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Isolated Left Axis Deviation In Diabetic Patients

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ABSTRACT : *Diabetes mellitus (DM) is a clinical syndrome characterized by an increase in plasma blood glucose [hyperglycemia].. Atherosclerosis of the coronary, cerebral, and peripheral arteries accounts for approximately 80 percent of mortality and for 75 percent of hospitalizations in persons with diabetes. Cardiovascular disease is increased in individuals with type 1 or type 2 DM. The Framingham Heart Study revealed a marked increase in PAD, CHF, CAD, MI, and sudden death (risk increase from one to fivefold) in DM. The American Heart Association has designated DM as a major risk factor for cardiovascular disease (same category as smoking, hyperten- sion, and hyperlipidemia). Type 2 diabetes patients without a prior MI have a similar risk for coronary artery related events as no diabetic indivi -duals who have had a prior MI."2"*

I. INTRODUCTION

AIM OF STUDY: To evaluate the presence of isolated left axis deviation (LAD)in diabetic patients.

PATIENTS AND METHODS: One hundred diabetic patient s and 102 control healthy individuals are evaluated for the presence of LAD. In this study; age, sex, BMI, smoking history, HbA1c, lipid profile, type and duration of DM in diabetic group are recorded. Age and sex of control group are recorded. ECG is done for diabetic and control group.

II. RESULTS AND DISCUSSION:

Left axis deviation is present in 35% of diabetic patients and in 8% of con -trol group in this study with significant difference p-value=0.0001. Paudyal e tal in 2013 showed that those with borderline or moderate-to-marked LAD have impaired FPG or impaired glucose tolerance with conditioning the effect of hypertension, age and sex ."14 "GW.Crus.JR et al showed that LAD indicates cardiac abnormality throu -gh the electrocardiograms of 154 patients with left axis deviation of the QRS between −30 and −90 degrees (LAD) were correlated with the clinical and at necropsy findings. Only 4 patients (2.6 %) did not have cardiac abnormality. Left axis deviation is usually indicating structural cardiac disease (LVH, CAD or left fascicular block) "2", so diabetic patients with positive LAD need further investigations and close follow up. Positive LAD are not related to duration of DM (p-value=0.982)and not related to HbA1c (p-value = 0.0281) this explain by fact that cardiac involvement in diabetic patient appears before diagnosis of DM and there are factors other than hyperglycemia. Evidence that improved glycemic control reduces cardiovascular compli-cations in DM is inconclusive. In the DCCT,the number of cardiovascular events in patients with type 1 diabetes did not differ between the standard and intensively treated groups during the trial. Trials to examine whether improved glycemic control reduces cardiovascular events in type 2 DM are underway. Positive LAD is seen in 100% of those with morbid obesity (BMI > 40 kg/m2) while 47.7% in those of normal BMI and 25% of obese (BMI 30-40 kg/m2) with no significant difference in p-value (p-value =0.46). The characteristic lipid profile in the diabetic patient is an elevated serum triglyceride (TG) concentration and suppressed high density cholesterol (HDL-c), both are risk factors for coronary artery disease. Initial steps in treating diabetic dyslipidemia should include optimization of glycemic control, dietary reinforcement, and a prescription of aerobic exercise."10" In this study, Positive LAD are seen in 50% of those with increased TG and in 20% of those with increased cholesterol with significantly no diff- erence in p-value (p-value = 0.050) while LAD is seen in 47.7% in those with normal both TG and cholesterol. In this study, normal cholesterol does not exclude low HDL-C and high atherogenic (LDL) cholesterol which are considered major dyslipidemia in DM. Most diabetic patients in this study are nonsmoker (80 %). Positive LAD is seen in 35.% of nonsmoker and in 35.3% of smoker with no significant difference in p-value (p-value =1.000). Positive LAD is seen in 18.2% of type 1 DM and in 43.3% of type 2 DM with significant difference in p-value(p-value = 0.024), this explains that complications (macro vascular) need time to appear in type 1 DM while sometimes appear at

time of diagnosis in type 2 DM (may be due to insulin resistance in type 2 DM)which is considered a cause of CAD and cardiovascular diseases.

II. CONCLUSION:

Isolated left axis deviation is a common finding in diabetic patients than in general population and it is usually indicating structural heart disease, so diabetic patients with LAD need further investigations and close follow up to exclude cardiac diseases and for early treatment of them if present.

III. ABBREVIATIONS

1- DM ----------[Diabetes mellitus
2-LAD----------[Left axis deviation]
3-PAD----------[Peripheral arterial disease]
4-CHF----------[Congestive heart failure]
5-CAD----------[Coronary artery disease]
6-MI----------[myocardial infarction]
7-BMI----------[Body mass index]
8-HbA1c----------[Hemoglobin A1c]
9-ECG----------[Electrocardiography]
10-LVH----------[Left ventricular hypertrophy]
11-DCCT----------[Diabetes control and complications trial]
12-TG----------[Triglyceride]
13-HDL-c----------[High density lipoprotein-cholesterol]
14-USA----------[United state of America]
15-ADA----------[American Diabetes Association]
16-FPG----------[Fasting plasma glucose]
17-OGTT----------[Oral glucose tolerance test]
18-IHD----------[Ischemic heart disease]
19-ASD----------[Atrial septal defect]
20-WPW----------[Wolf Parkinson White]

IV. AKNOWLEDGEMENT

We have to give all thanks to all diabetic patients and healthy control individuals who are participated in this study, also we have to thank those who work in Thi-Qar center for diabetes and endocrine diseases especially Dr. Khudair Al-Asadi.

Aim of study: To evaluate the presence of isolated left axis deviation (LAD) in diabetic patients and its relation to duration of DM, HbA1c, type of DM, body mass index, lipid profile and other parameters.

BACKGROUND : Diabetes mellitus (DM) is a clinical syndrome characterized by an incre- ase in plasma blood glucose (hyperglycemia).Diabetes is most commonly due to type 1 or type 2 DM. type 1 diabetes is caused by autoimmune destruction of insulin producing cells (*B* cells) in the pancreas resulting in absolute insulin deficiency, where as type 2 DM is characterized by resistance to the action of insulin and inability to prod -uce sufficient insulin to overcome this insulin resistance. "1"The worldwide prevalence of DM has risen dramatically over past two decades (from 30 million cases)in 1985 to(285 million)in 2010 and this may rises to(438 million) by the year of 2030. In USA, 8.3% of popula- tion have DM with 27% of individuals with DM were undiagnosed."2"

Diagnosis of DM is based on criteria derived from American Diabetes association [ADA] which include the following:

- A fasting plasma glucose (FPG) level of 126 mg/dL (7.0 mmol/L) or higher, *or*
- A 2-hour plasma glucose level of 200 mg/dL (11.1 mmol/L) or higher during a 75-g oral glucose tolerance test (OGTT), *or*
- A random plasma glucose of 200 mg/dL (11.1 mmol/L) or higher in a patient with classic symptoms of hyperglycemia or hyperglycemic crisis.

Whether a hemoglobin A1c (HbA1c) level of 6.5% or higher should be a primary diagnostic criterion or an optional criterion remains a point of controversy."3"

Complications of DM: affect many organ systems and these include microvascular complications (nephropathy, retinopathy, and neuropathy) and macrovascular or cardiovascular complications (hypertension, coronary artery disease, peripheral vascular disease, and cerebrovascular disease). Several different mechanisms are responsible for the development of chronic complications and include activation of the polyol pathway (with accumulation of sorbitol), formation of glycated proteins and advanced glycation end products (cross-linked glycated proteins), abnormalities in lipid metabolism, increased oxidative damage, hyperinsulinemia, hyperperfusion of certain tissues, hyperviscosity, platelet dysfunction (increased aggregation), endothelial dysfunction and activation of various growth factors."4"

Glycemic control in DM:

American Diabetes Association Standards for Glycemic Control in Diabetes Mellitus

Measurement	**Normal**	**Goal**
Preprandial capillary plasma glucose	< 100 mg/dl < 5.5 mmol/L	130 mg/dl 7.2 mmol/L
Peak postprandial capillary plasma glucose	< 140 mg/dl (< 7.7 mmol/L)	< 180 mg/dl (< 10.0 mmol/L)
Hemoglobin A_{1c} (%)	< 6%	< 7% "5"

Vascular diseases account for most morbidity and mortality in patients with diabetes mellitus. Diabetes causes microvascular diseases, such as

nephropathy, neuropathy, and retinopathy and macrovascular diseases (e.g., atherosclerosis). Atherosclerosis of the coronary, cerebral, and peri- pheral arteries accounts for approximately 80 percent of mortality and for 75 percent of hospitalizations in persons with diabetes."6"

Patients with diabetes have two to four fold increase in the risk of corona- ry artery disease(CAD). In the Multiple Risk Factor Intervention(MRFIT) study, more than 5000 men(out of approximately 350,000 screened) who reported taking medications for diabetes were followed for an average of 12 years. For every age stratum, ethnic background, and risk factor level, men with diabetes had an absolute risk of CAD death more than three times higher than that in the non diabetic cohort, even after adjustment for established risk factors. Another large cohort of 11,554 white men and 666 black men between the ages of (35 and 64years), screened from 1967 - 1973 and followed prospectively for 22 years, showed similar findings. "7"

In the general population, women experience relative protection from myocardial infarction and usually develop CAD approximately 10 years later than men. However, diabetes blunts the cardiovascular benefit of female gender. Diabetic women of European or African ancestry have this heightened American risk. Diabetes increases the risk of death after myocardial infarction in women more than men. In the First National Health and Nutrition Examination Survey (NHANES) and the NHANES Epidemiologic Follow-up Survey conducted 10 years apart, age-adjusted mortality decreased in non diabetic men and women, less so in diabetic men, but increased by 23 percent in diabetic women."8" Diabetes causes metabolic abnormalities, including hyperglycemia, dys- lipidemia, and insulin resistance that disrupt normal arterial function and (6) render arteries susceptible to atherosclerosis. It specifically alters the func -tion of vascular endothelium and smooth muscle cells,as well as platelets , in ways that promote atherogenesis. Diabetes impairs the vasodilator function of endothelial cells and decreases the bioavailability of nitric oxide (NO)."9"

Diabetic cardiomyopathy, one reason for the poor prognosis in patient with both diabetes and IHD seems to be an enhanced myocardial dysfunc -tion leading to accelerated heart failure (diabetic cardiomyopathy). Thus patients with DM are unusually prone to congestive heart failure and several factors underlie diabetic cardiomyopathy include:

[1]. Sever IHD.
[2]. Prolonged hypertension.
[3]. Chronic hyperglycemia.
[4]. Micro-vascular disease.
[5]. Glycosylation of myocardial protein.
[6]. Autonomic neuropathy."10"

LEFT AXIS DEVIATION: An axis of electrical activation can be defined in the frontal plane axis by combining the bipolar and augmented unipolar limb leads. By convention , the axis parallel to lead I (toward the left arm) is called 0 degrees. A frontal plane axis between –30 and +100 degrees is normal, Mild right axis deviation is a normal variant in children and young adults."11"

(7)
The normal QRS axis ranges from -30 to +90 degrees. An axis more nega -tive than -30 defines left axis deviation and an axis greater than +90 defines right axis deviation. In general, a positive QRS complex in leads I and aVF suggests a normal QRS axis between 0 and +90 degrees."12"

Common causes of left axis deviation include:

1- Mechanical shift such as high diaphragm as in (ascites, pregnancy and abdominal tumor).

2- Left bundle branch block, left anterior fascicular block.

3- Left ventricular hypertrophy.

4- Heart diseases like: ASD (primum), MI and WPW syndrome.

5- Normal variation."13"

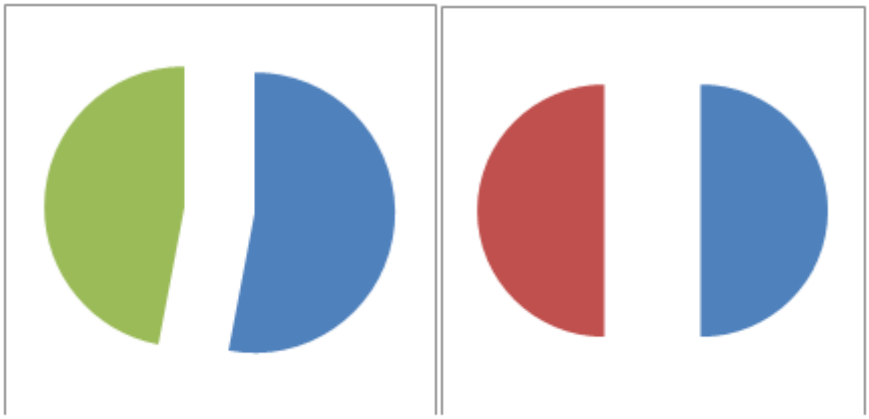
Left Axis Deviation (LAD) refers to the pattern of electrical activation that occurs in the heart. LAD is an ECG-specific finding and not necess -arily indicative of any specific cardiovascular condition. In fact, LAD is the most common ECG "abnormality" observed in adults, occurring in almost 10% of the adult population. LAD, however, may also occur in the presence of one of multiple cardiac conditions, including: thickening of muscle mass in the left ventricle (left ventricular hypertrophy), inferior wall heart attack, high blood potassium levels, congenital abnormalities such as an ostium primum ASD, and artificial cardiac pacing. It is import- ant to recognize these potential conditions, since unique treatments often apply to each of these conditions. "mediscape"

V. PATIENTS AND METHODS

This retrospective study done in Thi-qar centre of Diabetes and endocrine diseases on 100 patients with diabetes mellitus to evaluate the presence of isolated left axis deviation and 102 healthy individuals as control.
In this study, we excluded all diabetic patients who have the following criteria:
1-Those with history of cardiac diseases (IHD, Heart failure, CHD and others).
2-Those with ECG findings other than isolated left axis deviation.
3- Those with history of hypertension on treatment or newly discovered hypertension.
The age, sex, body mass index, type of DM, duration of DM and smoking history are recorded in diabetic group. In control group, age and sex are recorded.
In both diabetic and control groups, ECG is evaluated for positive LAD or not. Normal axis is between (-30 to+90) , left axis deviation is more negative than (-30). In this study, diagnosis of isolated LAD is consider when there is positive R in lead I with negative R in lead AVF and lead II.
In diabetic group, HbA_{1c} is recorded as a marker of glycemic control. In diabetes,the slow non-enzymatic covalent attachment of glucose to haem- oglobin (glycation) increases the amount of HbA_1 (HbA_{1c}) fraction relative to non-glycated adult haemoglobin (HbA_0). These fractions can be separated by chromatography. In many countries HbA_{1c} is now the preferred measurement for glycemic control. The rate of formation of (9)
HbA_{1c} is directly proportional to the ambient blood glucose concentration , a rise of 1% in HbA_{1c} corresponds to an approximate average increase of 2 mmol/l in blood glucose.
In diabetic group, lipid profile is reported in form of serum TG and serum cholesterol. Total serum cholesterol is considered normal when it's level is less than 200 mg\dl and serum TG is considered normal when it's level is less than 175 mg\dl.

VI. RESULTS

In diabetic group, number of men is 53 (53%) and number of women is 47 (47%) with a men to women ratio of1.1:1(nearly equal) while the control group including 51 men (50%) and 51women (50%)with a men to women ratio of 1:1 (equal).paragraph (1) shows the sex distribution in diabetic group and control group. (p-value = 0.775)



[red-women ; blue-men] [green-women ; blue-men]

Table(1) shows Age distribution in diabetic and control group

Group	15-25 years	26-35 years	36-45 years	46-55 years	56-65 years	>65 years	Total
Diabetic	8	19	35	23	10	5	100
	8%	19%	35%	23%	10%	5%	100%
Control	6	28	24	31	8	5	102
	5.9%	27.5%	23.5%	30.4%	7.8%	4.9%	100%

p-value=0.364

(11)

In diabetic group, large number of 35 patients (35%) is in the age refere- nce (36-45)while in control group is 31 persons (30.4%) in the age reference (46-55).

Table (2) shows the frequency of diabetic patients in relation to duration of DM,BMI, and HbA1c:

DM Duration	Frequency	BMI inkg/m^2	Frequency	HbA1c%	Frequency
0-5 years	64	Less18.5	3	< 6	1
6-10 years	27	18.5-24.9	38	6-6.9	5
11-15 years	6	25-29.9	30	7-7.9	8
16-20 years	1	30-39.9	28	8-8.9	21
> 20 years	2	≥ 40	1	≥9	65

In this study, 64% of diabetic patients have duration of illness between 0-5 years and only 9% have duration more than 10 years and 2% have more than 20 years duration.
Depending on BMI, 38% of the diabetic patients are overweight and 29% are obese.
Only 6% of diabetic patients in this study have HbA1c(< 7%),while 29 % have HbA1c in the range (7% - < 9%) and 65% have HbA1c ≥ 9%.

(12)

Table (3) shows the frequency of lipid profile and smoking in the diabetic group:

Lipid profile	Frequency	Smoking history	Frequency
Normal profile	78	Smoker	17
	78 %		17 %
Increased cholesterol	10	Non-smoker	80
	10 %		80 %
Increased TG	6	Ex-smoker	3
	6 %		3 %
Increased both	6		
	6 %		

In this study, 78% of diabetic patients have normal (cholesterol and TG) and only 6% have increased both cholesterol and TG while just increased TG is seen in 6% and just increased cholesterol in 10%.

80% of diabetic group are non-smokers while the smokers account only 17% and ex-smokers are 3% only.

Type 1 DM is seen in 33% of the diabetic group while type 2 DM is seen in67 % of the diabetic group.

(13)

Paragraph (2) shows the distribution of types of DM in diabetic group:

Type 2 DM (67%)	Type1 DM (33%)

Table (4) shows left axis deviation in diabetic and control group:

Group	Left axis deviation		Total
	Positive	Negative	
Diabetic	35	65	100
	35%	65%	100%
Control	8	94	102
	7.8%	92.2%	100%
Total	43	159	202
	21.3%	78.7%	100%

p-value=0.0001

In this study, Left axis deviation is seen in 35% of diabetic group while it is seen only in 8% of control group.

(14)

Table (5) shows left axis deviation(positive or negative) in relation to duration and control of DM:

Duration of DM	Left axis deviation		HbA1c	Left axis deviation	
	positive	negative		Positive	negative
0-5 years	22	42	< 6 %	1	0
	34.4%	65.6%			
				100%	0%
6-10 years	10	17	6-6.9%	3	2
	37.0%	63.0%		60%	40%
11-15 years	2	4	7-7.9%	1	7
	33.3%	66.7%		12.5%	87.5%
16-20 years	0	1	8-8.9 %	7	14
	0%	100.0%		33.3%	66.7%
≥ 20 years	1	1	≥ 9 %	23	42
	50%	50%		35.4 %	64.6 %

p-value=0.982 p-value=0.281

positive left axis deviation is seen in different durations but commonly seen as duration of illness increased as 50% in those with duration more than 20 years. In thosewithHbA1c morethan 9%(65 patients), positive LAD is seen in 35.4% (23) while negative LAD is seen in 64.6% (42).

(15)

Table (6)shows the presence of LAD in relation to BMI and lipid profile:

BMI	LAD		Lipid Profile	LAD	
kg/m^2	Positive	Negative		Positive	Negative
< 18.5	2	1	Normal	29	49
	66.7 %	33.3 %		37.2 %	62.8 %
18.5-24.9	7	23	Increased Cholesterol	2	8
	23.3 %	76.7 %		20.0 %	80.0 %
25-29.9	18	20	Increased TG	3	3
	47.4 %	52.6 %		50.0 %	50.0 %
30-39.9	7	21	Increased Both	1	5
	25.0 %	75.0 %		16.7 %	83.3 %
≥ 40	1	0			
	100.0 %	0.0 %			

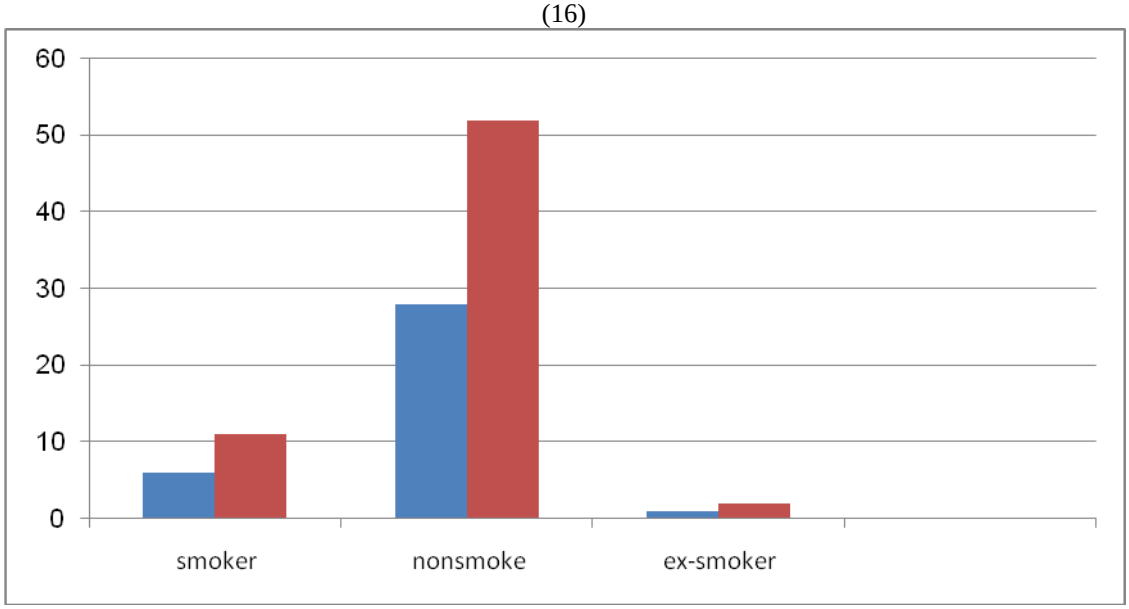
p-value=0.46 p-value=0.050

positive LAD is 100 % presenting in diabetic patients with BMI ≥ $40kg/m^2$ and it is only presenting in 25 % of those with BMI ≥ $30kg/m^2$.

Positive LAD is seen in37.2% of diabetic patients with normal lipid pro- file and only in 16.7 % of those with increased both cholesterol and TG.

Paragraph (3) shows positive LAD which is seen in (35.3%) of smoker group and (35%) in non smoker patients:

(16)

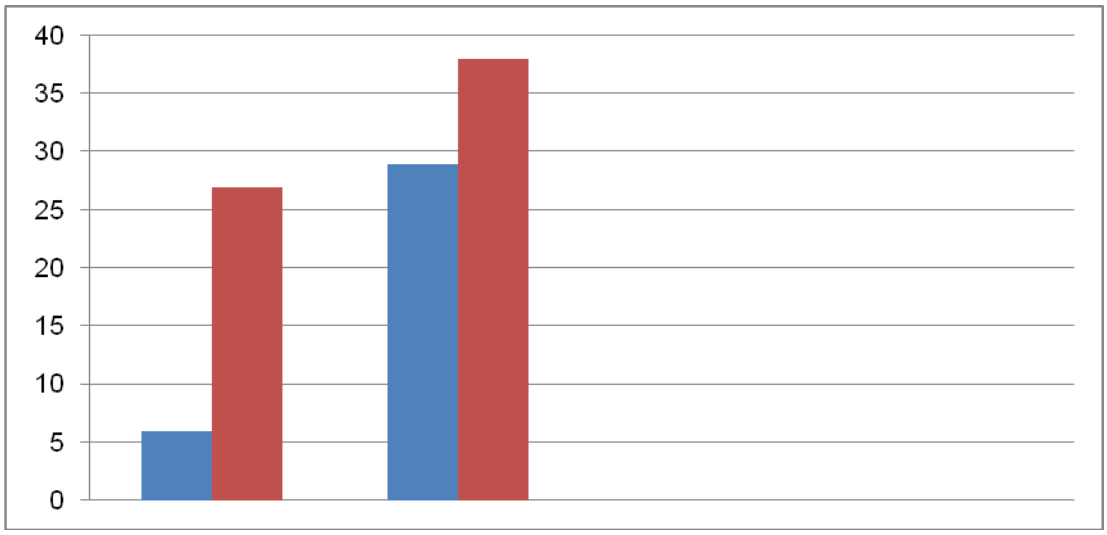


paragraph (3): blue color=positive LAD,red color= negative LA

p-value = 1.00

Positive LAD is seen in (18.2 %)of type 1 DM and in (43.3 %) of type 2 DM as seen in paragraph (4).

Paragraph(4) shows LAD in relation to type 1 and 2 of diabetes mellitus:



Type 1 DM Type2 DM Blue color =Positive LAD, Red color =Negative LAD (p-value=0.024) (17)

VII. DISCUSSION

Prevalence of DM in USA population is 8.3%with similar sex distribution between men and women (13.7% and 11.8% respectively)."12" In this study, men to women ratio is 1.1:1 in diabetic group(53% and 47% respectively)and 1:1 in control group(50% in both sex)with no significant difference (p-value=0.775). Most of patients in diabetic group (35 %) are in the range of age (36-45) years, while in control group is 31% in the range of age (46-55) years with no significant difference (p value=0.364). DM is increasing with age, in USA only 0.22 %below age of 20 and 9.6 % above age of 20 and 22.9 % in those older than 60 "2". In this study only 5% of diabetic patients are above the age of 65, this may be due to the exclusion criteria and small size of the patients sample. Type 1 DM accounts for(5-10 %) of all diabetic patients in USA "10", while type 1 diabetic patients in this study estimated to be 33 %, may be because of small number of patients sample and exclusion ofthose with cardiac disease or co-morbid illness or because of geographical variation. Number of patients in diabetic group decrease as duration of DM is incr- eased (64% in 0-5 years duration, 27% in 6-10 years duration and 2% in duration more than 20 years), this may be due to poor follow up of diab- etic patients or because of the exclusion criteria in this study. Overweight [body mass index (BMI) of 25 to 29.9kg/m2] and obesity [BMI > 30kg/m2] are major risk factors for T2DM and cardiovascular disease. (18)

There is strong correlation between increasing BMI and the risk of Type 2 DM. "4" Obesity is strongly associated with diabetes, with a prevalence of 14.9% in persons with class II obesity (defined as a BMI of 35.0 to 39.9 kg/m2) and 25.6% in persons with class III obesity (BMI > 40kg/m2), compared with 4.1% in persons of normal weight."13" As little as 5 to 10% weight loss in overweight/obese patients reduces the risk of diabetes and leads to increased insulin sensitivity with improve- ment in glycolic control, and the possibility of a reduction or cessation of anthyperglycemic therapy."10" In this study, 29% of diabetic patients are obese with BMI equal or more than 30 kg/m2 and 38 % are overweight and 30 % have normal BMI, this may be due to large number of type 1DM patients (33% of diabetic sample). 94 % of diabetic patients are not well controlled (HbA1c more than 7%) and only 6% are well controlled this may be due to poor follow up, poor medical education availability of new medications, bad dietary regimens, and most of our patients refusing insulin therapy. Patients with diabetes mellitus have different lipid abnormalities, includ-ingelevated plasma triglycerides(due to increased VLDL and lipoprot- ein remnants), elevated levels of dense LDL,and decreased plasma levels of HDL-C. Elevated plasma LDL-C levels usually are not a feature of DM and suggest the presence of an underlying lipoprotein abnormality or may indicate the development of diabetic nephropathy [2]. (19) In this study, 78 % of diabetic patients have normal TG and cholesterol, 12% have increasedTG and 16%have increased total cholesterol. Normal triglyceride and total cholesterol doesn't exclude dyslipidemia due to low HDL-C or increased level of dense LDL-C. 80% of the patients included in our study are non smoker, this can be ex- plained by exclusion of those patients with hypertension, cardiac disease or other co-morbidities. Cardiovascular disease is increased in individuals with type 1 or type 2 DM. The Framingham Heart Study revealed a marked increase in PAD, CHF, CAD, MI, and sudden death(risk increased from one to fivefolds) in DM. The American Heart Association has designated DM as a major risk factor for cardiovascular disease (same category as smoking, hyper- tension and hyperlipidemia).

Type 2 diabetes patients without a prior MI have a similar risk for coronary artery–related events asnon diabetic individuals who have had a prior MI "2". Left axis deviation is present in 35% of diabetic patients and in 8% of control group in this study with significant difference (p-value=0.0001). Paudyal et al in 2013 showed that those with borderline or moderate-marked LAD have impaired FPG or impaired glucose tolerance with cond -tioning the effect of hypertension, age and sex "14". GW. Crus. JR et al showed that LAD indicates cardiac abnormality throughthe electrocardiograms of 154 patients with left axis deviation of the QRS of between −30 and −90 degrees (LAD) were correlated with the findings clinically and at necropsy. Only 4 patients (2.6 percent) did not have cardiac abnormality, even though in 17 patients the electrocar-(20) diograms were normal except for the left axis deviation (LAD). MI was present in 52 percent of the patients, and unequivocal CAD is present in an additional 13 percent "15". Left axis deviation is usually indicates structural cardiac disease (LVH, CAD or left fascicular block) "2" so diabetic patients with positive LAD need further investigation and close follow up. Positive LAD is not related to duration of DM (p-value=0.982) and not related to HbA1c (p-value = 0.0281),this is explained by thefactthat cardiac involvementin diabetic patients appear before diagnosis ofDM and there are factors other than hyperglycemia. Evidence that improved glycemic control reduces cardiovascular compl- ications in DM is inconclusive. In the DCCT, the numberofcardiovascul- ar events in patients with type 1 DM did not differ between the standard and intensively treated groups during the trial. Trials to examine whether improved glycemic control reduces cardiovascular events in type 2 DM are underway. Concerns about the atherogenic potential of insulin remain, since in nondiabetic individuals, higher serum insulin levels(indicative of insulin resistance) are associated with a greater risk of cardiovascular morbidity and mortality. In the UKPDS, improved glycemic control did not conclusively reduce cardiovascular mortality "2".

Positive LAD are seen in 100% in those with morbid obesity BMI more than 40kg/m2 , while 47.7% present in those with normal BMI and 25% of obese patients (BMI = 30-40kg/m2) have LAD with no significant difference (p-value=0.46). Dyslipidemiais another crucial therapeutic target in the management of (21) diabetes. The most common lipid disorder associated with diabetes is an increased level of triglyceride-rich lipoproteins (e.g., VLDL), low levels of HDL, and the presence of small dense and, as a result, moreathero- genic LDL particles.The third report of the NCEP Expert Panel continues to identify LDL cholesterol as the primary target for therapy on the basis of overwhelming evidence from clinical trials.This panel has established diabetes as a coronary heart disease“equivalent”, meaning that all diabetic patients should strive for LDL levels below 100 mg/dL. The characteristic lipid profile in the diabetic patient is an elevated trigly- ceride concentration and suppressed HDL cholesterol, both risk factors for coronary artery disease. Initial steps in treating diabetic dyslipidemia should include optimization of glycemic control, dietary reinforcement, and a prescription of aerobic exercise."10" In this study, Positive left axis deviation is present in 50% of thosewith only increased TG and in 20% of those with only increased total cholest- erol with significant no difference (p-value=0.050)while present in 47.7% of those with normal TG and cholesterol. In this study, normal cholesterol does not exclude low HDL-C and dense (atherogenic) cholesterol which are considered major dyslipidemia in DM. Most diabetic patients in this study are non-smoker (80%), Positive LAD is seen in 35% of nonsmoker and in 35.3% of smoker with no significant difference (p-value=1.000). Positive LAD are seen in 18.2% of type 1DM and in 43.3% of type 2DM with significant difference(p-value=0.024),this explain that complications (macro-vascular)need time to appear in type 1,while complications some- times present at time of diagnosis of type 2 DM due to insulin resistance which is considered a cause to CAD and other cardiovascular diseases.

VIII. CONCLUSION

In this study, isolated left axis deviation is a common finding in diabetic patients in relation to general population.

LAD is usually indicating structural cardiac disease (LVH, left fascicular block or CAD) and it is sometimes normal variant.

Cardiovascular disease is increased in individuals with type 1 and type 2 DM. The American Heart Association has designated DM as a major risk factor for cardiovascular disease(same category as smoking, hypertension , and hyperlipidemia).so diabetic patients with LAD need further investi- gations to exclude cardiac disease and also they need close follow up for early diagnosis.

REFERENCES

[1]. E.R. Pearson , R. J. Mc Crimmon: Diabetes mellitus: introduction : chapter 21. Davidson's principles and practice of medicine; AA 22nd edition.
[2]. Alvin L-Powers: Diabetes mellitus: epidemiology of DM: chapter 334. Harrison's principles of internal medicine; 18th edition.
[3]. Type 2 DM-Mediscape-2013.
[4]. Philip S.Barnett, Glenn D. Braunstein: chronic complication: Diabetes mellitus: Cecil essentials of medicine-6th edition.
[5]. Braunwald's Heart Disease-2007.
[6]. Luscher TF, Creager MA, Beckman JA, Cosentino F: Diabetes and vascular disease: Pathophysiology, clinical consequences, and medical therapy: Part II. circulation 2003; 108:1655.
[7]. Gu K, Cowie CC, Harris MI: Diabetes and decline in heart disease mortality in US adults. JAMA 1999; 281:1291.
[8]. Beckman JA, Goldfine AB, Gordon MB,et al:Oral antioxidant therapy improves endothelial function in type 1 but not type 2 diabetes mellitus. Am J Physiol. Heart Circ Physiol. 2003; 285:H2392.
[9]. Type 2 DM: mediscape: 2013.
[10]. Leonard Ganz Edward Curtiss:Electrocardiography:Chapter 52: Cecil Textbook of Medicine-2008.
[11]. Lisa A. Mendes Joseph Loscalzo: Diagnostic Tests and Procedures in the Patient with Cardiovascular Disease: chapter 3.
[12]. Dannel et al;US prevalence of DM: 2013.
[13]. Type 2 DM-ACP; MEDICIE.
[14]. Paudyal e tal in 2013.
[15]. GW. Crus. JR et al show that LAD indicate cardiac abnormality throu -gh the electrocardiogram.