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A Study to Analyse the Relation between Consanguineous Marriage and Type of Dialysis in Chronic Kidney Disease Subjects

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Abstract: ***Chronic kidney disease is a progressive condition characterised by structural and functional changes to the kidney due to various causes. Chronic kidney disease is defined as a reduction in kidney function, an estimated glomerular filtration rate (eGFR) of less than 60 mL/min per 1·73 m², or markers of kidney damage, such as albuminuria, haematuria, or abnormalities detected through laboratory testing or imaging and that are present for at least 3 months. To understand how consanguineous marriages increase the prevalence of inherited genetic disorders, including CKD, due to higher chances of recessive gene inheritance. To assess the public health burden of CKD in populations with high rates of consanguineous marriages. To explore the prevalence of CKD in consanguineous marriages across different regions and cultural contexts. Aim of the study: A study to identify the co - relation of consanguineous marriage in chronic kidney disease. Objectives and Methodology: To study the relation between consanguineous marriage and Hemo dialysis in subjects with CKD; To study the relation between consanguineous marriage and Peritoneal dialysis in subjects with CKD. The correlation study was conducted on 90 subjects to identify if there is any relation between consanguineous marriage and chronic kidney disease. Results: There is no statistically significant association between the type of dialysis method (HD or PD) and consanguineous status (Consanguineous or Non Consanguineous). The distribution of patients between the two dialysis methods does not significantly differ based on whether they are consanguineous or non - consanguineous.***

Keywords: Consanguineous marriage, Chronic Kidney Disease, Hemodialysis, Peritoneal dialysis, End Stage Kidney Disease

1. Introduction

Chronic kidney disease is a progressive condition characterised by structural and functional changes to the kidney due to various causes. Chronic kidney disease is typically defined as a reduction in kidney function, an estimated glomerular filtration rate (eGFR) of less than 60 mL/min per 1·73 m², or markers of kidney damage, such as albuminuria, haematuria, or abnormalities detected through laboratory testing or imaging and that are present for at least 3 months [1]. The global burden of chronic kidney disease is substantial and growing: approximately 10% of adults worldwide are affected by some form of chronic kidney disease, which results in 1·2 million deaths and 28·0 million years of life lost each year [2, 3]. CKD is commonly caused by conditions such as diabetes, hypertension (high blood pressure), and glomerulonephritis, which is inflammation of the kidney's filtering units. Other risk factors include age, family history of kidney disease, obesity, and certain genetic conditions [3].

The process of removal of waste and extra water from blood is called dialysis [4]. It is an artificial replacement of kidney functioning, especially in renal failure cases. Dialysis cannot completely perform lost kidney function, but, to some extent, manages its activities by means of diffusion and ultrafiltration [5]. It is done in chronic renal failure (CRF) when the glomerular filtration rate falls below 15 ml/min/1.73m2 [6].

Hemodialysis (HD): Hemodialysis is the most common form of dialysis. In this method, blood is pumped out of the body to an artificial kidney (dialyzer) where it is filtered before being returned to the body. The dialyzer removes waste products, excess salts, and fluids. The process is typically done three times a week, with each session lasting about 3 to 5 hours. Hemodialysis can be performed in a hospital, dialysis center, or at home with the right equipment and training [7].

Types of Hemodialysis:
In - center Hemodialysis: Performed in a clinic or hospital where patients go several times a week.

Home Hemodialysis: Performed at home, which offers more flexibility in scheduling but requires training.

Peritoneal Dialysis (PD) Peritoneal Dialysis uses the lining of your abdomen (the peritoneum) to filter blood inside the body. A cleansing fluid, called dialysate, is infused into the peritoneal cavity where it absorbs waste products and excess fluids from the blood vessels in the abdominal lining. The fluid is then drained and replaced with fresh dialysate.

This process can be done manually throughout the day (Continuous Ambulatory Peritoneal Dialysis - CAPD) or automatically using a machine at night (Automated Peritoneal Dialysis - APD) [7, 8].

Types of Peritoneal Dialysis
Continuous Ambulatory Peritoneal Dialysis (CAPD): Involves multiple manual exchanges of dialysate fluid throughout the day.

Automated Peritoneal Dialysis (APD): Uses a machine to perform exchanges, typically while the patient sleeps. Dialysis is typically required in the later stages of chronic kidney disease (CKD), particularly in Stage 5, which is also known as End - Stage Renal Disease (ESRD) or Kidney Failure. At this stage, the kidneys have lost nearly all their ability to function effectively, and dialysis or a kidney transplant is necessary to sustain life [7, 8, 9,].

Consanguineous marriages are more common in south India primarily because of social and cultural factors. In India, marriages are considered as the most important ritual and social institution, which establish a strong relationship between two families. Most of the marriages in India are arranged by the parents because it is considered as the success rates of these marriages are high [10]. Especially in rural areas of south India consanguineous marriage are widely in practice and it is still a huge challenge1. Parents only consider the benefits of consanguineous marriage but they neglect the consequences [11]. According to Bittel "a consanguineous marriage is defined as a union between two individuals who are related as second cousins or closer, with the inbreeding coefficient (F) equal or higher than 0.0156, where (F) represents a measure of the proportion of loci at which the offspring of a consanguineous union is expected to inherit identical gene copies from both parents. Globally, in some countries like Western Europe, North America, Australia, and Russian societies consanguineous marriage is lesser than 1%. In societies of the Iberian Peninsula, Japan, South American countries the consanguineous marriages are about 1 to 10% of all marriages and comparatively Consanguinity is seen widely practised in South India than in Northern India [12, 13]. It is practised in Muslims, Hindus, Buddhism and Parsi religions, however in Christianity it is considered as taboo. Again, different religions follow the different types of consanguinity or degree of consanguinity according to their tradition consanguineous marriages are more in countries like Iran, India, Sub Saharan Africa, Central and South Asia i. e. about 20% - 50% of all marriages [14].

In relation to chronic kidney disease (CKD), consanguineous marriages can increase the risk of genetic disorders that may lead to or exacerbate CKD.

In such marriages, there is a higher chance of inheriting recessive genetic disorders from both parents, as they may share similar genetic backgrounds. This can result in an increased prevalence of inherited kidney diseases such as autosomal recessive polycystic kidney disease (ARPKD) or other genetic conditions that impact kidney function. Consanguineous marriages are recognized to be associated with higher risk for autosomal recessive transmitted diseases than in the general population [15].

To understand how consanguineous marriages increase the prevalence of inherited genetic disorders, including CKD, due to higher chances of recessive gene inheritance. To assess the public health burden of CKD in populations with high rates of consanguineous marriages. To explore the prevalence of CKD in consanguineous marriages across different regions and cultural contexts.

Aim of Study

A Study to Analyse the Relation Between Consanguineous Marriage and Type of Dialysis in Chronic Kidney Disease Subjects.

Objectives

1) To study the relation between consanguineous marriage and Hemodialysis in subjects with CKD
2) To study the relation between consanguineous marriage and Peritoneal dialysis in subjects with CKD

Methodology

Study setup: Department of Nephrology in SVIMS university, Tirupati Study design: observational study
Sampling method: Convenience sampling Study duration: April 2024 to August 2024 Sample size: 90 members

Inclusion Criteria

- AGE: all age groups GENDER: males and females
- Type of Dialysis: peritoneal and Haemodialysis
- Type of marriage: Consanguineous and non Consanguineous marriage

Exclusion Criteria

- Pregnancy and lactating mothers Cardio vascular conditions Neurological conditions

Study Procedure

90 subjects with chronic kidney disease stage 4 who had underwent either hemodialysis or peritoneal dialysis were included in the study after obtaining an informed consent. The baseline demographic data of Height, weight, BMI, Educational qualification, place of residence, occupation and marriage type was collected from the Department of Nephrology, SVIMS hospital.

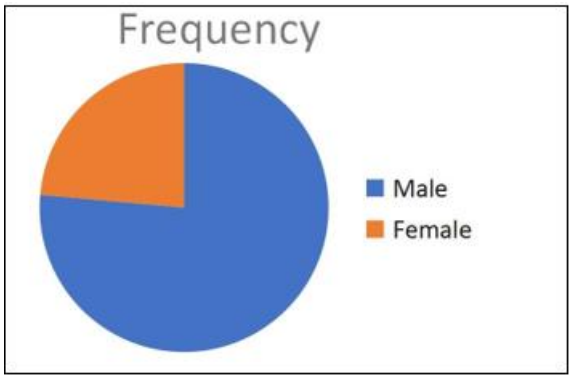
Descriptives

Descriptive Statistics

	Mean		Std. Deviation
	Statistic	Std. Error	Statistic
Age	53.94	1.657	15.637
Height (in ft)	5.3562	.04977	.46951
Weight	58.53	1.275	12.028
BMI	22.7366	.36307	3.42523
Valid N (listwise)			

Frequency Table

	Frequency	Percent	Valid Percent	Cumulative Percent
Vaild Male	68	76.4	76.4	76.4
Female	21	23.6	23.6	100.0
Total	89	100.0	100.0	

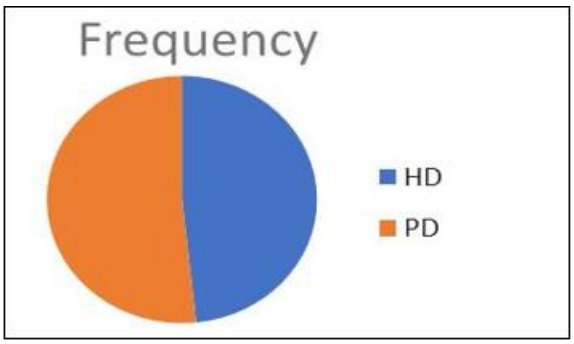


Educational Status

	Frequency	Percent	Valid Percent	Cumulative Percent
Graduate	13	14.6	14.6	14.6
High	18	20.2	20.2	34.8
School				
Illiterate	17	19.1	19.1	53.9
Middle	11	12.4	12.4	66.3
School				
Pre	2	2.2	2.2	68.5
University				
Primary	27	30.3	30.3	98.9
School				
Secondary	1	1.1	1.1	100.0
School				
Total	89	100.0	100.0	

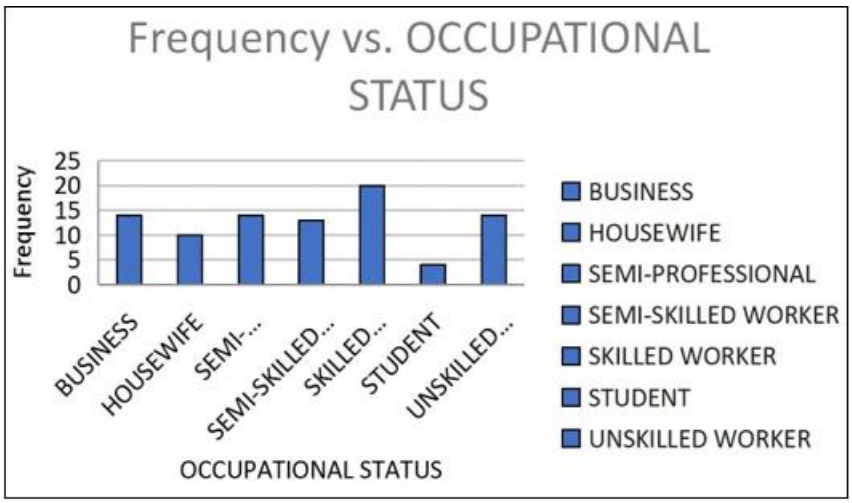
Dialysis Method

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid HD	43	48.3	48.3	48.3
PD	46	51.7	51.7	100.0
Total	89	100.0	100.0	



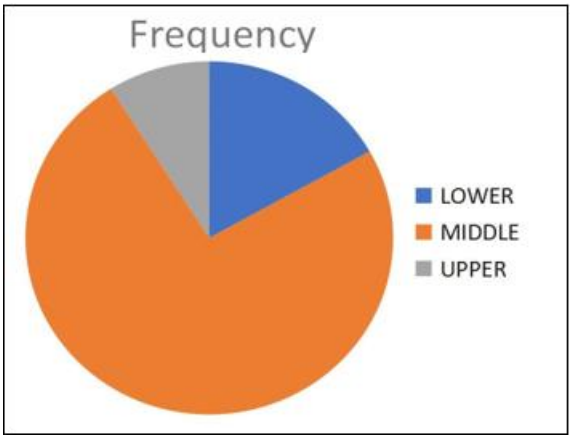
Occupational Status

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Business	14	15.7	15.7	15.7
Housewife	10	11.2	11.2	27.0
Semi -	14	15.7	15.7	42.7
Professional				
Semi - Skilled	13	14.6	14.6	57.3
Worker				
Skilled	20	22.5	22.5	79.8
Worker				
Student	4	4.5	4.5	84.3
Unskilled	14	15.7	15.7	100.0
Worker				
Total	89	100.0	100.0	



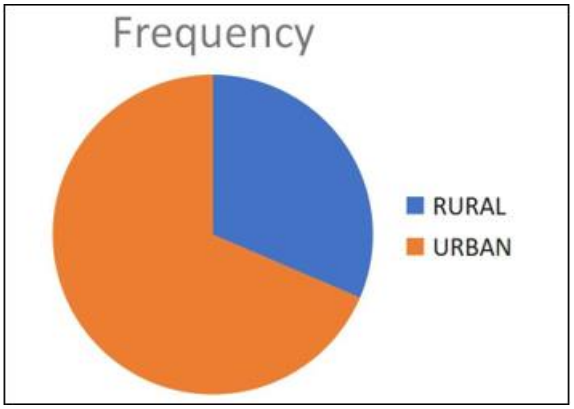
Socio- economic Status

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Lower	15	16.9	16.9	16.9
Middle	66	74.2	74.2	91.0
Upper	8	9.0	9.0	100.0
Total	89	100.0	100.0	



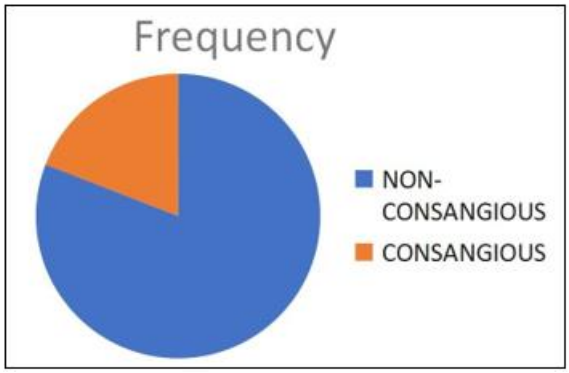
Place of Residence

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Rural	28	31.5	31.5	31.5
	Urban	61	68.5	68.5	100.0
	Total	89	100.0	100.0	



Consanginous/ Non- Consangious

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid NON -	72	80.9	80.9	80.9
Consangious				
Consangious	17	19.1	19.1	100.0
Total	89	100.0	100.0	



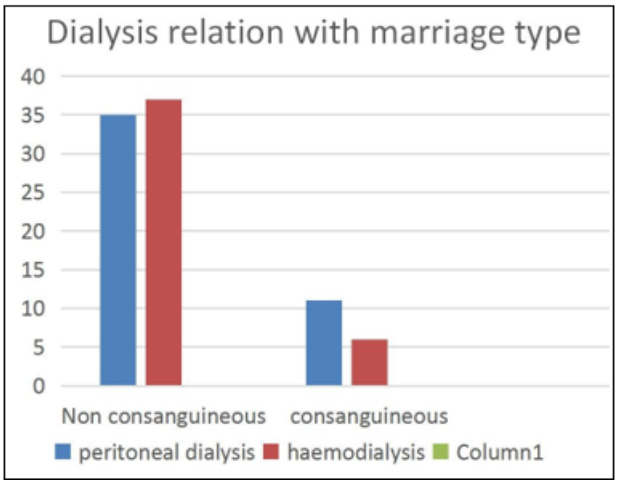
Crosstabs

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Dialysis Method * CONSANGINOUS/ NON - CONSANGIOUS	89	100.0%	0	0.0%	89	100.0%

Dialysis Method * CONSANGINOUS/NON - CONSANGIOUS Cross tabulation

	Peritoneal dialysis	Haemodialysis
Non Consangunieous	35	37
Consanguineous	11	6
Total	46	43



Chi - Square Tests

	Value	df	Asymp. Sig. (2 - sided)	Exact Sig. (2 - sided)	Exact Sig. (1 - sided)
Pearson Chi - Square	1.42a	1	.232		
Continuity Correctionb	.85	1	.355		
Likelihood Ratio	1.44	1	.229		
Fisher's Exact Test				.286	.178
Linear - by - Linear Association	1.41	1	.235		
N of Valid Cases	89				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 8.21.
b. Computed only for a 2x2 table

Pearson Chi - Square (Value = 1.427, p = 0.232): The p - value of 0.232 is greater than the standard significance level ($\alpha = 0.05$),
indicating no statistically significant association between the dialysis method and consanguineous status.
Continuity Correction (Value = 0.855, p = 0.355): This correction is applied to account for continuity in the 2x2 table,
but the p - value is still not significant.
Likelihood Ratio (Value = 1.447, p = 0.229): Similar to the Pearson Chi - Square, this test also suggests no significant association.
Fisher's Exact Test (p = 0.286, 2 - sided): Fisher's Exact Test is used when sample sizes are small. The result also indicates
no significant association.
Linear - by - Linear Association (Value = 1.411, p = 0.235): This test assesses whether there is a trend in the relationship between the two variables, but the result is not significant.

2. Discussion

Here's is a discussion on the relation between Consanguineous marriage and CKD. Consanguineous marriage can result in familial clustering of these genetic forms of CKD. The prevalence in certain populations: Consanguineous marriages are more common in regions such as South Asia, the middle East and North Africa. in these regions, the prevelance of CKD linked to genetic causes is often higher than in populations where Consanguinity is less common.

This observational study aimed to analyse the relation between Consanguineous marriage and type of Dialysis in CKD subjects.

In 2023 Semhat Karahisar organised a study with same focus of Consanguineous marriage on small kidney in CKD, that study had shown that CKD of uncertain etiology we believe that in regions with religional Consanguinity in the parents, frequent and high birth rate and insufficient maternal nutrition. We aimed to evaluate the effect of small kidney structure, which may occur due to the large number of children locally owned, maternal exposure to malnutrition, and narrowing of the genetic pool as a result of consanguineous marriage in closed societies, on the progression of CKD. We found that CKD develops at a younger age in those whose parents are related with small kidney

In July 2003, A Barbari et al conducted a epidemiological study on Consanguinity associated kidney diseases. that study concluded that consanguinity - associated kidney diseases pattern seems to differ from that of the general HD population by disease diagnosis and initiation at a younger age and a significantly higher risk for familial renal disease. It is a cultural phenomenon prevalent predominantly in the rural areas. We recommend a multi - disciplinary approach including educational, informative and probably legislative strategy to discourage consanguineous marriages in order to minimize.

3. Limitations

1) Data availability and quality
2) Retrospective nature (recall bias)
3) Genetic and environmental variability
4) Study population limitations
5) Ethical and cultural considerations
6) Diagnostic criteria variability

4. Future Recommendations

1) Intervention studies for Dialysis patients as it involves prolong duration of immobility.
2) Physical activity levels of these patients with CKD can be evaluated
3) Exercise prescription can be recommended

5. Conclusion

There is no statistically significant association between the type of dialysis method (HD or PD) and consanguineous status (CONSANGUINEOUS or NON - CONSANGUINEOUS). The distribution of patients between the two dialysis methods does not significantly differ based on whether they are consanguineous or non – consanguineous

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