Open Access Journal

Indian Journal of Medical Research and Pharmaceutical Sciences

October 2018;5(10) ISSN: ISSN: 2349-5340

DOI: 10.5281/zenodo.1451547 Impact Factor: 4.054

STUDY OF CORONARY RISK FACTORS AMONG ELDERLY DIABETIC PATIENTS

Moatassem S Amer[1], Omar H Omar[2], WalaaW Aly[1], Maram M Maher[1], Ramy M Mahmoud[3] & Dalia H Elsheikh[1]

Geriatric and Gerontology Department[1], Faculty of Medicine, Ain Shams University, Egypt.

Radiology Department[2],Faculty of Medicine, Ain Shams University, Egypt.

Clinical Pathology Department[3], faculty of medicine, Ain Shams University, Egypt.

Keywords:

coronary risk factors, elderly, diabetic.

Abstract

Background: type 2 diabetes mellitus is very common among elderly diabetic patients and plays a significant role in developing cardiovascular complications. Studying coronary risk factors in elderly diabetics is of utmost importance to decrease progression of vascular complications among diabetics.

Objective: to study coronary risk factors among elderly diabetic patients.

Method: A case control study involved 90 elderly patients, 60 years and above, was conducted at the inpatient wards and outpatient clinics of Ain Shams University hospitals from the first of January 2016 to the end of April 2018. They underwent detailed history taking, including history of diabetes mellitus if present and coronary risk factors, coronary risk assessment, detailed clinical examination, measurement of Fasting and 2 hours post- prandial blood glucose levels, Hemoglobin A1 C and Lipid profile.

Results: The study showed that coronary risk is significantly high in group III (6.4-38.9) followed by group II (4.4-48.3) then control group (2.2-19.2).**Conclusion:** Coronary risk is significantly increased in elderly diabetic patients in comparison to non diabetic subjects. Coronary risk factors are directly proportional to diabetic complications and co morbidities

Introduction

Type 2 diabetes mellitus (T2DM) is a chronic disease with long term morbidity and high mortality as a result of atherosclerosis. The overall prevalence of T2DM doubled associated with obesity and clinical profile of metabolic syndrome [1]**.**

Diabetes mellitus is a growing problem worldwide, because of long life expectancy and life style modifications [2]. Over the past 20 years, there has been an explosive increase in the number of cases of diabetes mellitus in both developed and developing countries [3].

Diabetes may be associated with accelerated atherosclerosis by either increasing the conventional risk factors, such as dyslipidemia and high blood pressure, or diabetes-specific risk factors, such as advanced glycation end products (AGEs), reactive oxygen species (ROS) and matrix protein production [4].

Cardiovascular disorders in the population with diabetes are 2-3 times more frequent than in non- diabetic population. The inflammatory process in diabetic patients is essential for the development and progress of atherogenesis, ending in the formation of atherosclerotic plaques [1]**.**

Diabetes is a major contributor to coronary artery disease morbidity and mortality. Patients with diabetes have more than a 200% greater risk of cardiovascular diseases than non-diabetic individuals. The traditional risk factors for diabetes, namely, high-density lipoprotein cholesterol, smoking habit, macroalbuminuria, lower estimated

Indian Journal of Medical Research and Pharmaceutical Sciences
October 2018;5(10) ISSN: ISSN: 2349-5340
DOI: 10.5281/zenodo.1451547 Impact Factor: 4.054

glomerular filtration rate, use of diabetes medication and longer duration of diabetes, can explain part of the increasing prevalence of coronary heart disease patients [5].

Hypertension is the most common risk factor of coronary artery disease all over the world which is present in 80.3% of patients. Besides, Isfahan cohort study, Iran, demonstrated that among conventional risk factors of cardiovascular disease including diabetes mellitus, smoking, dyslipidemia and hypertension; the presence of hypertension imposes the highest risk for developing cardiovascular disease in developing countries [6].

Life style has been recognized as a major factor for the susceptibility to cardiovascular disease and lack of exercise, smoking, and a diet of energy-dense fast food are the most important predisposing factors. These common risk factors have been detected through genome-wide association studies (GWAS) of cardiovascular disease and related phenotypes, such as blood lipids, obesity, and Type 2 Diabetes [7].

Cardiovascular disease is the major cause of morbidity and mortality in patients with type 2 diabetes. Traditional risk factors such as high LDL cholesterol and low HDL cholesterol, hypertension and smoking do not fully explain the increased cardiovascular risk in patients with type 2 diabetes. Therefore, it is of great importance to identify better and non-invasive risk factor assessment tools to predict and ultimately to prevent cardiovascular disease in this group [8].

Materials and methods

Study design: A case control study

Setting: inpatient wards and outpatient clinics of Ain Shams University hospitals.

Study participants:90 elderly patients, 60 years and above from the first of January 2016 to the end of April 2018. Elderly subjects were divided into 3 groups. Each group consisted of:Group I (controls): (30) patients without DM, Group II(cases): (30) patients with DM and without co-morbidities, Group III (cases):(30) patients with DM and with co-morbidities.

After obtaining an informed consent every participant was subjected to the
(1) Comprehensive geriatric assessment in the form of:

- Detailed history taking, including personal history, demographic data and past medical history (including detailed history of:
  - Diabetes mellitus if present
  - Coronary risk factors which include hypertension, DM, lack of exercise and unhealthy diet; high carbohydrates and fats).
- Coronary risk assessment: using the ASCVD algorithm published in 2013 ACC/AHA Guideline on the Assessment of Cardiovascular Risk [9].
- Detailed clinical examination
- Screening for dementia: using the Arabic version of mini-mental state examination (MMSE) [10].
- Screening for depression: using the Arabic version of geriatric depression scale (GDS).
- Functional assessment: using activities of daily living (ADL) [11]and instrumental activities of daily living (IADL) [12].

(2) Laboratory investigations:
Each patient was instructed to fast 12-14 hours and Venous blood (2 ml) were collected in plain vacutainers to be clotted and centrifuged for measurement of total cholesterol, HDL-C, LDL-C, and TG .The laboratory work was conducted at Clinical Pathology Department, in Ain Shams University.

Indian Journal of Medical Research and Pharmaceutical Sciences
October 2018;5(10) ISSN: ISSN: 2349-5340
DOI: 10.5281/zenodo.1451547 Impact Factor: 4.054

Another sample of 2 ml was withdrawn by venipuncture after fasting for 8 hours for measurement of fasting blood sugar .The last sample of 2 ml was withdrawn by venipuncture 2 hours after eating. Centrifugation done and serum used for measurement of 2 hour postprandial blood sugar.

- Laboratory methods:

1-Determination of blood sugar level
The analysis was done on Synchron CX-9 PRO autoanalyzer (Beckman Coulter, Inc. Fullerton, CA 92835-3100, USA) [13].
2- Determination of HbA1c:

- HbA1c and other hemoglobin fractions can be separated by High Performance Liquid Chromatography (HPLC). The principle of the assay is cation exchange chromatography.
- A haemosylate prepared from the patient sample is injected onto column packed with a cation exchange resin (Bio-Rex 70).
- Phosphate buffers of increasing ionic strength are used for step elution.
- The eluted hemoglobins are detected by absorbance reading at 415 and 690 nm [14].

3- Determination of serum lipids
Total cholesterol (TC), Triglycerides (TG) were done on Synchron CX-9 PRO autoanalyzer (Beckman Coulter, Inc. Fullerton, CA 92835-3100, USA)[15].

High density lipoproteins (HDL-C): The analysis was done on Synchron CX-9 PRO autoanalyzer after precipitation with withphosphotungstic acid according to the enzymatic method described by *Assmann et al., 1983* using a commercially available kit((Beckman Coulter, Inc. Fullerton, CA 92835-3100, USA)[16]**.**

Low density lipoproteins (LDL-C): LDL-C value was calculated according to "Friedewald equation" LDL-C = Total cholesterol-(HDL-C+TG/5). This equation is applied provided that serum TG is<400 mg/dl [17]**.**

Statistical Methods

The collected data were coded, tabulated, and statistically analyzed using IBM SPSS statistics (Statistical Package for Social Sciences) (V. 22.0) software version 22.0, IBM Corp., Chicago, USA, 2013.

Descriptive statistics were done for quantitative data as minimum& maximum of the range as well as mean±SD (standard deviation) for quantitative parametric data, while it was done for qualitative data as number and percentage.

Inferential analyses were done for quantitative variables using independent t-test in cases of two independent groups with parametric data. In qualitative data, inferential analyses for independent variables were done using Chi square test for differences between proportions and Fisher's Exact test for variables with small expected numbers.
The level of significance was taken at P value < 0.050 is significant, otherwise is non-significant. The p-value is a statistical measure for the probability that the resultsobserved in a study could have occurred by chance.

Results

The current study was carried out to study coronary risk factors among elderly diabetic patients.
The study enrolled ninety elderly subjects who were divided into 3 groups:Group I (controls): (30) patients without DM, Group II(cases): (30) patients with DM and without co-morbidities, Group III (cases):(30) patients with DM and with co-morbidities.

Their mean age was 65.633 (±6.009) and there is no significant difference between study groups regarding demographic data (table 1).

The mean fasting blood sugar was 98.300 (±15.961) in group I, 146.667(±41.200) in group II and 138.267 (±37.301) in group III. The mean 2 hour post prandial was 131.333(±26.813) in group I, 243.767(±73.738) in group II and 203.967(±58.254) in group III .The mean of HB A1c was 5.693(±0.402) in group I, 9.327 (±2.327) in group II and 8.410 (±1.706) in group III. The mean total cholesterol was 183.867(±49.494) in group I, 198.867(±52.124) in

Indian Journal of Medical Research and Pharmaceutical Sciences
October 2018;5(10) ISSN: ISSN: 2349-5340
DOI: 10.5281/zenodo.1451547 Impact Factor: 4.054

group II and 147.167(±49.981) in group III. The mean of triglycerides was 136.233±74.564 in group I, 160.967±81.586 in group II and 140.233±89.411 in group III. The mean LDL was 108.900±36.563 in group I, 118.167±39.748 in group II and was 87.933±37.689 in group III. The mean HDL was 47.733±9.450 in group I, 48.533±9.733 in group II and 31.233±11.380 in group III. (Table 2).

Coronary risk is significantly high in group III (19.300±9.542) followed by group II (18.200±11.704) then control group (7.562±5.241).(Table 3).

Discussion

T2DM is a very complex and multifactorial metabolic disease. In this regard, research was performed revealing further evidence that oxidative stress has an important role in hyperglycemia-induced tissue injury. The formation of AGEs is one contributing factor. However, the role of AGEs in the pathogenesis of T2DM and diabetic complications is only partly understood [18].

The current study aimed to study coronary risk factors among elderly diabetic patients.

The study enrolled ninety elderly subjects who were divided into thirty subjects without DM (group I), thirty elderly diabetic subjects without co-morbidities (group II) and thirty elderly diabetic subjects with co-morbidities (group III).The three groups were matched for age and sex.

Our study showed that HDL was significantly lower in diabetic patients with co-morbidities in comparison to control group. This result was consistent with the data obtained by ***Bonakdaran et al. (2011)*** who determine the prevalence and risk factors of CVD in 752 patients with type 2 diabetes mellitus, their results implied that HDL cholesterol was a significant independent predictors of CVD in diabetic patients [19].

As regard comparison between study groups regarding coronary risk, the results revealed that coronary risk is significantly high in group III (6.4-38.9) followed by group II (4.4-48.3) then control group (2.2-19.2).

This was consistent with many studies such as ***Kim et al. (2018)***cohort study who enrolled1302 consecutive patients with type 2 diabetes and without a prior history of CVD and their results showed that high hemoglobin glycation index (HGI) was independently associated with incident CVD in patients with type 2 diabetes and patients with high HGI at baseline had a higher inherent risk for CVD [20].

However, the credibility of results from a single case-control study is questionable due to small sample size of the study populations. As suggested, to generate robust data, a much larger sample size in each group might be required by increasing the sample size.

Table (1): Comparison between study groups regarding the demographic data:

		Groups						ANOVA or Chi-Square	
		Group I		Group II		Group III		F or X^2	P-value
Age	**Range**	60 - 80		60 - 75		60 - 85		2.620	0.079
	Mean ±SD	65.633 ± 6.009		64.300 ± 3.743		67.533 ± 6.372			
Sex	**Male**	9	30.00	12	40.00	10	33.33	0.689	0.709
	Female	21	70.00	18	60.00	20	66.67		
Marital	**Married**	19	63.33	21	70.00	12	40.00	7.077	0.132
	Widow	11	36.67	8	26.67	17	56.67		
	Divorced	0	0.00	1	3.33	1	3.33		
Education	**Illiterate**	16	53.33	22	73.33	22	73.33	3.611	0.461
	Read and write	9	30.00	5	16.67	5	16.67		
	High school	5	16.67	3	10.00	3	10.00		

Open Access Journal

Indian Journal of Medical Research and Pharmaceutical Sciences

October 2018;5(10) ISSN: ISSN: 2349-5340

DOI: 10.5281/zenodo.1451547 Impact Factor: 4.054

Smoking	**Current smoker**	5	16.67	7	23.33	4	13.33	3.032	0.552
	Ex-smoker	3	10.00	4	13.33	7	23.33		
	Never smoked	22	73.33	19	63.33	19	63.33		

Table (2): Comparison between study groups regarding laboratory findings:

		Groups			ANOVA		TUKEY'S Test		
		Group I (control)	**Group II**	**Group III**	**F**	**P-value**	**I&II**	**I&III**	**II&III**
FBS	**Range**	78-150	87-250	90-229	17.977	<0.001*	<0.001*	<0.001*	0.595
	Mean ± SD	98.300±15.961	146.667±41.200	138.267±37.301					
HbA1C	**Range**	4.9-6.5	6.5-15.6	5.4-12.7	37.854	<0.001*	<0.001*	<0.001*	0.094
	Mean ± SD	5.693±0.402	9.327±2.327	8.410±1.706					
2hr pp	**Range**	95-205	121-380	123-380	30.630	<0.001*	<0.001*	<0.001*	0.021*
	Mean ± SD	131.333±26.813	243.767±73.738	203.967±58.254					
T.ch	**Range**	96-305	140-361	74-284	8.307	<0.001*	0.487	0.017*	<0.001*
	Mean ±SD	183.867±49.494	198.867±52.124	147.167±49.981					
TG	**Range**	63-388	55-380	63-531	0.785	0.459			
	Mean ± SD	136.233±74.564	160.967±81.586	140.233±89.411					
LDL	**Range**	43-202	69-228	38-180	4.978	0.009*	0.614	0.089	0.008*
	Mean ± SD	108.900±36.563	118.167±39.748	87.933±37.689					
HDL	**Range**	28-64	26-65	13-69	27.373	<0.001*	0.951	<0.001*	<0.001*
	Mean ± SD	47.733±9.450	48.533±9.733	31.233±11.380					

FBS=fasting blood sugar **2hrpp** = 2 hour post prandial **T.ch**= total cholesterol **TG**= triglycerides. **LDL**= low density lipoproteins. **HDL**= high density lipoproteins.

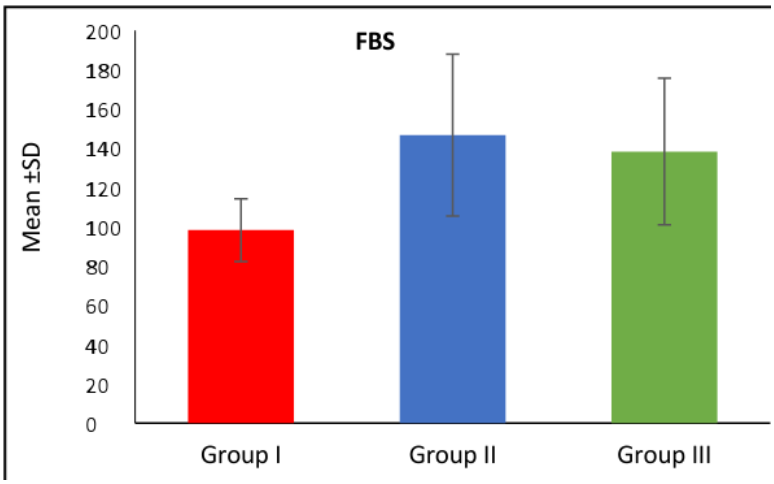

Figure (1): Comparison between study groups regarding FBS

Indian Journal of Medical Research and Pharmaceutical Sciences
October 2018;5(10) ISSN: ISSN: 2349-5340
DOI: 10.5281/zenodo.1451547 Impact Factor: 4.054

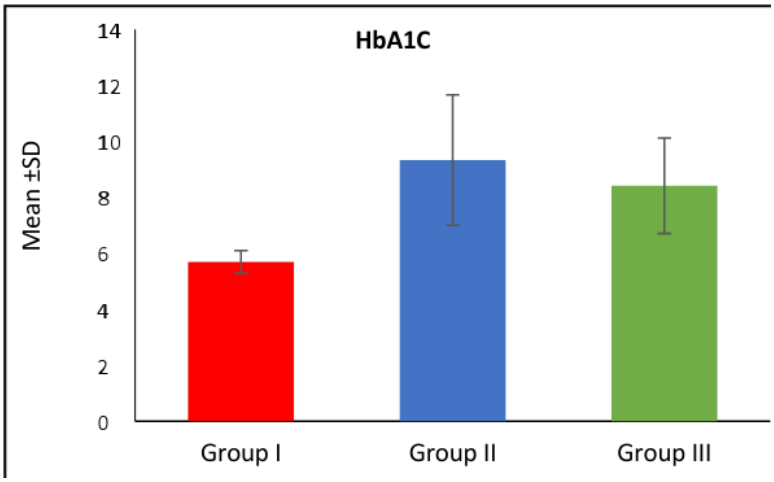

Figure (2): Comparison between study groups regarding HbA1C

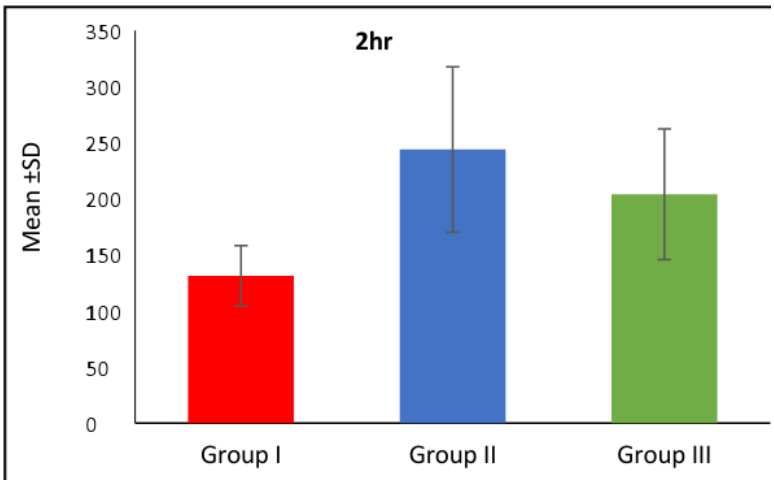

Figure (3): Comparison between study groups regarding 2hr pp

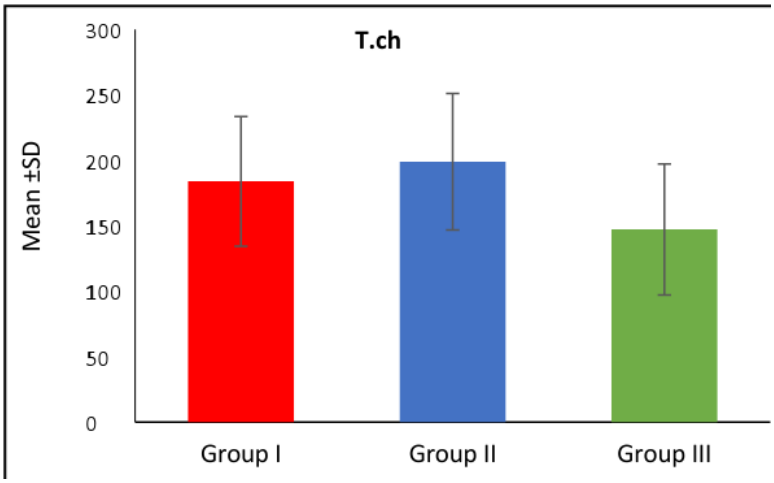

Figure (4): Comparison between study groups regarding T.ch

Indian Journal of Medical Research and Pharmaceutical Sciences
October 2018;5(10) ISSN: ISSN: 2349-5340
DOI: 10.5281/zenodo.1451547 Impact Factor: 4.054

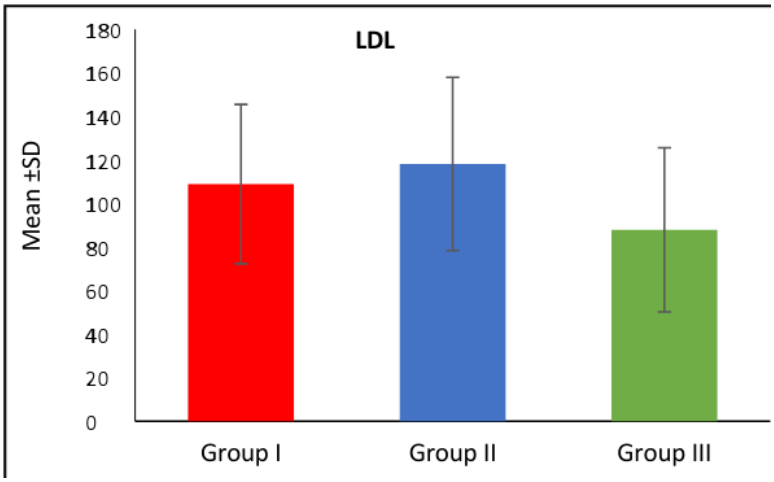

Figure (5): Comparison between study groups regarding LDL

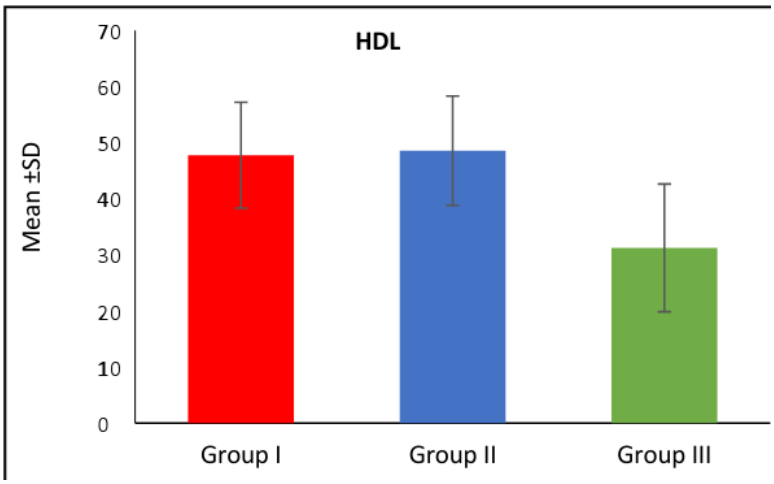

Figure (6): Comparison between study groups regarding HDL

Table (3): Comparison between study groups regarding coronary risk:

Coronary	Groups			ANOVA		TUKEY'S Test		
	Group I (26)	Group II (30)	Group III (13)	F	P-value	I&II	I&III	II&III
Range	2.2-19.2	4.4-48.3	6.4-38.9	11.252	<0.001*	<0.001*	0.001*	0.933
Mean ±SD	7.562±5.241	18.200±11.704	19.300±9.542					

Indian Journal of Medical Research and Pharmaceutical Sciences
October 2018;5(10) ISSN: ISSN: 2349-5340
DOI: 10.5281/zenodo.1451547 Impact Factor: 4.054

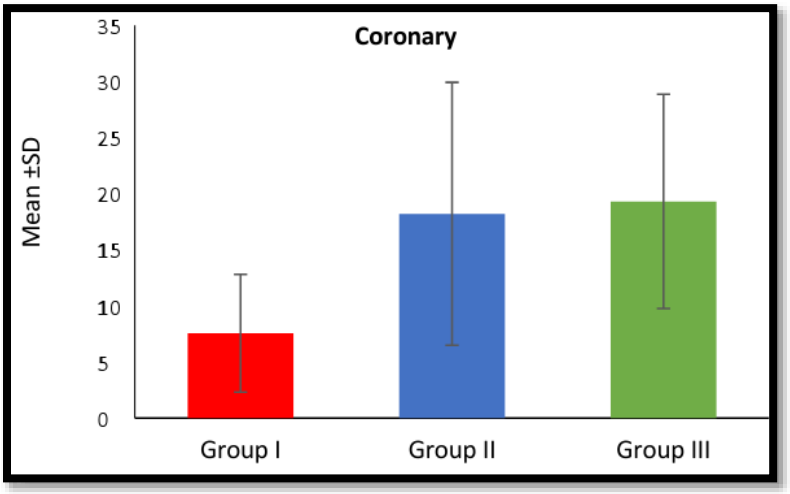

Figure (7): Comparison between study groups regarding coronary risk

Conclusion

Coronary risk is significantly increased in elderly diabetic patients in comparison to non diabetic subjects. Coronary risk factors are directly proportional to diabetic complications and co morbidities.

Acknowledgement

The authors acknowledgeAin Shams university hospitals, their colleagues and the study participants for their help and support.

References

1. Talavera JO, Hajj JT, Wacher NH, et al. (2015): carotid intima media thickness, ankle arm index, and inflammation profile in Mexican patients with early and late onset type 2 diabetes: Rev InvesClin, 67, 240-249.
2. Chentli F, Azzoug S, Mahgoun S (2015) : Diabetes mellitus in elderly.Indian Journal of Endocrinology and Metabolism, 19(6), 744–752.
3. Khan NA, Wang H, Anand S, et al. (2011) : Ethnicity and Sex Affect Diabetes Incidence and Outcomes. Diabetes Care 34(1):96-101.
4. Goldberg IJ. (2004): Why does diabetes increase atherosclerosis? I don't know! J Clin Invest 114:613–615.
5. Liu J, Zou Y, Tang Y, et al. (2016): Circulating cell-free mitochondrial deoxyribonucleic acid is increased in coronary heart disease patients with diabetes mellitus, J Diabetes Investig. 7(1): 109–114.
6. Masoudkabir F, Poorhosseini H and Vasheghani-Farahani A. (2015): Synergistic effect of hypertension with diabetes mellitus and gender on severity of coronary atherosclerosis: Findings from Tehran Heart Center registry. ARYA Atheroscler. 11(6): 317–322.
   Kovel CG, Mulder F, Setten JV, et al. (2016): Exome-Wide Association Analysis of Coronary Artery Disease in the Kingdom of Saudi Arabia Population, PLoS One, 11(2).
7. Dahlen EM, Bjarnegård N, Länne T, et al. (2013): Sagittal abdominal diameter is a more independent measure compared with waist circumference to predict arterial stiffness in subjects with type 2 diabetes - a prospective observational cohort study, CardiovascDiabetol. 12(55): 1475-2840 .
8. Goff DC, et al. (2013): 2013 ACC/AHA Guideline on the Assessment of Cardiovascular Risk. A Report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines.Circulation. 129 (25): 49-73.
9. Folstein MF, Folstein SE and McHug PR (1975): Mini-mental state examination. A practical method for grading the cognitive state of patients for the clinician of Psychiat. Res; 12(3):189-198.
10. Katz (1963): STUDIES OF ILLNESS IN THE AGED. THE INDEX OF ADL: A STANDARDIZED

October 2018;5(10) ISSN: ISSN: 2349-5340
DOI: 10.5281/zenodo.1451547 Impact Factor: 4.054

MEASURE OF BIOLOGICAL AND PSYCHOSOCIAL FUNCTION. JAMA. 185:914-919.
11. Lawton MP and Brody EM. (1969): Assessment of older people: self-maintaining and instrumental activities of daily living. Gerontologist. 9(3):179-86.
12. Sacks DB. (2006): Carbohydrates. In: Tietz textbook of clinical chemistry. 4thed. C.A. Burits, E.R. Ashwood and D.E. Bruns (Eds).Philadelphia, W.B. Saunders Co.837-872.
13. Eldemerdash OH, Tawfik PH and Shahin KH. (2008): clinical chemistry from principles to practice. Ch. 17, p. 19-20.
14. Dietschy JM, Weeks LE and Delento JJ. (1976): Enzymatic assessment of free and estrified cholesterol levels using the oxygen electrode in a modified glucose analyzer. ClinChemActa 73: 407.
15. Assmann G, et al. (1983): Quantification of high density lipoprotein cholesterol by precipitation with phosphotungstic acid-MgCl2. Clin. Chem 29: 2026-2030.
16. Friedewald WT, Levy RI, Fredrickson DS. (1972): Estimation of the concentration of low-density lipoprotein cholesterol in plasma, without use of the preparative ultracentrifuge. Clin Chem. 18(6):499-502.
17. Nowotny et al. (2015): Advanced glycation end products and oxidative stress in type 2 diabetes mellitus. Biomolecules.5(1):194-222.
18. Bonakdaran, Ebrahimzadeh S and Noghabi SH. (2011): Cardiovascular disease and risk factors in patients with type 2 diabetes mellitus in Mashhad, Islamic Republic of Iran Eastern Mediterranean Health Journal EMHJ 17(9) 640-646.
19. Kim et al. (2018): Hemoglobin glycation index predicts cardiovascular disease in people with type 2 diabetes mellitus: A 10-year longitudinal cohort study. J Diabetes Complications.