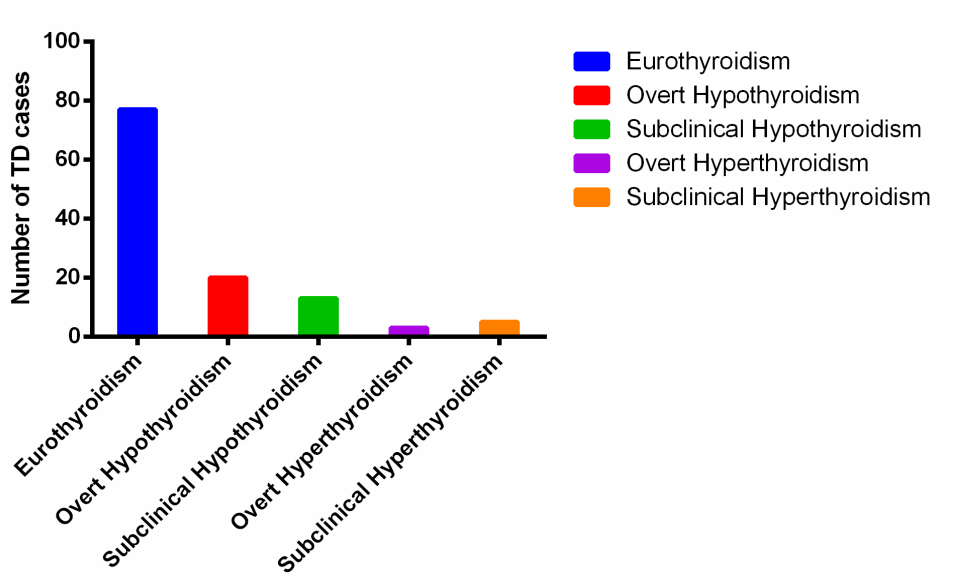

Table 4
Thyroid Dysfunction and Associated Risk Factors Among CKD Patients

Associated Risk Factor	CKD No TD	CKD + TD	Total	OR,95%CI	P value
Sex					
Male	19	8	27	1.35(0.53-3.42)	0.52
Female	58	33	91		
Age					
Age < 45 years	21	9	30	1.33(0.54-3.2)	0.53
Age > 45 years	56	32	88		
Hypertension					
Yes	4	9	13	5.133(1.47-17.9)	0.018
No	73	32	105		
Diabetes Mellitus:					
Yes	2	7	9	7.72(1.52-39.1)	0.0082
No	75	34	109		
High BMI					
Yes	2	3	5	2.96(0.47-18.4)	0.34
No	75	38	113		
Sob, Fatigue					
Yes	4	2	6	0.93(0.16-5.34)	1
No	73	39	112		
Heart Failure					
Yes	5	8	13	3.49(1.06-11.49)	0.03
No	72	33	105		
Palpitations					
Yes	2	2	4	1.92(0.26-14.1)	0.51
No	75	39	114		

Socio-demographic distribution of thyroid dysfunction among CKD patients

Li et al (2019) mentions that older patients are at risk of being affected by thyroid dysfunction and CKD. This is due to the dilapidating effects of aging. In this study, most participants were 63 years of age, with known CVD conditions and CKD. The younger population did not present with requests for thyroid function screening.

Although further research can be carried out, the elderly was presenting with problems of thyroid dysfunction and kidney failure. 77% of the study population was female. More females than males presented with cases of thyroid dysfunction and renal failure. As a result, sex could be a factor in the development of hypothyroidism. As observed by Asanari et al. (2023), as age advances, there is reduced deiodination of T4 to form T3 levels. The levels of antithyroperoxidase and anti-thyroglobulin antibodies rise with age, commonly seen in women above 60 years of age, contributing to the decline in levels of T3.

Risk factors associated with thyroid dysfunction among CKD patients

In the general population, hypothyroidism is a known risk factor for cardiovascular disease including Heart failure and hypertension Given that 40% of ESRD deaths are due to cardiovascular cause (Klein & Ojamaa, 2001), there has been increasing interest in hypothyroidism as an under-recognized risk factor for cardiovascular disease in this population CKD can lead to serious complications, such as end-stage renal disease, cardiovascular disease, and death. Some of the most common risk factors for CKD are diabetes and hypertension, which can impair the blood flow and function of the kidney cells. Although both diabetes and hypertension can be controlled their pathophysiology can worsen the state of the patient and contribute to thyroid dysfunction. In this study patients presented with clinical data such as hypertension, diabetes, cardiovascular accidents, and abnormal weight gain and loss. A substantial number of these patients suffered from some form of thyroid dysfunction. Our finding revealed significant association between Heart failure, hypertension and diabetes mellitus in CKD patients with TD these findings corroborate with study by Mohamedali et al. (2014) where Hypertension and Diabetes mellitus were reported as potential risk factors. With regards to Diabetes mellitus it has been postulated the risk of nephropathy and cardiovascular events increases in type 2 diabetes mellitus with subclinical hypothyroidism (SCH) (Heidari & Asadzadeh, 2021; Liu et al., 2023) and this could corroborate with our findings where Diabetes mellitus was significantly found to be a risk factors associated with CKD. In our study BMI was not significantly associated with CKD

opposite results were found by Cotoi et al. (2020) and he stipulated that an increase of BMI with more than one unit increases the risk of developing thyroid disease with 1.083 times in patients with ESRD this could be due to the fact patients were already in stage5 of the CKD where as in our study we focus on stage 1-3 of CKD. It has been reported that hypothyroidism may lead to decreased cardiac output as a consequence of systolic and diastolic dysfunction and decreased red blood cell production (Klein & Ojamaa, 2001) this could corroborate with Heart failure reported as risk factors in our present finding. However, in this present study stages of CKD1-3 were not associated with occurrence of thyroid disorders where similar finding was reported by Keunmoe et al. (2019). However, a study targeting CKD stage revealed out of 461,607 United States (US) veterans with stages 3–5 CKD, about 23% patients were found to have hypothyroidism defined by TSH levels and treatment status stipulating a likely wood implication of CKD stage in hypothyroidism (Ree et al., 2015).

In Islam, health and illness are considered as tests from God as in Surah Al-Baqarah/2:155 which is translated:

> *"And We will surely test you with something of fear and hunger and a loss of wealth and lives and fruits, but give good tidings to the patient".*

The verse emphasizes that humans will be tested with difficulties, including illness. These trials are an opportunity for believers to demonstrate patience and resilience. The verse serves as a reminder that enduring such trials with faith and perseverance can bring spiritual rewards.

From an Islamic perspective, managing chronic conditions like CKD and diabetes mellitus is not only about physical health but also about maintaining spiritual well-being. Muslims are encouraged to seek medical treatment while simultaneously placing trust in Allah's wisdom. The trials of illness can strengthen one's faith, as they offer a chance to reflect on life, seek forgiveness, and increase acts of worship.

Therefore, integrating Islamic teachings with medical findings reinforces the importance of holistic care in managing chronic diseases. It encourages patients to address their health issues with both medical interventions and spiritual fortitude, aligning their actions with the broader Islamic understanding of life's trials and the virtues of patience and trust in Allah's plan.

The strength of this present study is by providing the stratify prevalence of all subtypes of thyroids disorders in CKD setting as well on potential risk factors taken in account both clinical and laboratory data despite its moderate sample size and effort were made to exclude all factors which could influence our finding under exclusion criteria our finding were crucial in Zimbabwe country were there was paucity of data in this regard. The limitation of this study is his small sample small size. Other's limitation is the sensitivity analyses were not performed to assess the impact of the exclusions factors or criteria on the results. In addition, even though effort was made to minimize bias and impact of confounding variables through randomization still the statistical tests used could have implications for the study's findings. Further large-scale study is need taken in account multivariate analysis of potential risk factors for Thyroid dysfunction in CKD setting. The retrospective nature of the study was a limitation as the etiology of their CKD was not known, the correlation of the etiology of CKD with thyroid dysfunction could not be studied. Furthermore, patients on dialysis, were not taken in account which also could affects the thyroid profile which could be subject for further researches. Giving the interrelationship between kidney function and thyroid hormone status and their variability, this present study finding is vital for clinicians to understand their correlation hence the outcome of this present study may help to understand the comorbid conditions associated with CKD to guide therapy and patient's prognosis

CONCLUSIONS

In this study, there was a high prevalence of thyroid dysfunction (53%) among chronic kidney disease patients, but this prevalence was lower than previous studies, which may be due to our smaller sample size and geographical location. The most prevalent form of thyroid dysfunction was overt hypothyroidism (20%). Thyroid dysfunction increased with age, mostly in females. Hypertension, diabetes mellitus was the most significant risk factor with thyroid dysfunction among chronic kidney disease patients. Our study suggests thyroid disorder is associated with CKD and the most significant risk factors were mainly cardiovascular and Diabetes mellitus therefore CKD patients should be routinely screened for these in addition patients should routinely being checked for their thyroid function profile at secondary care level giving the fact that hypothyroidism in CKD patients can complicate disease progression, impact mortality rates, and affect overall quality of life. Therefore, routine screening for thyroid abnormalities should be conducted in all CKD patients.

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AUTHORS' CONTRIBUTIONS
Lindiwe A. Sibanda, Sundika M. Olivier, Idi D. Yacoubou, Aboubacar K. Kaka are reviewed the manuscript and and performed the field work. Maibouge T. M. Salissou wrote the manuscript, acquired the data, revised the manuscript designed the study, and formulated the concept. The present manuscript has been read and approved final manuscript by all the authors, and the requirements for authorship as stated earlier in this document have been met, and that each author believes that the manuscript represents honest work.

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COMPETING INTERESTS
The author(s) declare no potential conflict of interest with respect to the research, authorship, and/or publication of this article.

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