



## Prevalence & Risk Factors of Nephropathy in Type 2 Diabetic Patients

Vimalkumar V K, C.R. Anand Moses, Padmanaban S.

International Journal of Collaborative Research on Internal Medicine & Public Health  
Vol. 3 No. 8 (August 2011)

### International Journal of Collaborative Research on Internal Medicine & Public Health (IJCRIMPH)

ISSN 1840-4529 | Journal Type: Open Access | Volume 3 Number 8

Journal details including published articles and guidelines for authors can be found at:

<http://www.iomcworld.com/ijcrimph/>

**To cite this Article:** Vimalkumar VK, Anand Moses CR, Padmanaban S. Prevalence & Risk Factors of Nephropathy in Type 2 Diabetic Patients. *International Journal of Collaborative Research on Internal Medicine & Public Health*. 2011; 3(8):598-615.

**Article URL:** <http://iomcworld.com/ijcrimph/ijcrimph-v03-n08-02.htm>

Correspondence concerning this article should be addressed to Vimalkumar V K, KILPAUK Medical College, Chennai- 600010, India / Email: vkvimal@gmail.com / Phone: 00919884384108

Paper publication: 17 August 2011

#### International Journal of Collaborative Research on Internal Medicine & Public Health

**Editors-in-Chief:**

Asst. Prof. Dr. Jaspreet S. Brar (University of Pittsburgh, USA)  
Forouzan Bayat Nejad

**Executive Editor:** Mostafa Nejati

**Deputy Editor:** Dr. Mensura Kudumovic (University of Sarajevo, Bosnia & Herzegovina)

**Associate Editors:**

Dr. Monica Gaidhane  
Dr. Suresh Vatsyayam (FreeGP, New Zealand)

## Prevalence & Risk Factors of Nephropathy in Type 2 Diabetic Patients

Vimalkumar V K<sup>\*</sup>, C.R. Anand Moses, Padmanaban S.

Kilpauk Medical College, Chennai, India

*\* Corresponding author*

---

### ABSTRACT

**Background:** 31.7 million people in India are suffering from diabetes. Diabetic nephropathy (Kimmelstiel-Wilson syndrome) is the leading cause of end-stage renal disease (ESRD) worldwide and a leading cause of DM-related morbidity and mortality. It is estimated that 79.4 million diabetic patients will be in India by 2030. So a study was done on the prevalence rate of diabetic nephropathy (DN) and its associated risk factors.

**Aims and Objectives:** This study is a small cross sectional study conducted in a tertiary hospital (Dr. Ambedkar institute of diabetes, Kilpauk medical college hospital, Chennai.). The objective is to analyze the prevalence of DN and to determine the factors leading to DN in type 2 diabetic patients (mainly containing urban Asian Indian population)

**Materials and Methods:** 200 Type 2 diabetic patients were randomly selected. All the patients were interviewed with a questionnaire. A detailed history including risk factors like age, sex, socio economic status, duration of diabetes, smoking, alcohol, family history of DM and kidney disease, Ischemic heart disease(IHD), Oral Hypoglycemic Drugs(OHA), Insulin was taken followed by measurement of blood pressure, BMI assessment, urine analysis for albuminuria and microalbuminuria using dipsticks, lipid profile, GFR estimation, retinopathy screening. Statistical analysis was done by SPSS software. Univariate analysis, Chi-square and Binary Logistic Regression Model was used.

**Results:** In this study prevalence rate of overt nephropathy is 2.5% and microalbuminuria is 13%, Using Binary logistic regression analysis, Woman gender, Duration of diabetes, family history of kidney disease, Hypertension, BMI, GFR, retinopathy were found to be significantly associated with overt DN. There was no increased risk among IHD patients, smokers, alcoholics and no significant relationship with treatment history.

**Limitations:** This is a hospital based cross sectional study. Population based Case control studies should be conducted for assessment of multiple risk factors. This triggers the need for studies with higher sample size to assess various risk factors and mass screening programs.

**Conclusion:** According to study, as the duration of diabetes increases, the incidence of nephropathy also increases and is statistically significant. Hence all diabetic patients, especially those with increased duration should be screened for nephropathy and made aware of the complications. Since nephropathy is a forerunner for end stage renal disease, preventive measures can help in preventing renal failure.

---

**Keywords:** Diabetic nephropathy, risk factors, diabetes

---

## Introduction

Diabetes mellitus (DM) refers to a group of common metabolic disorders that share the phenotype of hyperglycemia. Several distinct types of DM exist and are caused by a complex interaction of genetics and environmental factors. [1]

50,768,300 People in India suffer from diabetes according to diabetes atlas of IDF (international diabetes federation. It is estimated that 79.4 million diabetic patients will be in India by 2030, 439 million adults in world (corresponding to 7.8% of the world's adult population) by 2030. [2]

The chronic complications of DM affect many organ systems and are responsible for the majority of morbidity and mortality associated with the disease.[3] Chronic complications can be divided into vascular and nonvascular complications. The vascular complications of DM are further subdivided into microvascular (retinopathy, neuropathy, and nephropathy) and macrovascular complications [coronary artery disease (CAD), peripheral arterial disease (PAD), cerebrovascular disease]

Diabetic nephropathy (Kimmelstiel-Wilson syndrome) is the leading cause of end-stage renal disease (ESRD) worldwide and a leading cause of DM-related morbidity and mortality. Both microalbuminuria and macroalbuminuria in individuals with DM are associated with increased risk of cardiovascular disease.[7] Individuals with diabetic nephropathy commonly have diabetic retinopathy.[4] So a study was done on the prevalence rate of diabetic nephropathy (DN) and its associated risk factors.

## Aims and Objectives

This study is a small cross sectional study conducted in a tertiary hospital (Dr. Ambedkar institute of diabetes, Kilpauk medical college hospital, Chennai.). The objective is to analyze the prevalence of DN and to determine the factors leading to DN in type 2 diabetic patients (mainly containing urban Asian Indian population)

## Materials and Methods

Age, gender, family history (of diabetes, of kidney disease), smoking h/o were obtained from the questionnaire. Ethical committee approval was obtained from Institutional ethical committee.

**Height:** Height was measured by a tape measure fixed to wall and a movable headboard. Subjects were asked to remove the foot wears, stand upright with feet flat, arms by the side, shoulders level, with head, shoulders, buttocks, and heels touching the wall and eyes directed forward

**Weight:** Weight was calculated by standard weighing scale in kg. The person stands with minimal movement with hands by their side. Shoes and excess clothing were removed.

**BMI:** The body mass index was calculated using the following formula:

Weight (kg)/height (m<sup>2</sup>).

## Measuring BP

Prior to the BP measurement, the patient was seated in a quiet room with selected arm free of constricted clothing so that the cuff can be wrapped around the upper arm without impediment. Blood pressure is recorded for systolic and diastolic BP to the nearest 2 mmHg using mercury sphygmomanometer. The same procedure is repeated with 30 seconds interval and the mean of the two was taken as the final blood pressure reading.

A blood pressure more than 140/90 mm hg is taken as hypertension.

## Blood Sample

The blood sample was used to measure serum triglycerides, ldl, hdl and creatinine. Gfr was calculated from the serum creatinine using the MDRD formula.

$$\text{GFR (mL/min/1.73 m}^2\text{)} = 186 \times (\text{Pcr})^{-1.154} \times (\text{age})^{-0.203} \times (0.742 \text{ if female}) \times (1.210 \text{ if African American})$$

## Urine Sample

Urine sample was used to find microalbuminuria and macroalbuminuria using dipstick methods.

Microalbuminuria is defined as 30–300 mg/d in a 24-h collection or 30–300 mg/mg creatinine in a spot collection

## Retinopathy

Retinopathy was diagnosed by optic fundoscopy

## Statistical Tool

SPSS software was used for analysis and binary logistic regression model was performed for the risk factors with respect to diabetic nephropathy.

A p value of <0.05 was considered significant.

## Observation and Results

In this study prevalence rate of overt nephropathy is 2.5% and microalbuminuria is 13%, Using Binary logistic regression analysis, woman gender, Duration of diabetes, family history of kidney disease, Hypertension, high bmi, low Gfr, retinopathy were found to be significantly associated with DN..

## Discussion

200 patients for the study were selected based on the following inclusion criteria

- All known type 2 diabetic patients attending the Diabetology clinic (Dr. Ambedkar institute of diabetes, Kilpauk medical college hospital, Chennai.).
- Patients under regular treatment.

The following variables were studied in detail with respect to nephropathy (microalbuminuria).

- A. Age, duration of diabetes.
- B. Gender
- C. Family history of diabetes and kidney disease
- D. Smoking
- E. Bmi
- F. Hypertension
- G. Triglyceride, ldl, hdl
- H. Gfr
- I. Retinopathy

The details of the studied variables (including tables and figures) are provided at the end of the article.

## Binary Logistic Regression Model

**Dependent Variable:** nephropathy

**Risk Factors Tested:** age, duration of diabetes, gender, family history, smoking, BMI, hypertension, triglyceride, LDL, HDL, GFR, and retinopathy.

**Risk Factors Significant:** woman gender, duration of diabetes, family history of kidney disease, hypertension, BMI, GFR, retinopathy.

## Conclusion

According to study, as the duration of diabetes increases, the incidence of nephropathy also increases and is statistically significant. Hence all diabetic patients, especially those with increased duration should be screened for

nephropathy and made aware of the complications. Since nephropathy is a forerunner for end stage renal disease, preventive measures can help in preventing renal failure. Microalbuminuria may be present even before the diagnosis in a latent period, which needs to be identified as it is a potentially reversible form of kidney injury. So screening measures should be made effective.

## Limitations

This is a hospital based cross sectional study. Population based Case control studies should be conducted for assessment of multiple risk factors. This triggers the need for studies with higher sample size to assess various risk factors and mass screening programs. Other causes of proteinuria such as prostate disease, infection, CCF has to be ruled out.

## References

1. Vijay V, Snehalatha C, Ramachandran A, Viswanathan M: Prevalence of proteinuria in non-insulin dependent diabetes. J Assoc Physicians India 42:792-794, 1994.
2. Shaw JE, Sicree RA, Zimmet PZ. Global estimates of the prevalence of diabetes for 2010 and 2030. Diabetes Res Clin Pract 2010; 87(1):4-14.
3. Bertoni AG, Krop JS, Anderson GF, Brancati FL. Diabetes-related morbidity and mortality in a national sample of U.S. elders. Diabetes Care 2002; 25:471-75.

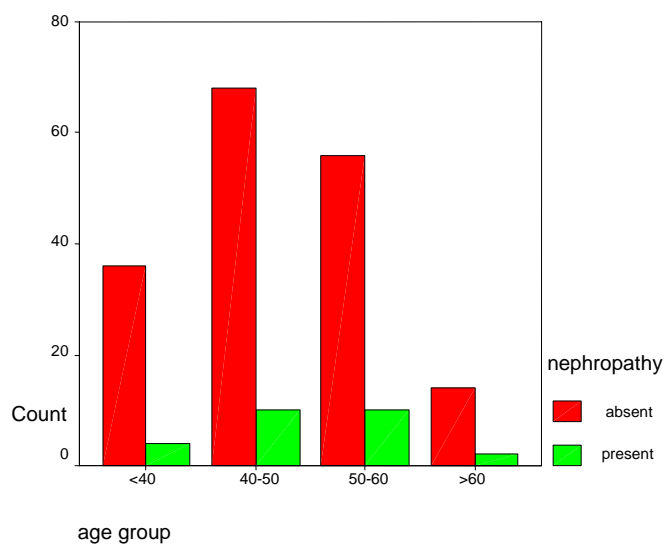
4. Mohan V, Meera R, Premalatha G, Deepa R, Miranda P, Rema M: Frequency of proteinuria in type 2 diabetes mellitus seen at a diabetes centre in southern India. *Postgrad Med J* 76:569–573, 2000.
5. Prevalence and Risk Factors of Diabetic Nephropathy in an Urban South Indian Population: The Chennai Urban Rural Epidemiology Study (CURES 45) *Diabetes Care* August 2007 30:2019-2024.
6. National High Blood Pressure Education Program: The seventh report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure. *JNC 7 Express*. Bethesda, MD, National Heart Lung and Blood Institute Health Information Center, 2003, p. 1–52 Klein R, Klein BE, Moss SE: Prevalence of microalbuminuria in older-onset diabetes. *Diabetes Care* 16:1325–1330, 1993.
7. Vijay V, Seena R, Lalitha S, Snehalata C, Jayaraman M, Ramachandran A: Significance of microalbuminuria at diagnosis of type 2 diabetes. *Int J Diab Dev Countries* 18:5–6, 1998.
8. Marshall SM: Recent advances in diabetic nephropathy. *Postgrad Med J* 80:624–633, 2004.
- Gatling W, Knight C, Mullee MA, Hill RD: Microalbuminuria in diabetes: a population study of the prevalence and an assessment of three screening tests. *Diabet Med* 5:343–347, 1988

## STUDIED VARIABLES

Age

Age group \* DN Crosstab

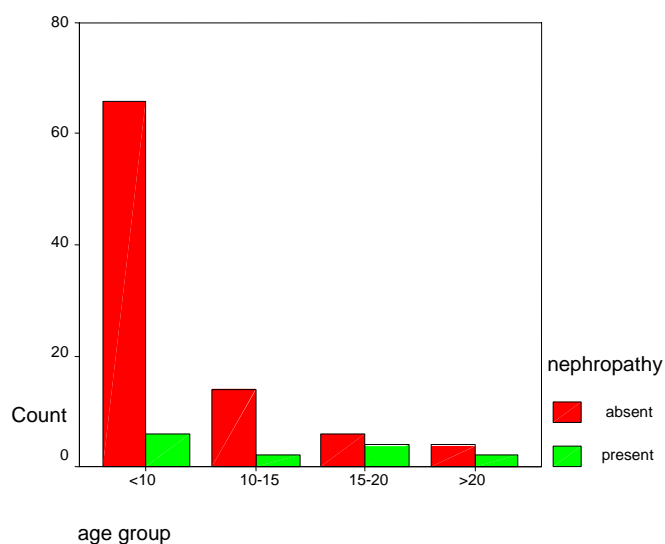
		nephropathy		Total	
		absent	present		
age group	<40	Count	36	4	40
		% of Total	18.0%	2.0%	20.0%
	40-50	Count	68	10	78
		% of Total	34.0%	5.0%	39.0%
	50-60	Count	56	10	66
		% of Total	28.0%	5.0%	33.0%
	>60	Count	14	2	16
		% of Total	7.0%	1.0%	8.0%
Total	Count	174	26	200	
	% of Total	87.0%	13.0%	100.0%	



P values: 0.898, 0.895, 0.555.

**Duration of diabetes****DURATION \* DN Crosstab**

		nephropathy		Total	
		absent	present		
duration	<10	Count	133	13	146
		% of Total	66.5%	6.5%	73.0%
	10-15	Count	26	3	29
		% of Total	13.0%	1.5%	14.5%
	15-20	Count	10	6	16
		% of Total	5.0%	3.0%	8.0%
	>20	Count	5	4	9
		% of Total	2.5%	2.0%	4.5%
Total		Count	174	26	200
		% of Total	87.0%	13.0%	100.0%

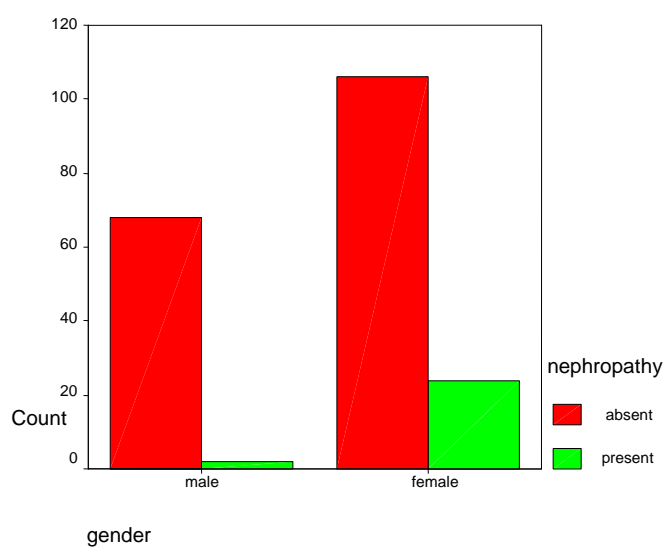


P value: .045



**Gender****Crosstab**

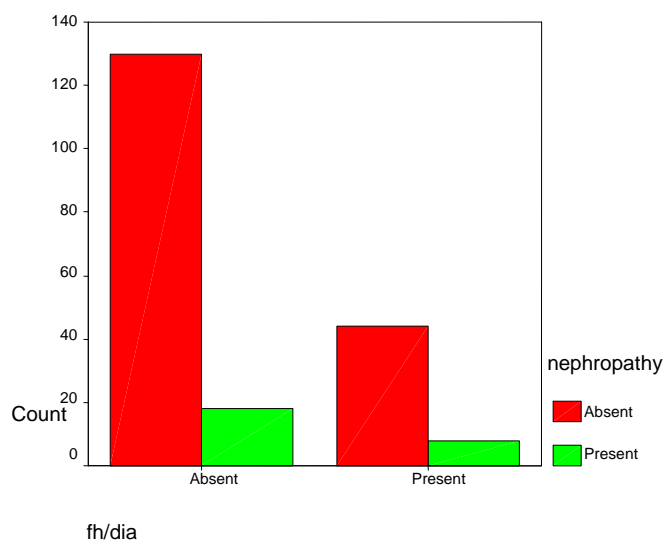
		nephropathy		Total	
		absent	present		
gender	male	Count	68	2	70
		% of Total	34.0%	1.0%	35.0%
	female	Count	106	24	130
		% of Total	53.0%	12.0%	65.0%
Total		Count	174	26	200
		% of Total	87.0%	13.0%	100.0%



P value: .001

**Family history of diabetes****Crosstab**

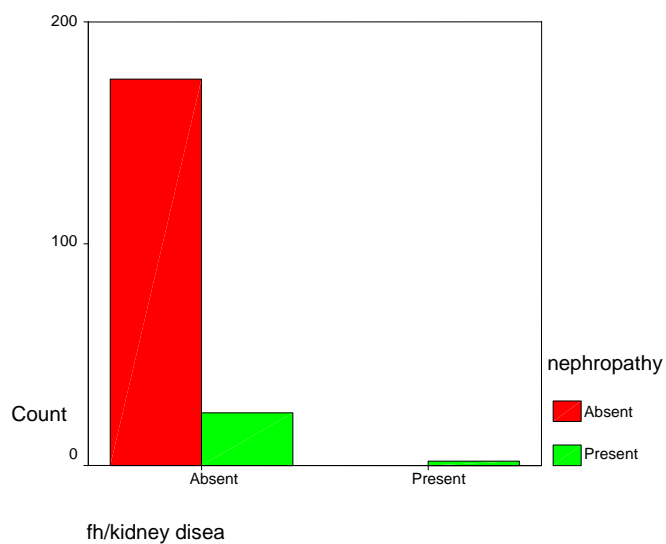
			nephropathy		Total
			Absent	Present	
fh/dia	Absent	Count	130	18	148
		% of Total	65.0%	9.0%	74.0%
	Present	Count	44	8	52
		% of Total	22.0%	4.0%	26.0%
Total	Count	174	26	200	
	% of Total	87.0%	13.0%	100.0%	



P value: .352

**Family history of kidney disease****Crosstab**

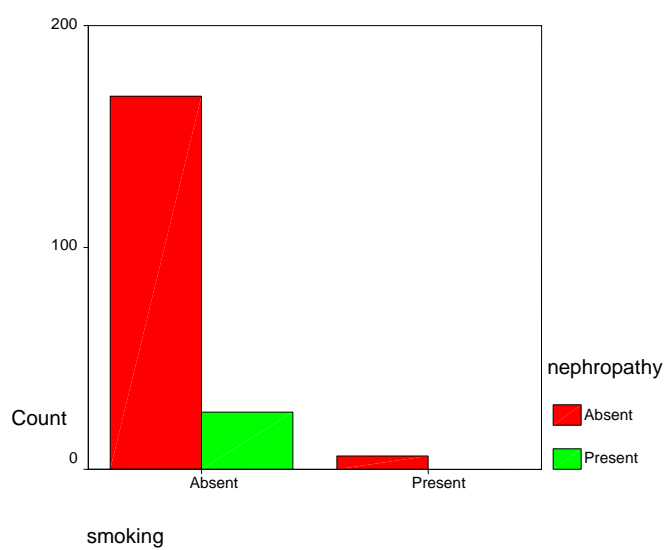
		nephropathy		Total
		Absent	Present	
fh/kidney disea	Absent	Count 174	Count 24	Count 198
		% of Total 87.0%	% of Total 12.0%	% of Total 99.0%
	present	Count 0	Count 2	Count 2
		% of Total .0%	% of Total 1.0%	% of Total 1.0%
Total		Count 174	Count 26	Count 200
		% of Total 87.0%	% of Total 13.0%	% of Total 100.0%



P value: .016

**Smoking****Crosstab**

		nephropathy		Total	
		Absent	Present		
smoking	Absent	Count	168	26	194
		% of Total	84.0%	13.0%	97.0%
	present	Count	6	0	6
		% of Total	3.0%	.0%	3.0%
Total	Count	174	26	200	
	% of Total	87.0%	13.0%	100.0%	

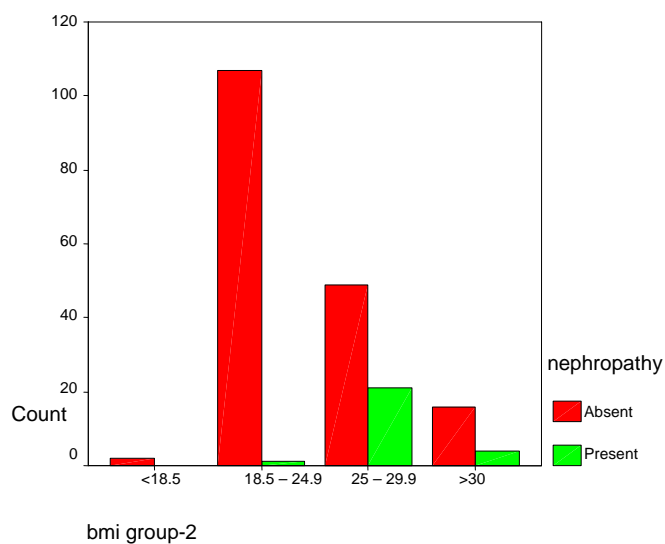


P value: .429

**BMI****Crosstab**

		nephropathy		Total	
		Absent	Present		
bmi group	<18.5	Count	2	0	2
		% of Total	1.0%	.0%	1.0%
	18.5-24.9	Count	107	1	108
		% of Total	53.5%	.5%	54.0%
	25-29.9	Count	49	21	70
		% of Total	24.5%	10.5%	35.0%
	>30	Count	16	4	20
		% of Total	8.0%	2.0%	10.0%
Total	Count	174	26	200	
	% of Total	87.0%	13.0%	100.0%	

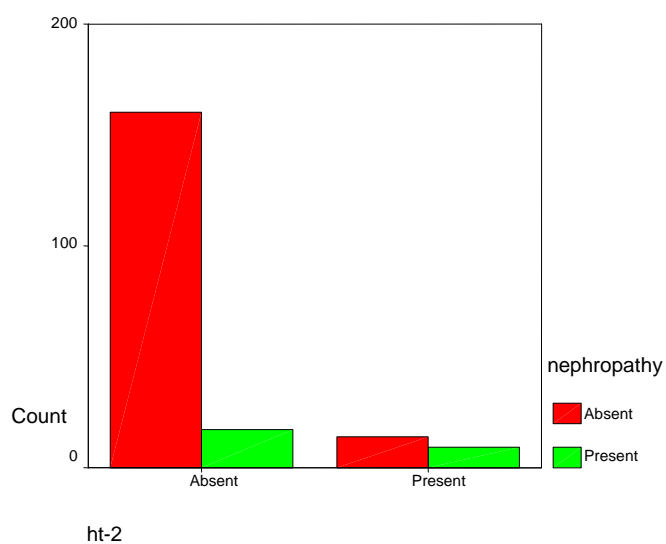
- Underweight = <18.5
- Normal weight = 18.5-24.9
- Overweight = 25-29.9
- Obesity -BMI = 30 or greater



P value: .001, .001, .001

**Hypertension****Crosstab**

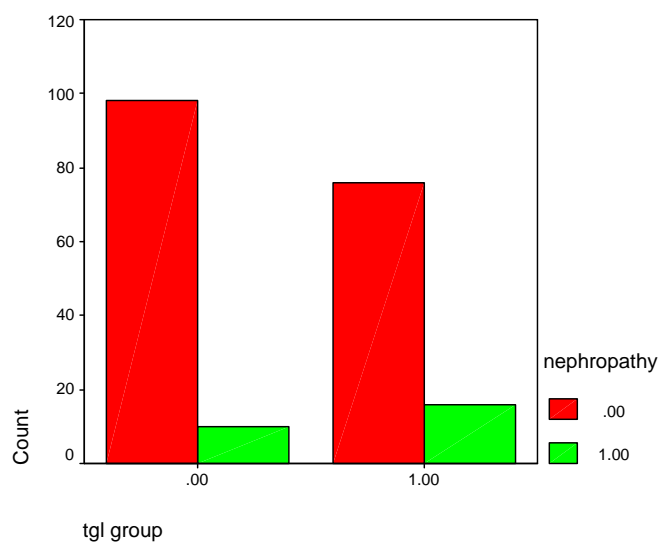
		nephropathy		Total	
		Absent	Present		
ht	Absent	Count	160	17	177
		% of Total	80.0%	8.5%	88.5%
	Present	Count	14	9	23
		% of Total	7.0%	4.5%	11.5%
Total		Count	174	26	200
		% of Total	87.0%	13.0%	100.0%



P value: .001

**Triglycerides****Crosstab**

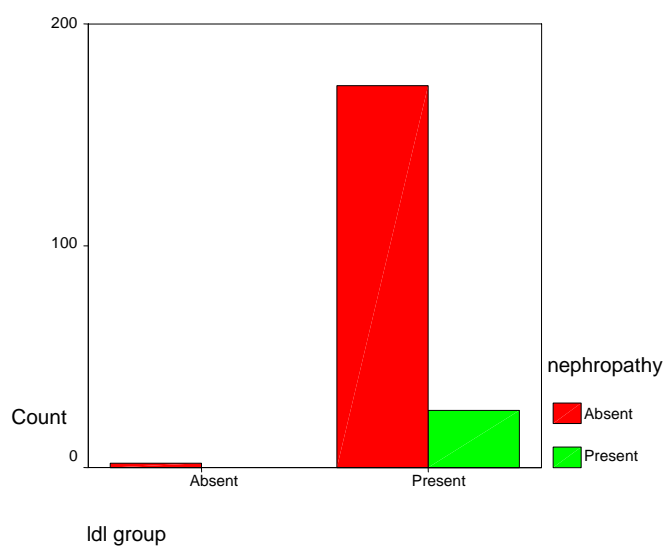
		nephropathy		Total
		Absent	Present	
tgl group <150	Count	98	10	108
	% of Total	49.0%	5.0%	54.0%
>150 md/dl	Count	76	16	92
	% of Total	38.0%	8.0%	46.0%
Total	Count	174	26	200
	% of Total	87.0%	13.0%	100.0%



P value: .068

**LDL****Crosstab**

		nephropathy		Total
		Absent	Present	
ldl group <100	Count	2	0	2
	% of Total	1.0%	.0%	1.0%
>100 mg/dl	Count	172	26	198
	% of Total	86.0%	13.0%	99.0%
Total	Count	174	26	200
	% of Total	87.0%	13.0%	100.0%

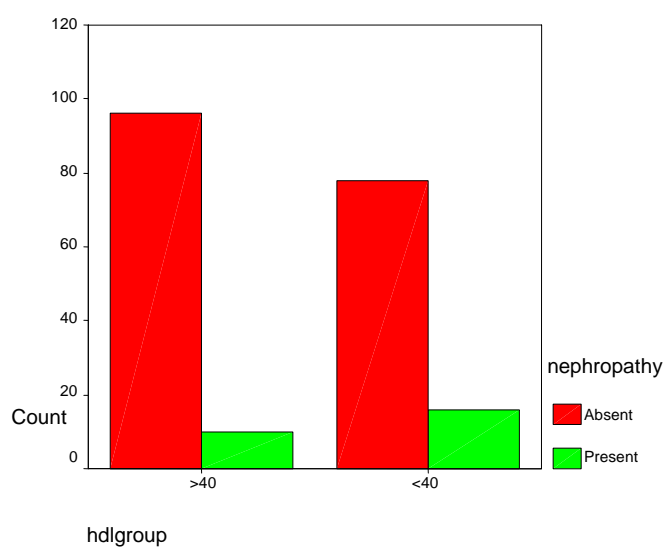


P value: .756



**HDL****Crosstab**

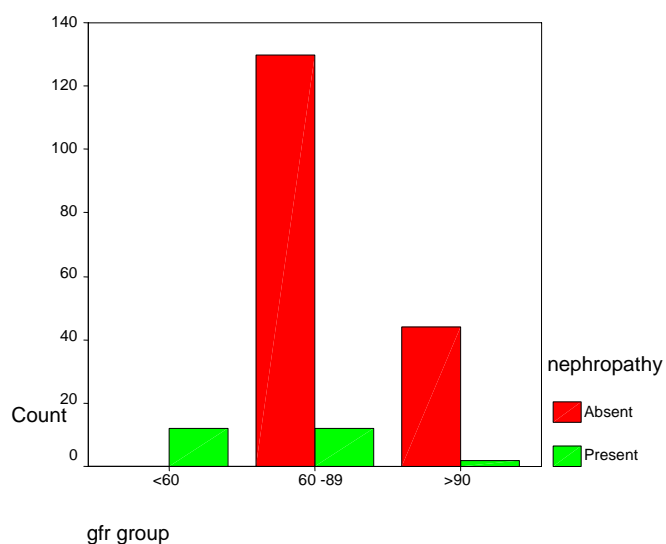
		nephropathy		Total	
		Absent	Present		
hdlgroup	>40	Count	96	10	106
		% of Total	48.0%	5.0%	53.0%
	<40	Count	78	16	94
		% of Total	39.0%	8.0%	47.0%
Total		Count	174	26	200
		% of Total	87.0%	13.0%	100.0%



P value: .084

**GFR****Crosstab**

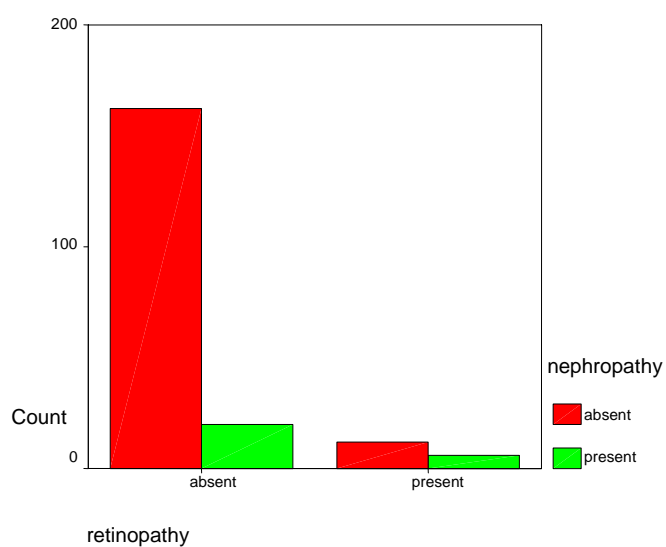
			nephropathy		Total
			Absent	Present	
gfr group	<60	Count	0	12	12
		% of Total	.0%	6.0%	6.0%
	60-89	Count	130	12	142
		% of Total	65.0%	6.0%	71.0%
	>90	Count	44	2	46
		% of Total	22.0%	1.0%	23.0%
Total	Count	174	26	200	
	% of Total	87.0%	13.0%	100.0%	



P value: .001, .001, .001

**Retinopathy****Crosstab**

		nephropathy		Total
		absent	present	
retinopathy	absent	Count 162	20	182
		% of Total 81.0%	10.0%	91.0%
	present	Count 12	6	18
		% of Total 6.0%	3.0%	9.0%
Total		Count 174	26	200
		% of Total 87.0%	13.0%	100.0%



P value: 0.017