Severity & Relationship of other co-morbidities with chronic kidney disease among patients in Bangladesh

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DECLARATION

I, Salma Akter, hereby affirm that the thesis entitled **"Severity and Relationship of Other Co-Morbidities with Chronic Kidney Disease Among Patients in Bangladesh"** is entirely my own work, with all references duly acknowledged. I also confirm that this work has not been submitted for evaluation or any other purpose at any other institution.

Signature

...……..

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CERTIFICATION

This certifies that, under my close supervision, Salma Akter completed her thesis, "Severity and Relationship of Other Co-Morbidities with Chronic Kidney Disease Among Patients in Bangladesh," satisfactorily. A portion of the requirements for the Master of Public Health (MPH) degree are satisfied by this study. To the best of my knowledge, no other university or institution has accepted the findings provided in this thesis as credit toward a degree or diploma.

Signature of the Supervisor:

Prof. Dr. Salamat Khandker
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Approval of Dissertation

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Acknowledgements

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Acronyms

REC	Research Ethics Committee
SPSS	Statistical Package for Social Sciences
WHO	World Health Organization

Abstract

Background: Chronic kidney disease (CKD) is a significant public health issue in Bangladesh, often accompanied by various co-morbidities that exacerbate its impact on patients. This study investigates the severity and relationship of co-morbidities with CKD among patients in Bangladesh.

Methods: A cross-sectional study was conducted involving 243 CKD patients from healthcare facilities in Bangladesh. Socio-demographic data, lifestyle factors, and clinical parameters were collected through structured interviews and medical records. Statistical analyses, including chi-square tests, were used to examine associations between co-morbidities and various factors such as body mass index (BMI), CKD duration, age, marital status, smoking, diet type, and dialysis status.

Results: The study included participants ranging from 15 to over 70 years, with a mean age of 50.42 years. Most participants were male (77.4%), married (92.6%), and had a monthly income of less than 30,000 BDT (57.6%). Significant associations were found between co-morbidities and BMI ($\chi^2 = 15.5$, $p = 0.00$), CKD duration ($\chi^2 = 70.4$, $p = 0.00$), age ($\chi^2 = 33.5$, $p = 0.00$), marital status ($\chi^2 = 40.9$, $p = 0.00$), smoking ($\chi^2 = 4.7$, $p = 0.03$), diet type ($\chi^2 = 10.26$, $p = 0.00$), and dialysis status ($\chi^2 = 19.9$, $p = 0.00$). Hypertension (26.7%) and diabetes (38.3%) were the most common co-morbidities among participants.

Conclusion: The study highlights significant associations between co-morbidities and various socio-demographic and clinical factors in CKD patients in Bangladesh. These findings underscore the need for a holistic approach in CKD management, addressing socio-economic factors, promoting healthy lifestyle choices, and ensuring comprehensive medical care. Future research should focus on longitudinal studies to further elucidate these relationships and inform targeted interventions.

Keywords: Chronic Kidney Disease (CKD), Co-morbidities, Bangladesh, Public health.

Chapter I: Introduction

1.1.1 Background:

Chronic kidney disease (CKD), or chronic kidney failure, is characterized by a gradual decline in kidney function. This condition involves persistent damage to renal tissues and nephrons (Lopez et al., 2011). Comorbidities associated with CKD, such as hypertension, diabetes, and cardiovascular disease (CVD), complicate clinical management and increase healthcare costs (National Library of Medicine, 2009). Globally, CKD is a significant public health concern, leading to considerable death and disability, which are exacerbated by related comorbidities (Macrae et al., 2021). The prevalence of CKD is rising and was the 18th leading cause of death worldwide in 2010, up from 27th in 1990. In developed nations, moderate-to-severe CKD (stages G3–G5) affects 5%–6% of the population, with higher rates observed in older adults, lower socioeconomic groups, and certain ethnicities (Frasher et al., 2016). The risk of cardiovascular disease is particularly pronounced in CKD patients, often surpassing the risk of progressing to end-stage kidney disease. This progression leads to significant costs for healthcare systems, including an estimated £1.45 billion spent on CKD-related treatments in the UK in 2009–2010, with a substantial portion allocated to renal replacement therapy and cardiovascular complications (Wright et al., 2009).

CKD is defined by an estimated glomerular filtration rate (eGFR) below 60 mL/min/1.73 m² or the presence of proteinuria. The prevalence of CKD varies widely, with significant regional differences. In Asia, approximately 434.3 million adults are affected by CKD, with 65.6 million experiencing advanced stages of the disease. The highest numbers are found in China and India, which together account for 69.1% of the region's CKD cases (Liyanage et al., 2022).

In Bangladesh, kidney diseases are among the leading causes of death, with an age-adjusted mortality rate of 14.83 per 100,000 population. Chronic kidney disease often progresses to end-stage renal disease (ESRD), requiring regular dialysis to sustain life. Around 1.6 million people in Bangladesh suffer from ESRD, but fewer than 10% receive dialysis due to limited availability in both private and public hospitals (Al Amin et al., 2021). In rural areas and some urban regions, approximately one-third of the population remains undiagnosed with CKD. The prevalence of CKD increases with age and is associated with obesity, diabetes, and hypertension. Ethnic

disparities also exist, with some groups showing higher creatinine levels due to increased muscle mass, leading to decreased glomerular filtration rates.

Advanced CKD patients frequently experience anemia, as well as deficiencies in calcium and vitamin D. Anemia becomes more common with the progression of CKD and affects 60% to 80% of those with end-stage renal disease. This condition leads to reduced physical strength, decreased appetite, impaired cognitive function, increased susceptibility to infections, and overall diminished quality of life. The primary cause of anemia in CKD patients is insufficient erythropoietin production by the kidneys. In Bangladesh, challenges related to CKD comorbidities are compounded by socioeconomic factors, with many individuals unable to afford the high costs of treatment for associated conditions like hypertension, diabetes, and cardiovascular disease (Al Amin et al., 2021).

1.1.2 Problem Statement

The combination of chronic kidney disease (CKD) and other comorbidities has become a significant global health concern. The prevalence of CKD and its concomitant conditions, including diabetes, hypertension, and cardiovascular illnesses, have been rising over time. To create efficient preventative and management measures for this global health issue, a thorough understanding is required. Chronic Kidney Disease (CKD) is more common among the elderly, with nearly half of CKD patients being over the age of 70. Nevertheless, whereas younger individuals with CKD tend to undergo a gradual decline in kidney function, 30% of CKD patients aged 65 and above have a stable form of the disease. In the lack of rewards or quality standards for prioritizing CKD care, guidelines on evaluating and managing early CKD are available but have not yet been widely embraced. People with lower socioeconomic position bear a disproportionate amount of the burden of CKD since it affects them more frequently. (KDIGO—2017). CKD and related comorbidities are a specific problem in the Asian region. Variations in eating habits, genetic predisposition, and healthcare infrastructure are directly involved in this problem. So, the focusing factor contributes to the unique CKD burden in Asia.

Crucial to tailor interventions that account for these specific challenges—Changes the lifestyle modification.

Bangladesh faces distinct challenges in dealing with CKD and its comorbidities. This South Asian nation grapples with a high CKD prevalence, often linked to environmental factors, limited access to healthcare, and socioeconomic disparities , Essential for developing targeted solutions and policy recommendations within the Bangladeshi context are --Most of the people had inadequate knowledge of CKD & other comorbidity , Lack of CKD screening and educational programs have contributed to the inadequate patient knowledge about the condition –So focus these area – improvement people awareness .Support them mentally & financially . Changes the lifestyle modification, Focus the limited access to healthcare -improvement this sector, develop infrastructure etc (Banik S. et al 2021)

1.1.3 Justification:

Significant global morbidity is brought on by chronic kidney disease (CKD), which also raises mortality from all causes including cardiovascular disease. There hasn't been agreement on whether health systems and governments should prioritize early detection and intervention for CKD and other comorbidities, in contrast to other chronic diseases with established screening procedures. Study can determine the selection of populations for CKD & other comorbidity screening, the relative diagnostic and predictive characteristics of tests for kidney disease, hypertension, diabetes, and cardiovascular diseases, the evidence base for treatments that lower the risk of CKD progression and cardiovascular disease, and implementation strategies for CKD & other comorbidities. The prevalence of CKD is 15.1–22.9% in some districts of Sri Lanka, and previous research has found this association on farming occupations' respondents. (GBD Chronic Kidney Disease Collaboration, 2017). A recent systematic review found that the overall pooled prevalence of CKD among Bangladeshi adults was 17.3%, ranging from 12.8% to 26.0%. (Islam SMS, Salehin et al 2021).

So, the study identified the contributory factors that progression of chronic kidney diseases & association with others comorbidity in my study that's help to people improve their lifestyle & treatment procedure. Focus the contributory factor & helps them early diagnosis & treatment, thus study hope reduce the prevalence of CKD & association with others Comorbidity,

Operational definition:

1. Chronic kidney disease - CKD is a condition in which the kidneys are damaged and cannot filter blood as well as they should.
2. Comorbidity – the simultaneous presence of two or more diseases or medical conditions in a patient.
3. Severity: Severity of illness scores 1-5 in CKD -Kidney tissue damage as well as nephron damage & filtration is very poor or unable.

1.3 Research questions:

What is the Severity & Relationship of other co-morbidities with chronic kidney disease among patients in Bangladesh?

1.4 Research objectives

General objective:

To determine the Relationship of progression of chronic kidney diseases with severity of other comorbidity.

Specific objectives:

1. To identify Sociodemographic Characteristics of respondents,

3.To identify other comorbidity among the respondents,

2.To find out the severity of chronic kidney disease of respondents,

4. To assess the association between comorbidity and other variables of CKD patients.

Chapter Two: Literature Review

Patients with Chronic Kidney Disease (CKD) in stages 3-5 who had at least three other medical conditions when they were first enrolled started dialysis at an earlier stage (with a hazard ratio of 2.971) compared to patients who did not have any comorbidities. Factors that increased the risk of having multiple comorbidities included advanced age, smoking, and the presence of proteinuria. Through a straightforward and easily applicable method of assessing comorbidities, this study revealed a connection between having multiple medical conditions and poorer kidney outcomes in patients with stage 3-5 CKD. These findings suggest an immediate need for personalized CKD care strategies for high-risk groups, in addition018) to the current guideline-based approaches. (Lee WC et al., 2018)

Another study reported that only 4% had no comorbidities, while 26% had one comorbidity, 29% had two comorbidities, and 40% had more than two comorbidities. Hypertension was the most common comorbidity 88%, followed by "painful conditions" in 30% of the participants, anemia in 24%, ischemic heart disease in 23%, diabetes in 17%, and thyroid disorders in 12%. On average, participants were taking 5 medications, and this number increased with the severity of comorbidities. The study also found that a higher treatment burden and the presence of multiple comorbidities were independently associated with factors such as age, smoking, higher body mass index, and a lower estimated glomerular filtration rate (eGFR). Lower educational status was also independently associated with a higher treatment burden. Also revealed that having more comorbidities was independently associated with a higher risk of mortality, with a hazard ratio of 2.81 for individuals with three or more comorbidities compared to those with none or one. (Fraser et al., 2015)

A study reported that the most common conditions after CKD were hypertension (59.3%), obesity (30.8%), ischemic heart disease (16.8%), and diabetes (15.4%). Having two co-existing conditions was the most prevalent scenario (27%), with hypertension and obesity being the most common combination (29%). Overall, 73.9% of participants had multimorbidity, rising to 86.6% in those with CKD. Age, BMI, and decreasing eGFR were significantly associated with multimorbidity. (Hirts JA et al. 2020)

A study showed that hypertension and chronic kidney disease (CKD) are highly prevalent among individuals with stage 3-5 CKD. Diabetes emerged as the most common cause of End Stage Renal Disease (ESRD) according to our findings. Additionally, our study revealed a higher prevalence of CKD among males (61.25%) compared to females (38.75%). The study also identified that the prevalence of CKD is highest in the age group of 40-49 years (32.5%) and lowest in individuals older than 70 years (11.25%). Importantly, our research demonstrated a significant association between smoking and the presence of CKD. (Mullangi, S. et al, 2022)

A study in Libya showed that approximately 73.61% of selected patients had comorbidities, averaging 4.8 concurrent diseases per patient. Most patients (53.3%) were taking more than 10 drugs on average, with an average of 11.25 prescribed medications per patient. The average length of hospital stay was 5.58 days. Among these patients, 502 drug-related problems were identified, representing about 87.15% of the study population. The most common issues were untreated conditions like hyponatremia and anemia, making up 39.6% of drug-related problems. Improper drug selection accounted for 16.3%, drug use without indications (e.g., antibiotics) for 13.5%, and overuse of drugs (e.g., metoclopramide) for 12.5%. (Alssageer et al., 2023)

Another study found that in 2017, globally, 1.2 million people died from chronic kidney disease (CKD). The all-age mortality rate due to CKD increased by 41.5% since 1990, while the age-standardized mortality rate remained stable. There were 697.5 million cases of CKD in 2017, resulting in a global prevalence of 9.1%, with a 29.3% increase since 1990. CKD caused 35.8 million Disability-Adjusted Life Years (DALYs), with diabetic nephropathy contributing significantly. The burden of CKD was highest in regions with lower development levels and lower in regions like western Europe. CKD also had a substantial impact on cardiovascular diseases, with 1.4 million cardiovascular disease-related deaths and 25.3 million cardiovascular disease DALYs linked to impaired kidney function. (GBD Chronic Kidney Disease Collaboration, 2017)

Approximately 70.8% of end-stage renal disease patients had at least one comorbidity, with hypertension, diabetes, and cardiovascular disease being the most common. Health-Related Quality of Life (HRQOL) varied significantly based on the number of comorbidities, with a statistically highly significant ($p < 0.001$). Specifically, among the comorbidities, diabetes was associated with a lower quality of life in these patients. (Cha J et al. 2020)

Hepatitis C negatively affects the survival of hemodialysis and renal transplant patients. Treating hepatitis C in end-stage renal disease is challenging with low response rates and tolerability issues. New antiviral drugs may change treatment for those with mild to moderate renal impairment, but their safety in severe renal impairment is uncertain. The safety of newer Hepatitis C therapies in individuals with severe renal impairment is still uncertain. This review article explores the connection between hepatitis C and chronic kidney disease, outlines the various renal diseases associated with hepatitis C, and discusses the available treatments for hepatitis C in the context of this specific subgroup of patients. (Azmi AN et al. 2015)

A study conducted in Bangladesh reported among 300 patients, there were 153 in the early stage of chronic kidney disease (ESCKDP) and 147 in the advanced stage (ASCKDP). ASCKDP had lower levels of hemoglobin (Hb) and red blood cells (RBC), but higher levels of corpuscular Hb than ESCKDP. These changes were associated with the severity of CKD, and there were significant age and body mass index differences between ESCKDP and ASCKDP. (Rahman MA.et al, 2022)

The prevalence of chronic kidney disease (CKD) in Asia varies significantly, with an overall range of 7.0% to 34.3%, and the prevalence of advanced CKD (eGFR <30 mL/min/1.73 m2) ranging from 0.1% to 17.0%. In Asia, an estimated 434.3 million adults have CKD, including approximately 65.6 million with advanced CKD.

The highest numbers of adults living with CKD are found in China, with up to 159.8 million individuals, and India, with up to 140.2 million. These two countries collectively account for 69.1% of all adults with CKD in the region. (Liyanage T. et al., 2021)

Chapter Three: Methodology

Study Design:

This research utilized a cross-sectional survey design, based on primary survey data collected by the researcher. The study was quantitative in nature.

Study Area

The study was conducted at Bangabandhu Sheikh Mujib Medical University (BSMMU), specifically within the Nephrology Department.

Study Population

The target population included all patients diagnosed with chronic kidney disease (CKD), with or without other comorbidities, who were admitted to the Nephrology Department at BSMMU. Data were also collected from outpatient CKD patients.

Sample Size:

The sample size was calculated using the formula:

$n=z^2pq/d^2$

Where,

n= desired sample size

d= desired margin of error

z = 1.96 (95% confidence interval)

p = *prevalence of CKD in Bangladesh (0.2)* (Banik S et al 2019)

q = 1-p = 1-0.2 = 0.80

d = 5 % =0.05

So,

$n = (1.96)^2 (0.20 \times 0.80)/ (0.05)^2$

=243

Sampling technique

A systematic approach employing a simple random sampling technique was implemented, wherein every alternative sample was systematically selected for inclusion in the study.

Selection Criteria:

- **Inclusion Criteria**:
    1. Individuals diagnosed with CKD.
    2. Both male and female participants.
    3. Individuals who were available and willing to participate in the study.
- **Exclusion Criteria**:
    1. Individuals who declined to participate.
    2. Individuals who did not have CKD.

Study Period

Data collection took place over three months, from November 2023 to February 2024. The timeline included two months for data collection, 15 days for data analysis and interpretation, and the final 15 days for report writing and submission.

Data Collection and Quality Control

Quantitative data were gathered through a semi-structured questionnaire. The questionnaire was pretested and finalized to ensure its suitability and appropriateness. An English version of the questionnaire was pretested in a non-sampling area to gather feedback regarding question clarity and sequencing. All data were carefully checked and edited before being entered into SPSS.

Data Analysis

Using SPSS software, the interview data were double-checked for accuracy, coded, and then added to a database. The analysis was centered on the goals of the study and pertinent metrics. Data analysis was done using statistical tests, such as chi-square and Fisher's exact tests.

Ethical Issues

To guarantee adherence to ethical standards, the study protocol was submitted to the Dhaka International University (DIU) Faculty of Health and Life Sciences Research Ethics Committee for evaluation and approval.

Chapter Four: Result

Socio-demographic status of the participants

Table 1 presents the socio-demographic characteristics of the study participants. The ages of the participants ranged from 15 to over 70 years, with a mean age of 50.42 years (SD ± 15.2). Most participants (41.2%) were aged between 31 and 50 years. The majority were male (77.4%), and a large proportion were married (92.6%). In terms of income, over half (57.6%) of the participants reported a monthly income of less than 30,000 BDT. Exercise habits were nearly evenly distributed, with 50.6% of participants engaging in regular exercise. Smoking prevalence was lower, with 56.4% of participants not smoking compared to 43.6% who did. Regarding the duration of chronic kidney disease (CKD), 51.0% of participants had been living with CKD for 3-5 years. Dietary habits showed that a majority (61.3%) followed a mixed diet, while 25.1% adhered to a vegetarian diet, and 13.6% consumed a protein-rich diet.

Table 1: Socio-demographic status of the participants

Variable		**Frequency**	**percentage**
Age	15 – 30	32	13.2
	31 – 50	100	41.2
	51 – 70	91	37.4
	70 +	20	8.2
	Mean ± SD	50.42 ± 15.2	
Gender	Male	188	77.4
	Female	55	22.6
Marital Status	Married	225	92.6
	Unmarried	18	7.4

Monthly Income	<30000	140	57.6
	30001 – 40000	55	22.6
	40001 – 50000	48	19.8
Exercise	Yes	123	50.6
	No	120	49.4
Smoking	Yes	106	43.6
	No	137	56.4
Duration of CKD	<2	69	28.4
	3 – 5	124	51.0
	6+	50	20.6
Diet	Veg	61	25.1
	Protein	33	13.6
	Mixed	149	61.3

Occupation status of the respondents

Figure 1 illustrates the occupational distribution of the study participants. Among them, 29.2% are engaged in service-related jobs, making it the largest category. This is followed by those involved in business, constituting 27.2% of the participants. Unemployed individuals account for 21%, while 15.6% are housewives. Students make up 4.9% of the participants, and day laborers represent the smallest group at 2.1%.

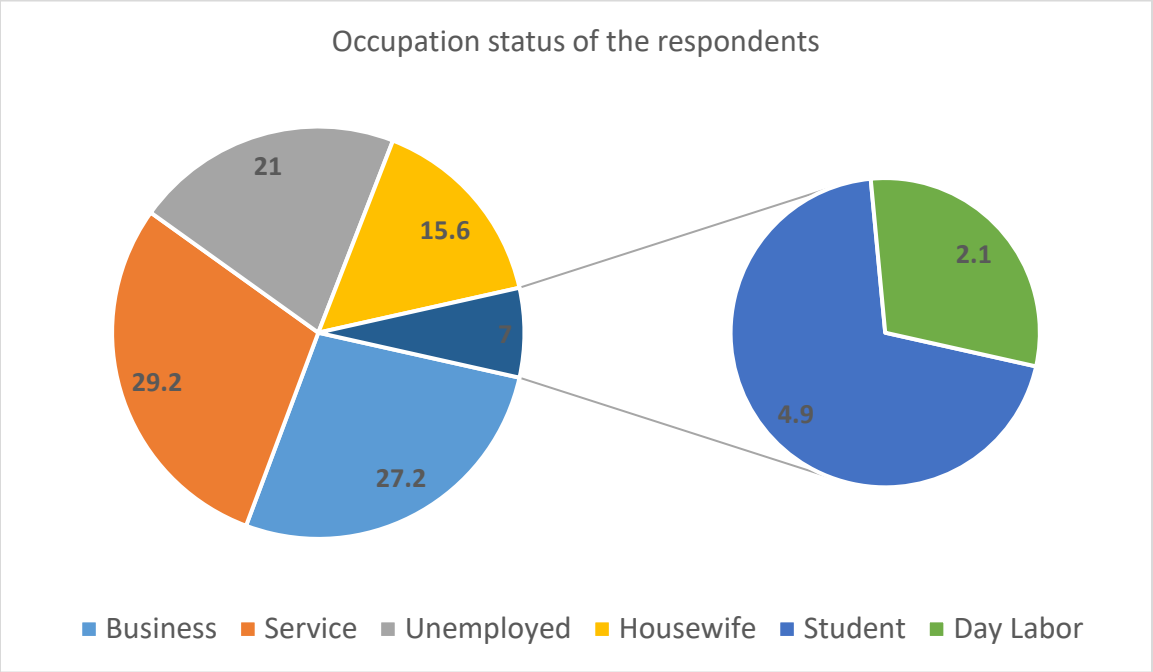

Fig 1: Occupation status of the respondents

BMI of the respondents

Figure 2 presents the Body Mass Index (BMI) distribution of the study participants. A significant majority, 87.2%, have a BMI categorized as low (<18.5). In contrast, only 12.8% of the participants have a normal BMI (18.6-24.9).

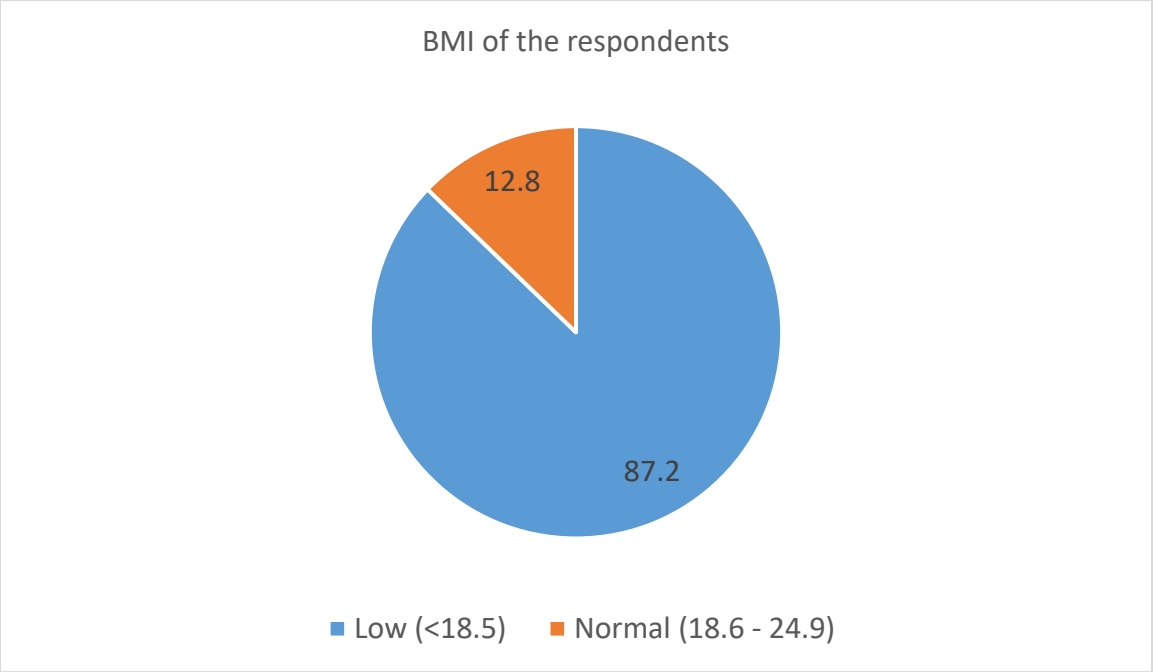

Fig 2: BMI of the respondents

Family history of the Respondents

Figure 3 depicts the family history of chronic kidney disease (CKD) and co-morbidities among the study participants. A majority, 74.9%, reported no family history of CKD, while 25.1% did have such a history. Regarding co-morbidities, 61.7% of participants indicated no family history, whereas 38.3% reported having a family history of co-morbid conditions.

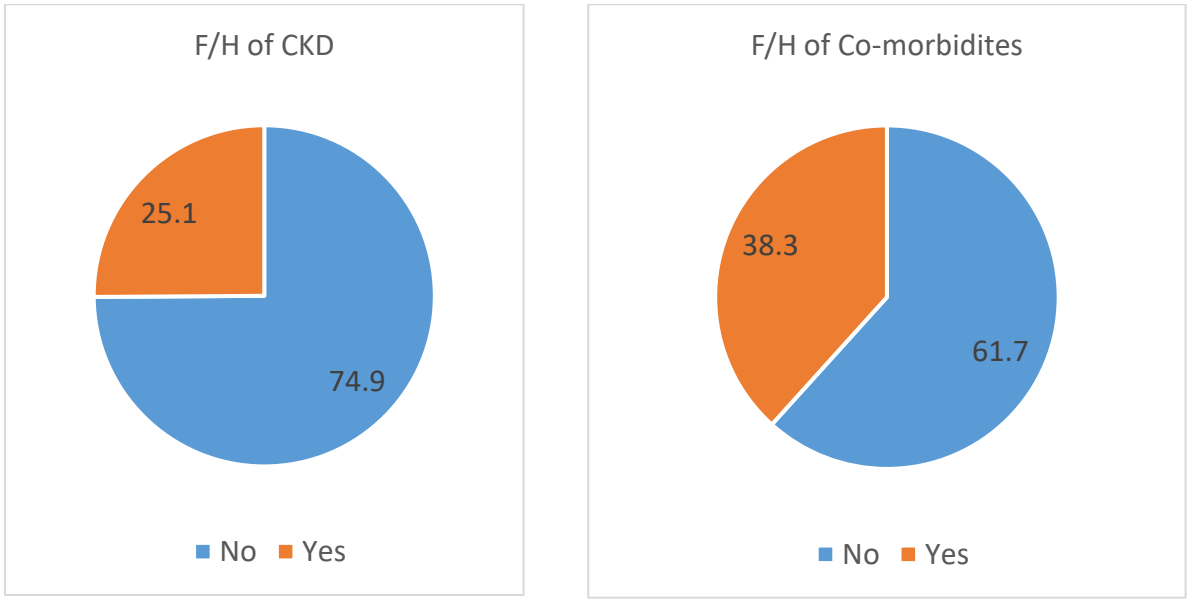

Fig 3: Family history of the Respondents

Dialysis status of the respondents

Figure 4 shows the dialysis status of the study participants. A vast majority, 83.1%, are not undergoing dialysis, while 16.9% are receiving dialysis treatment.

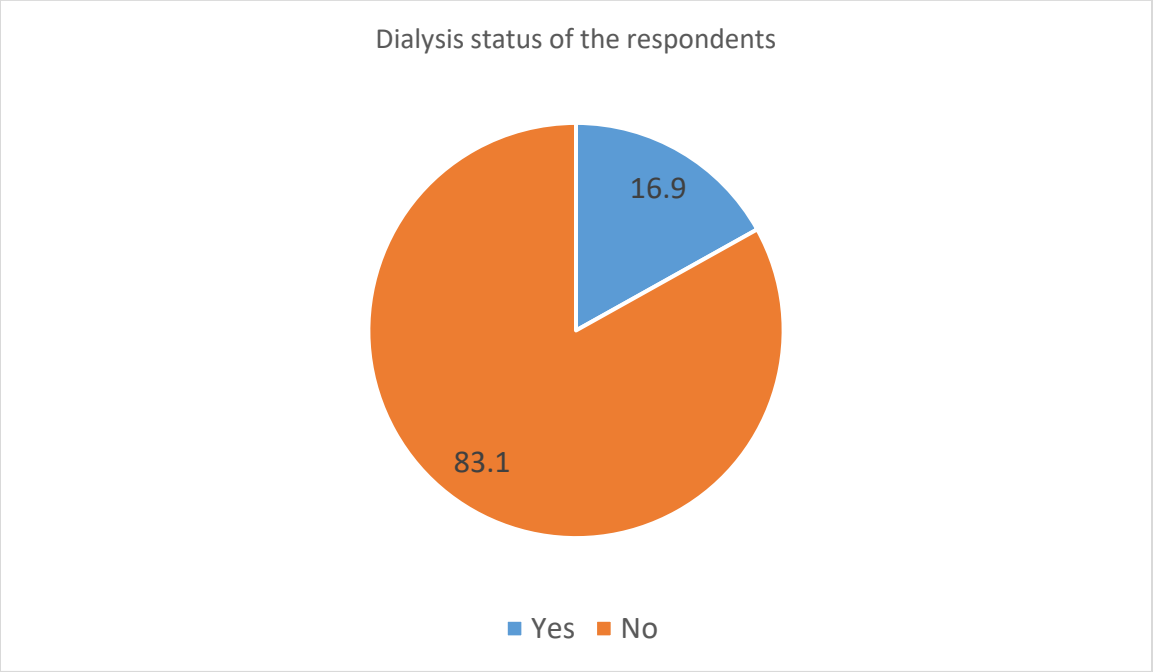

Fig 4: Dialysis status of the respondents

Co-morbidities status of the respondents

Figure 5 illustrates the distribution of co-morbidities among the study participants. Of the participants, 30.5% have no co-morbidities. Hypertension is present in 26.7% of the participants, while 38.3% have diabetes. Additionally, 4.5% have other types of co-morbidities.

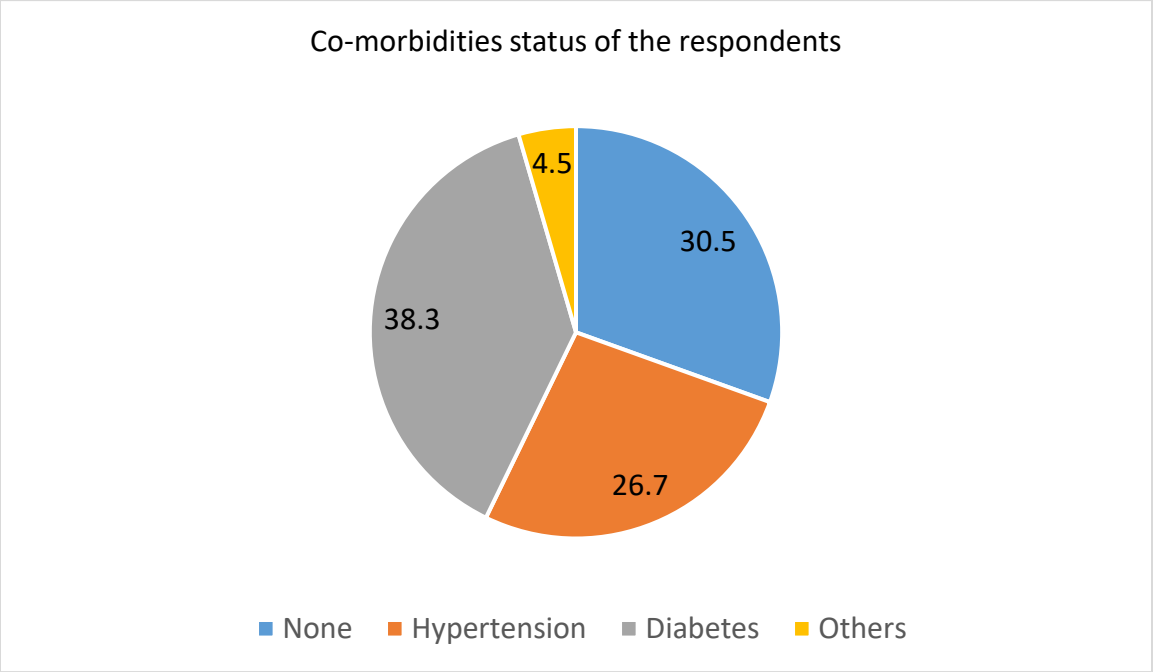

Fig 5: Co-morbidities status of the respondents

Health status and severity of the respondents

Table 2 details the health status and severity of conditions among the study participants. In urine routine examinations, 41.6% of participants had normal results, 20.2% exhibited hematuria, and 38.3% had proteinuria. Regarding lipid profiles, 71.2% had normal lipid levels, while 28.8% had elevated levels. Hemoglobin levels were normal in 69.5% of participants, with the remaining 30.5% displaying low levels. Blood Urea Nitrogen (BUN) levels were normal in 54.7% of participants, whereas 45.3% had elevated levels. Creatinine levels varied, with 60.9% falling between 8-14, 24.7% between 15-20, and 14.4% above 20. Random Blood Sugar (RBS) was normal in 61.7% of participants, with 38.3% having high levels. Serum Glutamate Pyruvate Transaminase (SGPT) levels were high in 63.8% of participants, leaving 36.2% with normal levels. Lastly, 74.1% of participants had normal Serum Glutamic-Oxaloacetic Transaminase (SGOT) levels, while 25.9% had elevated levels.

Table 2: Health status and severity of the respondents

Variable		**Frequency**	**percentage**
Urine routine examination	Normal	101	41.6
	Hematuria	49	20.2
	Proteinuria	93	38.3
Lipid Profile	Normal	173	71.2
	High	70	28.8
Heamoglobin	Normal	169	69.5
	Low	74	30.5
Blood urea nitrogen (BUN)	Normal	133	54.7
	High	110	45.3
Creatinine	8 – 14	148	60.9

	15 – 20	60	24.7
	20+	35	14.4
RBS	Normal	150	61.7
	High	93	38.3
Serum Glutamate Pyruvate Transaminase (SGPT)	Normal	88	36.2
	High	155	63.8
Serum glutamic-oxaloacetic transaminase (SGOT)	Normal	180	74.1
	High	63	25.9

Association between co-morbidities and other variables

The association between co-morbidities and various variables shows several significant results. A significant association was found between co-morbidities and BMI ($\chi^2 = 15.5$, $p = 0.00$), indicating that BMI is significantly related to the presence of co-morbidities. CKD duration also demonstrated a significant association with co-morbidities ($\chi^2 = 70.4$, $p = 0.00$), suggesting that the length of time living with chronic kidney disease is an important factor. Age was another variable with a significant association ($\chi^2 = 33.5$, $p = 0.00$), highlighting that different age groups have varying prevalence of co-morbidities. Marital status showed a strong association with co-morbidities ($\chi^2 = 40.9$, $p = 0.00$), indicating that marital status can influence the presence of co-morbid conditions. Smoking was significantly associated with co-morbidities ($\chi^2 = 4.7$, $p = 0.03$), suggesting a link between smoking habits and the prevalence of co-morbidities. Diet type also showed a significant association ($\chi^2 = 10.26$, $p = 0.00$), indicating that dietary choices are related to co-morbid conditions. Lastly, dialysis status was significantly associated with co-morbidities ($\chi^2 = 19.9$, $p = 0.00$), suggesting that undergoing dialysis is an important factor in the presence of co-morbidities.

Table 3: Association between co-morbidities and their other variables

Variable		**Co-morbidities**		**χ^2 value**	**P value**
		No (%)	**Yes (%)**		
BMI	Low	74 (30.5)	138 (56.8)	**15.5**	**0.00**
	Normal	0 (0)	31 (12.8)		
CKD Duration	<2	48 (19.8)	21 (8.6)	**70.4**	**0.00**
	3 – 5	21 (8.6)	103 (42.3)		
	6+	5 (2.1)	45 (18.5)		
Age	15 – 30	23 (9.5)	9 (3.7)	**33.5**	**0.00**
	31 – 50	28 (11.5)	72 (29.5)		

	51 – 70	22 (9.1)	69 (28.4)		
	70 +	1 (0.4)	19 (7.8)		
Marital status	Unmarried	18 (7.4)	0 (0)	**40.9**	**0.00**
	Married	56 (23.0)	169 (69.5)		
Gender	Male	62 (25.5)	126 (51.9)	2.5	0.11
	Female	12 (4.9)	43 (17.7)		
Exercise	No	28 (11.5)	92 (37.9)	5.67	0.17
	Yes	46 (18.9)	77 (31.7)		
Smoking	No	34 (14.0)	103 (42.4)	**4.7**	**0.03**
	Yes	40 (16.5)	66 (27.2)		
Diet type	Veg	12 (4.9)	49 (20.2)	**10.26**	**0.00**
	Protein	17 (7.0)	16 (6.6)		
	Mixed	45 (18.5)	104 (42.8)		
Dialysis	No	74 (30.5)	128 (52.7)	**19.9**	**0.0**
	Yes	0 (0)	41 (16.9)		

Chapter Five: Discussion

The present study aimed to investigate the severity and relationship of other co-morbidities with chronic kidney disease (CKD) among patients in Bangladesh. The results revealed significant associations between co-morbidities and various socio-demographic and clinical factors, contributing to the growing body of knowledge on CKD and its multifaceted impact on patients.

The socio-demographic profile of our participants showed that the majority were male (77.4%) and married (92.6%), with a mean age of 50.42 years. This aligns with previous studies indicating that CKD prevalence is higher among older adults and males (O'Seaghdha et al., 2011). Additionally, the high proportion of participants with low monthly income (<30,000 BDT) emphasizes the economic burden of CKD, corroborating findings from Vart et al. (2015), which identified a significant association between low socio-economic status and CKD.

Regular exercise was reported by 50.6% of participants, and 43.6% were smokers. The significant association between smoking and co-morbidities ($\chi^2 = 4.7$, $p = 0.03$) supports the established link between smoking and adverse health outcomes in CKD patients (Hallan & Orth, 2011). Our findings regarding exercise habits, while evenly distributed, suggest that promoting physical activity could be beneficial, consistent with research advocating exercise as a means to improve CKD outcomes (Huang et al., 2019).

More than half of the participants (51.0%) had been living with CKD for 3-5 years. The significant association between CKD duration and co-morbidities ($\chi^2 = 70.4$, $p = 0.00$) underscores the progressive nature of CKD and its complications (Go et al., 2004). Dietary habits also showed a significant relationship with co-morbidities ($\chi^2 = 10.26$, $p = 0.00$), indicating that diet plays a crucial role in managing CKD and associated conditions (Chen et al., 2020). The predominance of mixed diets (61.3%) among participants suggests a potential area for dietary intervention.

The occupational distribution highlighted that service-related jobs (29.2%) and business (27.2%) were common among participants, with a notable proportion being unemployed (21%). This occupational diversity reflects the broad impact of CKD across different job sectors. Additionally, the overwhelming majority of participants (87.2%) had a low BMI (<18.5), and the significant association between BMI and co-morbidities ($\chi^2 = 15.5$, $p = 0.00$) suggests that undernutrition or malnutrition could be a prevalent issue among CKD patients, which is consistent with the findings of Carrero et al. (2008).

A substantial portion of participants reported no family history of CKD (74.9%) or co-morbidities (61.7%). The significant association between dialysis status and co-morbidities ($\chi^2 = 19.9$, $p = 0.00$) indicates that dialysis patients are more likely to experience additional health complications, a finding supported by various studies that highlight the high burden of co-morbidities in dialysis patients (Klag et al., 1996).

Hypertension (26.7%) and diabetes (38.3%) were the most prevalent co-morbidities among participants. These findings are in line with previous research that identifies hypertension and diabetes as major risk factors for CKD (Fox et al., 2004). The significant associations of co-morbidities with age ($\chi^2 = 33.5$, $p = 0.00$) and marital status ($\chi^2 = 40.9$, $p = 0.00$) further highlight the complex interplay of socio-demographic factors in CKD management.

The health status and laboratory findings revealed that a notable proportion of participants had abnormal results in urine routine examinations, lipid profiles, hemoglobin levels, BUN, creatinine, RBS, SGPT, and SGOT. These results emphasize the need for regular monitoring and comprehensive management of CKD patients to prevent and manage co-morbidities (Levin et al., 2007).

CHAPTER-VI

Conclusions

This study explored the severity and relationship of co-morbidities with chronic kidney disease (CKD) among patients in Bangladesh, providing a comprehensive understanding of socio-demographic, lifestyle, and clinical factors associated with CKD. The key findings revealed that most participants were male (77.4%), married (92.6%), and aged between 31-50 years, with a mean age of 50.42 years. Over half had a monthly income of less than 30,000 BDT, and regular exercise and smoking were reported by 50.6% and 43.6% of participants, respectively. More than half had been living with CKD for 3-5 years, and 61.3% followed a mixed diet. The largest occupational group was service-related jobs (29.2%), with a significant majority (87.2%) having a low BMI (<18.5). Most participants (74.9%) had no family history of CKD, and 83.1% were not undergoing dialysis. Hypertension (26.7%) and diabetes (38.3%) were the most common co-morbidities. Significant associations were found between co-morbidities and BMI, CKD duration, age, marital status, smoking, diet type, and dialysis status, with notable proportions of participants displaying abnormal laboratory results in urine routine examinations, lipid profiles, hemoglobin levels, BUN, creatinine, RBS, SGPT, and SGOT. These findings underscore the need for a holistic approach in CKD management, addressing socio-economic factors, promoting healthy lifestyle choices, and ensuring comprehensive medical care to improve outcomes for CKD patients in Bangladesh. Future research should focus on longitudinal studies to further elucidate these relationships and inform targeted interventions, contributing valuable insights for healthcare providers and policymakers in designing effective CKD management and prevention strategies.

Recommendations

- ✓ Based on the findings of this study, the following recommendations are proposed to enhance the management of chronic kidney disease (CKD) in Bangladesh:
- ✓ Implement campaigns to educate the public about CKD risk factors and the importance of early detection.
- ✓ Encourage regular physical activity and smoking cessation through community programs for CKD patients.
- ✓ Develop dietary guidelines and provide access to nutrition counseling to help patients adopt healthier eating habits.
- ✓ Enhance CKD screening and diagnostic services, especially in rural areas, and strengthen healthcare facilities for comprehensive CKD care.

Limitation

This study has several limitations. First, the cross-sectional design restricts the ability to establish causal relationships between co-morbidities and chronic kidney disease (CKD). Second, self-reported data on lifestyle factors, such as diet and exercise, may be subject to recall bias. Additionally, the study's sample may not be representative of the broader CKD population in Bangladesh, limiting the generalizability of the findings. Finally, factors such as genetic predispositions and environmental influences on CKD progression were not explored, which may affect the comprehensive understanding of the disease.

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