

STUDY OF THE IMPACT OF MICROALBUMINURIA ON THE MORBIDITY AND MORTALITY OF THE ACUTE CORONARY SYNDROME IN DIABETIC PATIENTS DURING ICU ADMISSION

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ABSTRACT

Background: Microalbuminuria (MA) is a well-known risk factor for coronary artery disease (CAD) in diabetics and non diabetics. It is associated with higher cardiovascular mortality. However, the impact of MA on the morbidity and mortality of the acute coronary syndrome (ACS) in diabetic patients is not definitively known and the relationship between the degree of albuminuria and outcome of ACS is unclear. **Aim of the Work:** To Study the morbidity and mortality of diabetic patients presenting with acute coronary symptoms in relation to presence of MA during ICU admission. **Patient and Methods:** This study was planned to evaluate the impact of MA on outcome of ACS in diabetics patients admitted to ICU in internal medicine department Zagazig University. The study included 80 patients with acute coronary syndrome 60 diabetics and 20 non diabetics. Patients were classified into four groups: Group (A): 20 ACS non diabetic patients with no albuminuria. Group (B): 20 ACS type 2 diabetic patients without albuminuria. Group (C): 20 ACS type 2 diabetic patients with MA. Group (D): 20 ACS type 2 diabetic patients with macroalbuminuria. Urinary albumin excretion rate was performed to all patients with ACS. They were followed up during their staying in the ICU for the occurrence of heart failure, pulmonary embolism, shock, arrhythmia or death. Serum lipid profile and HbA1c were performed also for all patients. **Results:** Complications occurred more significantly in albuminuric patients with MA (70%) and with macroalbuminuria (65%) than non albuminuric patients (20%);(P<0.001). Complications also occurred more significantly in patients with HbA1c>7%(69.7%) than those with HbA1c<7%(30.3%);(P<0.001). Also complications occurred more significantly in patients with serum triglyceride>150 mg/dl(78.4%) than those with serum triglyceride<150 mg/dl(14%);(P<0.001) and LDL>100mg/dl(82.4) than those with LDL<100mg/dl(15.3%);(P<0.001). **Conclusions:** There is a significant prevalence of albuminuria in diabetic patients in comparison with non diabetic patients. Complications including life threatening disorder as arrhythmia, heart failure, shock and cardiac arrest occurred more significantly in diabetic albuminuric patients with ACS during admission to ICU. Complications occurred more significantly in patients with abnormal lipid profile especially patients with hypertriglyceridemia or LDL > 100mg/dl.

Keyword: Microalbuminuria, Cardiovascular disease, Acute Coronary Syndrome, Diabetes, Hypertriglyceridemia.

INTRODUCTION

Microalbuminuria (MA) is a well-known risk factor for coronary artery disease (CAD) in diabetics and non diabetics. It is associated with higher cardiovascular mortality, especially in diabetics. However, there are few data linking angiographic severity of CAD to MA (1).

The presence of albuminuria is a powerful predictor of cardiovascular risk in patients with type 2 diabetes (T2D) and hypertension. In addition, multiple studies have shown that decreasing the level of albuminuria reduces the risk of adverse cardiovascular outcomes (2).

In most survival studied in non-insulin dependant diabetes mellitus (NIDDM), microalbuminuria predicts early mortality; in cross-section studies, it is associated with CAD morbidity (3).

MA was found to be an independent predictor for the presence and severity of CAD. A strong relationship between MA and the severity of CAD was reported by **Deveci et al.**, (4).

However, the impact of MA on the morbidity and mortality of the acute coronary syndrome (ACS) in diabetic patients is not definitively known and the relationship between the degree of albuminuria and outcome of ACS is unclear.

The aim of this work is to Study the morbidity and mortality of diabetic patients presenting with acute coronary symptoms in relation to presence of MA during ICU admission.

PATIENTS AND METHODS

This study had been carried out in Internal Medicine Department, Cardiological Intensive Care Unite, and Biochemistry Department at Zagziag University Hospitals.

It included 80 patients with ACS: 60 diabetics and 20 non diabetics. Their ages ranged from 50 to 86 yrs old with mean \pm SD 59.7 \pm 8.7 years and 40 of them are males and other 40 are females.

Inclusion criteria:

Patients who were diagnosed to have ACS were included in this study either diabetics or not.

Exclusion criteria:

Patient with renal disease, liver dysfunction, those receiving medication affecting kidney albumin excretion were exclude from this study.

Patients were classified into 4 groups:

Group (A): 20 ACS non diabetic patients with no albuminuria. Their age ranged from (45 -75) years.

Group (B): 20 ACS type 2 diabetic patients without albuminuria Their age ranged from (45-75) years.

Group (C): 20 ACS type 2 diabetic patients with MA. Their age ranged from (49- 80) years.

Group (D): 20 ACS type 2 diabetic patients with macro albuminuria. Their age ranged from (48-70) years.

All patients were subjected to the following:-

- Full history taking and detailed clinical examination with particular consideration on:
 - Symptoms and signs of coronary heart disease.
 - Estimation of BMI and waist /hip ratio.
- Routine laboratory investigations.
 - Complete blood picture using sysmex S.F3000 automated analyzer.
 - Liver and kidney function tests using Dimmsion E.S. chemical auto analyzer.
 - Admission blood glucose level
 - Urine analysis for detection of albuminuria.
 - Serum uric acid.
 - Cardiac enzyme CPKMB
- All patients have also
 - ECG
 - Plain X-ray chest
 - Pelvi-abdominal ultrasonography.
- Specific laboratory investigations:
 - Serum lipid profile (cholesterol - triglycerides - LDL- HDL).
 - HbA1c.
 - Microalbumin in urine
 - Creatinine in urine.

Principle of methods:

1. HbA1c measured by HbA1c kits (code, 11044, 11045 Bio systems).

After preparing the hemolysate, where the labile fraction is eliminated hemoglobins are retained by a cationic exchange resin. HbA1c is specifically eluted after washing away the hemoglobin A1+b fraction1 (HbA1c), and is quantified by direct photometric reading at 415nm. The estimation of the relative concentration of HbA1c is made by the measure of total hemoglobin concentration by direct photometric reading at 415nm.

2. Albuminuria: measured by microalbumin (code, 31324, 31924 Biosystem).

Albumin in the urine sample causes agglutination of the latex particles coated with anti-human albumin. The agglutination of the particles is proportional to the albumin concentration and can be measured by turbidimetry. After interpretation of the results of microalbumin in urine and creatinine in urine calculation of albumin creatinine ratio was done.

According to National Kidney Disease Program (NKDEP) urine albumin-to-creatinine ratio (UACR) in evaluating patients with T2D for kidney disease:

$$\frac{\text{Urine Albumin (mg/dL)}}{\text{Urine Creatinine (g/dL)}} = \text{UACR in mg/g} \sim \text{Albumin excretion in mg/day}$$

UACR is a ratio between two measured substances. Unlike a dipstick test for albumin, UACR is unaffected by variation in urine concentration.

According to NKDEP Albuminuria is a term that describes all levels of urine albumin. Microalbuminuria is a term used to describe urine albumin levels not detected by a dipstick test, i.e., 30mg/g – 300mg/g. Macroalbuminuria is sometimes used to describe albumin levels more than 300mg/g.

RESULTS

A total of 80 ACS patients (60 T2D and 20 non diabetics) were recruited for the study.

1- Study of the demographic data and clinical characteristics among studied groups:

Table (1) shows the demographic data among diabetics and non diabetics. The diabetic group comprised 30 women and 30 men while the non diabetic group comprised 8 women and 12 men, the sex distribution didn't differ significantly between the two groups. The age rang in the diabetic group was (45-75) years while it was in non diabetic group (45-70), the mean age in diabetics was 59.7±8.7 while it was in non diabetics 57.8±8. The mean age didn't differ significantly between the two groups. There was non-significance between the two groups of the study as regards body weight (BW), height and body mass index (BMI).

2- Study of the biochemical parameters between the 2 groups:

Table (2) shows the comparison between the 2 groups of the study as regards their serum lipid profile (total cholesterol, triglycerides, low density of lipoprotein [LDL], high density of lipoprotein [HDL]) (mg/dl). Serum total cholesterol was significantly higher in diabetics than non diabetic ($p < 0.05$) while LDL, HDL didn't differ significantly between the two groups. Serum triglycerides were none significantly higher in the diabetics than in the non diabetes. On the other hand, admission blood glucose was significantly higher in the diabetics than in the non diabetics ($p < 0.001$). The same as HbA1c which was significantly higher in diabetics than the non diabetics ($p < 0.001$). Also, the cardiac enzymes (CPK-MB) was non significantly different between the two groups ($p > 0.05$). Albuminuria expressed by (Alb /cr) ratio was significantly higher in the diabetic group in

comparison with the non diabetic group ($p < 0.001$).

3- Study of the relation between albuminuria and outcome of ACS patients admitted to ICU:

Table (3) shows the outcome was assessed as the occurrence of any complications requiring assistance or death. These complications included life threatening conditions as arrhythmia, heart failure, shock and cardiac arrest. Complications occurred more significantly in the albuminuric patients with microalbuminuria (70%) and with macroalbuminuria (65%) than non albuminuric patients (20%) ($p < 0.001$). Complications occurred more significantly in MA patients (70%) than non- microalbuminuric patients (20%) ($p < 0.001$). Also, in the relation between MA and outcome there were more significantly in macroalbuminuric patients (65%) than non macroalbuminuric patients (20%) ($p < 0.001$).

Figure (1) shows relation between albuminuria and outcome by general linear model (GLM). Complications occurred more significantly with increasing levels of albuminuria.

4- Study of the relation between HbA1C level and outcome of ACS patients admitted to ICU:

Table (4) shows the relation between HbA1C level and outcome. Complications occurred more significantly in patients with HbA1C $> 7\%$ (69.7%) than those with HbA1C $< 7\%$ (30.3%); ($p < 0.001$).

Figure (2) Bar chart shows the relation between HbA1C and outcome. **Figure (3)** shows the relation between HbA1C and outcome by GLM General Linear Model. There were complications occurred more significantly in patients with higher levels of HbA1C than those with lower levels of HbA1C ($F=7.6$; $p > 0.05$).

5- Relation between serum lipid profile level mg/dl and outcome of ACS patients admitted to ICU:

Table (4) shows that the complications occurred more significantly in patients with serum triglycerides > 150 mg/dl 78.4% than those with triglycerides < 150 mg/dl 14% with ($p < 0.001$). As regards, the relation of LDL to outcome, there were more significantly in patients with LDL > 100 (mg/dl) (82.4%) than those with LDL < 100 (mg/dl) (15.3%) with ($p < 0.001$). While the relation of HDL to outcome, there was non-significant relation in patients with HDL < 40 for male < 50 for female (43.5%) than those with HDL > 40 for male and > 50 for female (27.3%) with ($p > 0.05$).

6- Study of the relation in between risk factors of coronary heart disease in type 2 diabetics:

Table (5) showed that there was non significant relation between serum triglycerides > 150 mg/dl and MA. As regards, there was positive significant relation between LDL > 100 mg/dl and MA, but we found a non-significant relation between abnormal HDL level and albuminuria. Also, there was a non-significant relation between BMI and outcome ($P > 0.05$) as shown in **table (6)**. There was non-significant positive relation between HbA1C and levels of albuminuria by this diagram. As regards, relation between albuminuria and lipid profile (mg/dl) **Figure (4)**. Also, There were non-significant correlation between HbA1c and (triglycerides, LDL and HDL) levels ($P > 0.05$) **Figure (5, 6, 7)**.

7- Study the relation between Weight ratio and outcome:

There was non-significance in studying the relation between Weight ratio and outcome ($P = NS$) **Figure (8)**. While our finding found the prevalence of complications among ACS patients admitted to intensive care unit (ICU); this diagram shows that the number of not complicated cases was 50 (62.5%) and number of complicated cases was 30 (37.5%) as shown in **Figure (9)**.

Table (1): Demographic data among diabetics and non diabetics patients admitted to ICU with ACS

	Diabetics (n = 60)		Non diabetics (n = 20)		t	p
	No	%	No	%		
Age (years)	59.7± 8.7 (45-75)		57.8± 8 (45-70)		0.885	NS
X±SD						
Range						
Gender					0.6	NS
Male	30	50.0	12	60.0		
Female	30	50.0	8	40.0		
BW	82±25.2		91.4±33.1		-1.311	NS
X±SD						
Height (m)	170.0±77.9		162.1±9.1		0.450	NS
X± SD						
BMI	33.9±7.3		35.9±10.0		0.924	NS
X± SD						

Bw: body weight

BMI: body mass index **NS:** non-significant $p > 0.05$

Table (2): Comparison between the two groups of study as regards their laboratory investigations (e.g., Blood glucose level, HbA1c, serum lipid profile, Cardiac enzyme [CPK-MB] and Albuminuria which expressed by [Alb/cr] ratio)

Variable	Diabetics (n = 60)	Non diabetics (n = 20)	t	p
Admission blood glucose (mg/dl) X±SD	223.6±101.8	132.2±33.9	3.9	<0.001
HbA1c (%) X±SD	7.2±1.8	5.1±8.7	5.2	<0.001
Total Cholesterol (mg/dl) X+ SD	195.0±36.6	168.0± 48.2	-2.3	<0.05
Triglycerides (mg/dl) X+ SD	197.9± 85.8	136± 56.1	0.37	NS
LDL (mg/dl) X+ SD	113.1±30.6	103.1±30.8	-0.9	NS
HDL (mg/dl) X+ SD	36.9±20.5	35.3±8.7	0.08	NS
CPK-MB X+SD	36.5±35.0	39.4±54.7	-0.2	NS
Albuminuria X+SD	331.6±392.8	20.9±6.0	3.5	<0.001

Table (3): Relation between albuminuria and outcome in ACS patients admitted to ICU

	Not Complicated (n = 45)		Complicated (n = 35)		χ^2	p
	No	%	No	%		
No albuminuria (n = 40)	32	80.0	8	20.0		
Microalbuminuria (n = 20)	6	30.0	14	70.0	18.4	< 0.001
Macroalbuminuria (n = 20)	7	35.0	13	65.0		

Table (4): Relation of HBA1c, serum triglycerides, LDL, and HDL to outcome in ACS patients admitted to ICU

	Not Complicated		Complicated		χ^2	p
	No	%	No	%		
HbA1c (n = 44) < 7% (n = 36) > 7%	(n = 47) 34 13	 72.3 27.7	(n = 33) 10 23	 30.3 69.7	0.138	< 0.001
Triglycerides (mg/dl) (n = 43) < 150 (n = 37) > 150	(n = 45) 37 8	 86.0 21.6	(n = 35) 6 29	 14.0 78.4	33.5	< 0.001
LDL (mg/dl) (n = 46) < 100 (n = 34) > 100	(n = 45) 39 6	 84.7 17.6	(n = 35) 7 28	 15.3 82.4	35.8	< 0.001
HDL (mg/dl) (n = 11) > 40 (n = 69) < 50	(n = 47) 8 39	 72.7 56.5	(n = 33) 3 30	 27.3 43.5	1.0	> 0.05

LDL: low density of lipoprotein **HDL:** high density of lipoprotein P < 0.001: highly significant P > 0.05: non-significant

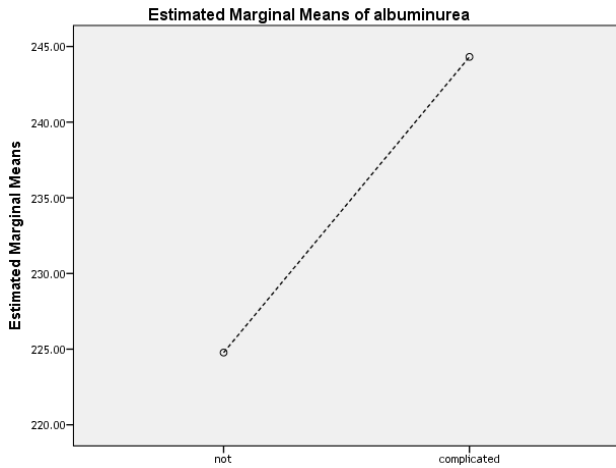


Figure (1): Relation between albuminuria and outcome by General Linear Model (GLM)

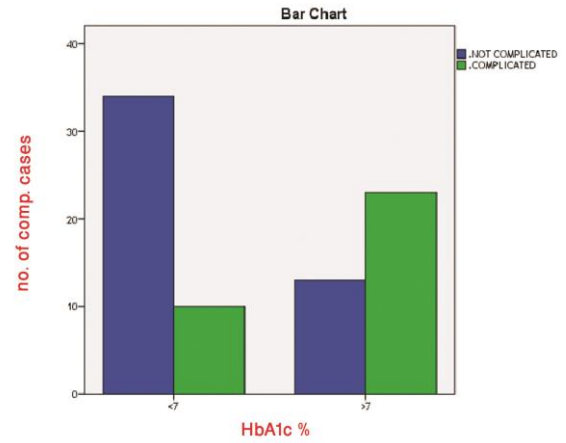
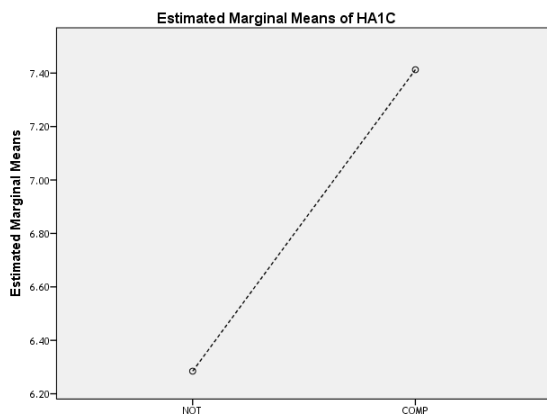
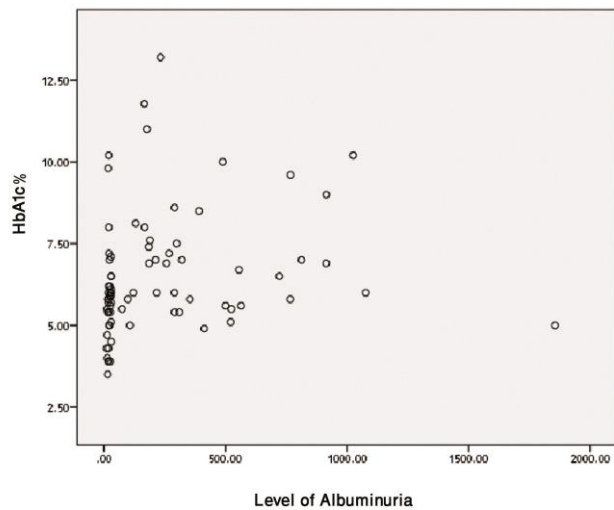


Figure (2): Bar chart showing the relation between HbA1c and outcome



(GLM) F= 7.6 P=<0.05

Figure (3): Relation between HbA1C and outcome by GLM method. General Linear Model



General Linear Model (GLM) F= 7.8
P=<0.001 **

Figure (4): Scattered diagram showing relation between HbA1C and albuminuria

Table (5): Shows the relation between serum lipid profile and albuminuria

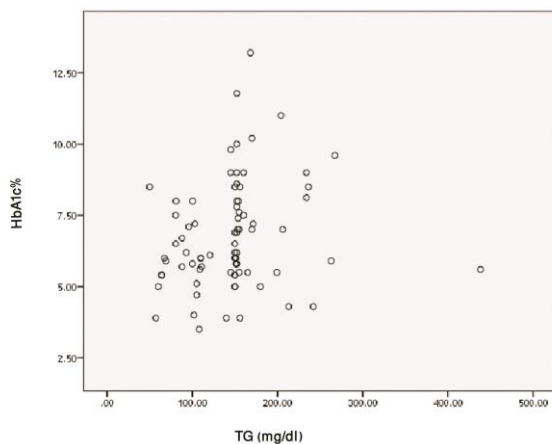
	No albuminuria (n = 40)		Microalbuminuria (n = 20)		Macroalbuminuria (n = 20)		χ^2	p
	No	%	No	%	No	%		
Triglycerides (n = 43) <150 mg/dl	28	70.0	6	30.0	9	45.0	9.4	> 0.05
(n = 37) >150 mg/dl	12	30.0	14	70.0	11	55.0		
LDL (n = 46) <100mg/dl	34	85.0	7	35.0	5	25.0	25.1	< 0.001
(n = 34) >100mg/dl	6	15.0	13	65.0	15	75.0		
HDL (n = 8) <50mg/dl for female & <40 mg/dl for male (n = 72) > 50mg/dl for female & >40 mg/dl for male	6	15.0	1	5.0	1	5.0	2.2	> 0.05
	34	85.0	19	95.0	19	95.0		

LDL: low density of lipoprotein HDL: high density of lipoprotein P < 0.001: highly significant P > 0.05: non-significant

Table (6): Relation between BMI and outcome in ACS patients admitted to ICU

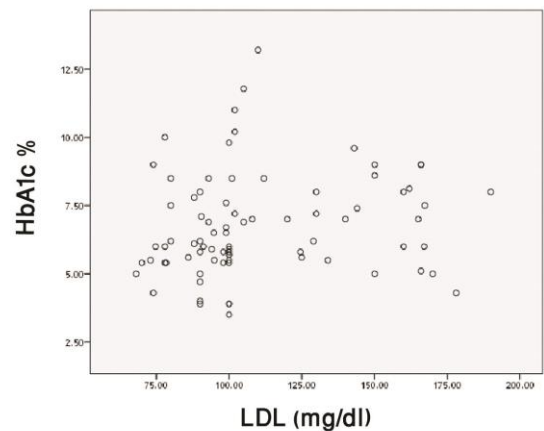
	Not Complicated		Complicated		χ^2	p
	No	%	No	%		
BMI (n = 1) Normal	1	100.0	0	0.0	0.2	> 0.05
(n = 32) Overweight	15	46.8	17	53.2		
(n = 47) Obese	29	61.0	18	38.3		

BMI: body mass index P > 0.05: non-significant



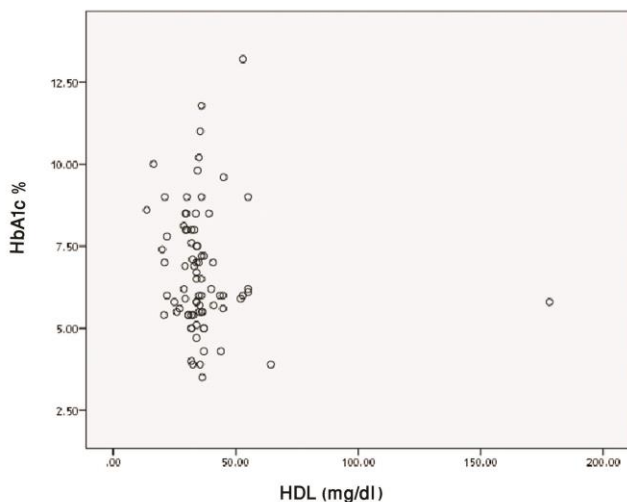
TG Pearson $r = -0.09$ P=NS

Figure (5): Showing correlation between HbA1c and Triglycerides



LDL Pearson $r = -0.16$ P=NS

Figure (6): Showing correlation between HbA1C and LDL



HDL Pearson $r = -0.04$ $P = NS$

Figure (7): Showing correlation between HbA1C and HDL

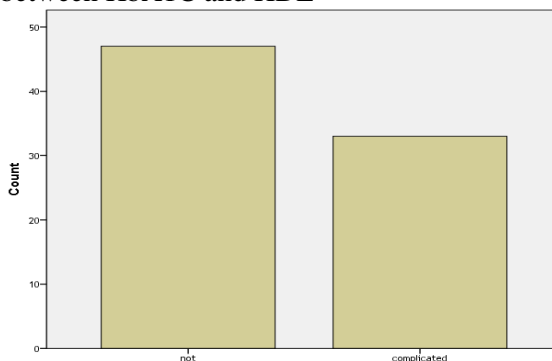


Figure (10): Showing the prevalence of complications in ACS patients admitted to ICU

DISCUSSION

Type 2 diabetes (T2D) is considered one of the major risk factors for ACS. Individuals with T2D are more likely to experience a coronary heart disease and have worse outcomes compared with non diabetic individuals (5).

ACS referred to unstable angina and myocardial infarction (MI) with or without ST-segment elevation which are life-threatening conditions that remain a source of high morbidity and mortality despite advances in treatment (6).

Intensive glucose control in T2D patients can reduce the risk of developing serious cardiovascular disease outcomes such as heart failure, arrhythmia, cardiogenic shock and cardiac arrest.

Evaluation of blood glucose control can be achieved by (HbA_{1c}) level measurement which is a convenient and well-known biomarker in clinical practice for average blood glucose concentrations over the preceding 2-3 months (7, 8).

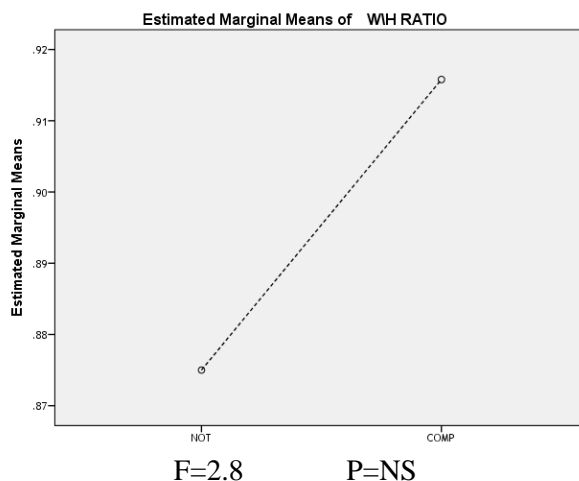


Figure (8): Relation between WH ratio and outcome by GLM method

The present study documented the effect of glycemic control on morbidity and mortality of ACS through measurement of (HbA_{1c}). This study showed that complications occurred more significantly with increased levels of HbA_{1c} >7% in which percentage of complicated cases was 69.7% than that below 7% in which percentage of complicated cases was 30.3%. So it was observed in the present study that non diabetics and good controlled type 2 diabetics have better outcome of CAD and lower percentage of complications than uncontrolled type 2 diabetics.

This observation correlates with Nishimura et al. which proved that a significant relation between having an HbA_{1c} level $\geq 6.5\%$ and risk of CAD in Japanese patients (8). Also recommended that including lipid levels in the assessment model could help to identify subjects at high risk, Therefore, evaluating the relationship between HbA_{1c} and CAD in patients with hypercholesterolemia is important to identify patients in a high-risk population (9).

The present study correlates with **Liu et al.** who observed that elevated HbA1c levels predict increased risk of short and long term mortality in patients hospitalized with CAD. They also recommended that elevated HbA1c was associated with a higher risk of mortality in patients without recognized diabetes even after adjusting for other known risk factors (10).

This study also correlates with **Olofsson et al.** who proved that progressively increasing risk of CAD and total mortality with higher HbA1c, and no risk increase at low HbA1c levels even with longer diabetes duration, previous CVD or treatment with either insulin or OHDs. Patients achieving HbA1c <7% showed reduced risk to have CAD (11).

The present study also correlates with **Sahibzada et al.** who proved that increased level of hyperglycemia expressed by higher levels of HbA1c associated with increase in the mortality. They also documented that Hyperglycemia associated with impaired left ventricular function and clinical evidence of left ventricular failure (12).

Diabetic dyslipidemia is characterized by elevated triglyceride levels, decreased high-density lipoprotein cholesterol levels, and elevated low-density lipoprotein cholesterol (LDL-C) levels. It is a well-recognized and modifiable risk factor for coronary heart disease. When diagnosis of dyslipidemia is established in T2D aggressive treatment should be started (13, 14).

The present study documented that the prevalence of hypercholesterolemia is significantly more in diabetics than non diabetics ($p < 0.05$). On the other hand other parameters of lipid profile did not differ significantly between diabetics and non diabetics. This study also revealed that the complications occurred more significantly in patients with abnormal hypertriglyceridemia (>150mg/dl) 78.4% and abnormal levels of LDL (>100 mg/dl) 82.4%. But there was non significant prevalence of complications among patients with abnormal HDL level (<40mg/dl for male, <50mg/dl for female). So it was observed in the present study that hyperlipidemia had deleterious effect on morbidity and mortality of ACS patients admitted to ICU.

This study correlates with **Preis et al.** who proved that the risk of developing cardiovascular disease is higher in diabetics than in non-diabetics. Compared with those without diabetes, individuals who eventually developed diabetes had higher levels of hypertension ($P = 0.003$), high LDL ($p = 0.04$), low HDL ($p = 0.0001$), high triglycerides ($P = 0.04$), and obesity ($p < 0.0001$) at

time points 30 years before diabetes diagnosis. After further adjustment for BMI, there was statistically significant for hypertension ($p = 0.02$) and low HDL ($p = 0.01$) remained statistically significant (15).

This study also correlates with **Clausen et al.** who proved that hypertriglyceridemia is a risk factor for CAD. They recommended that fasting lipid profile is a blood test that assesses the risk for developing cardiovascular complications by measuring levels of total cholesterol, high-density lipoprotein HDL, triglycerides, and low-density lipoprotein LDL (16).

The present study correlates with **Nesto et al.** who proved that among patients with T2D, insulin resistance, relative insulin deficiency, and obesity are associated with hypertriglyceridemia, low serum HDL cholesterol concentrations, and occasionally high serum LDL cholesterol and lipoprotein (a) values. They also recommended that any serum lipoprotein concentration abnormality brought diabetic patients to have more coronary disease than non diabetic patients (17).

This study also correlates with **Betteridge**, who documented that dyslipidemia, an important component of the insulin resistance syndrome and T2D, is strongly related to CVD risk. Statins have proved to be safe, very-well tolerated, and highly effective in reducing the levels of LDL cholesterol and Apo lipoprotein B. After that the next target of lipid-lowering therapy is to increase HDL-cholesterol levels, which tend to be low in patients with T2D (18).

Albuminuria is a well-known predictor of poor renal outcomes in patients with type 2 diabetes and in essential hypertension. Albuminuria has also been shown more recently to be a predictor of cardiovascular outcomes in these populations (19, 20).

The present study documented that complications of ACS occurred more significantly in microalbuminuric patients (70%) and macroalbuminuric patients (65%) than non albuminuric patients (20%). So it was observed in the present study that development of MA in type 2 diabetic patients worsen outcome of ACS patients admitted to ICU.

This study correlates with **Weir**, who proved that there is continuous positive relationship between urinary albumin excretion (UAE) and adverse clinical outcomes (21) and so MA is associated with an increased risk for all-cause and cardiovascular mortality (22).

The present study also correlates with **Deveci et al.** who proved that there is strong relationship

between MA and the severity of CAD. They also demonstrated a positive relation between urine albumin/creatinine ratio (ACR) and extent of CAD both in the diabetic and non diabetic patients (4).

Basi et al. proved that the presence of albuminuria is a powerful predictor of renal and cardiovascular risk in patients with T2D and hypertension. He also recommended that decreasing albuminuria with ACE inhibitor or ARB therapy can lead to improvement of the outcomes (2).

Aziz et al. examined coronary angiograms for extent of severe CAD (luminal narrowing >70%) in patients without DM and so proved that , patients with MA have more severe angiographic detected coronary artery disease than those without MA (23).

With respect to our study, few studies focused on the relation between albuminuria and the outcome of ACS patients in ICU.

Jordanova-Laleva et al proved that the MA is a Considerable predictive factor in intra-hospital mortality coronary incidents and the death over longer periods after myocardial infarction. A considerable higher and heavier degree of coronary disease has been registered in patients with acute myocardial infarction (AMI) and MA than in patients with AMI but without MA (24).

Taskiran et al. documented that MA is strongly associated with an increased hazard of mortality in patients with AMI and increases the risk of death, independently of age and gender. Thus, MA is a very strong and robust risk indicator among patients with AMI (25).

Apostolovic et al proved that UACR measured during the first week after AMI is independently associated with increased long-term risk for in-hospital and six-month mortality. On the basis of these results, they suggested that this measurement should be included in the routine clinical work up of patients with AMI (26).

This study documented that there is significant positive relation between albuminuria and HbA1c level. Patients uncontrolled type 2 diabetics or recently discovered diabetics who showed higher levels of HbA1c also showed positive micro or macroalbuminuria. This correlates with **Sheikh et al**, who proved that early onset of MA in the selected community which could be due to poor glycaemic control (high HbA1c > 7%) or heredity factors. Screening for MA and HbA1c test should be done in both newly and already diagnosed T2D patients as an early marker of renal dysfunction and glycaemic control (27).

On the contrary **Afkhami-Ardekani et al**, who proved that there is no statistical significant correlation between the prevalence of MA and the fasting blood sugar or HbA1c (28).

CONCLUSION:

There is a significant prevalence of albuminuria in diabetic patients in comparison with non diabetic patients. Complications including life threatening disorder as arrhythmia, heart failure, shock and cardiac arrest occurred more significantly in diabetic albuminuric patients with ACS during admission to ICU. Complications occurred more significantly in patients with abnormal lipid profile especially patients with hypertriglyceridemia or LDL > 100mg/dl.

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المخلص العربي

يعد الزلال البولي الدقيق من عوامل الخطر التي تؤدي إلى الإصابة بأمراض الشرايين التاجية سواء في مرضى السكري أو في الأشخاص الغير مصابين بمرض السكري. فهي مرتبطة ارتباطاً هاماً بزيادة معدلات الوفيات من أمراض القلب والأوعية الدموية.

اتضح أن مرضى السكري الذين يعانون من الزلال البولي لديهم ارتفاع في نسبة السكر الصائم والهيموجلوبين المتسكر بالمقارنة مع غيرهم من مرضى السكري الذين لا يعانون من الزلال البولي.

هناك ارتباط قوي بين الزلال البولي وأمراض القلب والأوعية الدموية خاصة في مرضى السكري من النوع الثاني وأيضاً المرضى الذين يعانون من ارتفاع ضغط الدم .

حيث أظهرت الدراسات أن الحد من نسبة الزلال البولي يقلل من احتمالية حدوث أمراض القلب والأوعية الدموية ففي معظم الدراسات تبين أن وجود الزلال البولي يؤدي إلى ازدياد معدلات الاعتلال والوفاة نتيجة أمراض القلب والشرايين التاجية خاصة في مرضى السكري .

الهدف من البحث

- (١) دراسة معدلات الاعتلال في مرضى السكري الذين يعانون من متلازمة الشرايين التاجية وعلاقتها بالزلال البولي.
- (٢) دراسة معدلات الوفيات في مرضى السكري الذين يعانون من متلازمة الشرايين التاجية وعلاقتها بالزلال البولي .
- (٣) دراسة أثر الزلال البولي (سواء كان دقيقاً أو غير دقيق) على مرضى القلب والأوعية الدموية خاصة الذين يعانون مرض السكري .
- (٤) دراسة العلاقة بين الزلال البولي واعتلال نسبة الدهون بالدم في مرضى السكري الذين يعانون من متلازمة الشرايين التاجية الحادة.

ولقد شملت هذه الدراسة ٨٠ مريضاً:

- ✓ **عشرون مريض** يعانون من متلازمة الشرايين التاجية ولا يعانون من مرض السكري.
- ✓ **عشرون مريض** يعانون من متلازمة الشرايين التاجية ويعانون من مرض السكري (النوع الثاني) وأيضاً الزلال البولي الدقيق.
- ✓ **عشرون مريضاً** يعانون من متلازمة الشرايين التاجية ويعانون من مرض السكري (النوع الثاني) وأيضاً الزلال البولي.
- ✓ **عشرون مريضاً** يعانون من متلازمة الشرايين التاجية ويعانون من مرض السكري (النوع الثاني) ولا يعانون من الزلال البولي .

وقد أجريت عليهم الفحوصات الآتية:

- تاريخ مرضى كامل .
- فحص إكلينيكي شامل.
- حساب مؤشر كتلة الجسم ونسبة الخصر إلى الحوض.
- وظائف كبد و كلى ونسبة اليورك أسيد بالدم.
- تحليل سكر عشوائي عند الدخول إلى المستشفى ونسبة الهيموجلوبين المتسكر.
- أشعة عادية علي الصدر وأشعة تليفزيونية علي البطن والحوض .
- رسم قلب كهربائي ونسبة إنزيمات القلب بالدم.
- نسبة دهون ثلاثية وكليستيرول وترايغلسريد بالدم.
- تحليل بول كامل وحساب كمية الزلال البولي

وتم تجميع النتائج وتحليلها بطرق إحصائية مناسبة ووضعها في جداول و صور ومناقشتها.**ونستخلص من هذه الدراسة ما يلي:**

- (١) هناك انتشار كبير لارتفاع نسبة الكوليستيرول بالدم في مرضى السكري مقارنة مع المرضى الغير مصابين بمرض السكري.
- (٢) يوجد ارتفاع في نسبة الهيموجلوبين المتسكر لدى مرضى السكري (النوع الثاني) خاصة الغير منتظمين مع العلاج والمرضى ذو تاريخ مرضي قصير.
- (٣) ارتفاع نسبة الزلال البولي لدى مرضى السكري مقارنة مع المرضى الغير مصابين بمرض السكري.
- (٤) هناك ارتباط طردى بين ارتفاع نسبة المضاعفات التي تهدد الحياة مثل عدم انتظام ضربات القلب وقشل عضلة القلب والسكتة القلبية ووجود الزلال البولي في مرضى السكري سواء كان دقيقاً أو غير دقيق .
- (٥) يوجد علاقة طردية بين ارتفاع في نسبة الهيموجلوبين المتسكر وارتفاع نسبة حدوث المضاعفات لدى مرضى متلازمة الشرايين التاجية .
- (٦) هناك ارتباط وثيق بين ارتفاع نسبة الدهون بالدم و حدوث المضاعفات لدى مرضى متلازمة الشرايين التاجية خاصة ارتفاع نسبة الدهون الثلاثية في الدم.