eISSN:2413-6096 ljmr.ly

Original Article

Gender discrepancy in CardioVascular Disease prevalence & risk factors among diabetic patients at Tripoli – Libya (between 2013 & 2022).

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Abstract:

Cardio-Vascular Disease (CVD) remains the leading cause of death among diabetic patients. Aim: To compare the CVD prevalence and assess the CVD risks between females and males diabetic patients. Methods: All patients with diabetes who attended the outpatient clinicat National Diabetes Hospital from Sep 2013 to April 2022 were interviewed and examined, demography data about their ages, smoking habits, Body Mass Index measures, history of prior cardiovascular events, blood pressure measurement and fasting lipid profile were collected, these data were analyzed Statistically by SPP. Results:1060patients have completed the study,689 females representing (65%), themean age was 54.07±14.5 years, Bodyweight of the studied patients ranged from 44 kg to 186 kg(85.66 ±1.73) underweight was seen in 1.4%,normal BMI seen in 15.8%,and 828 (78.55%) have uncontrolled body weight. The duration of diabetes varying from newly diabetes (20.3%)to more than ten years duration(37.9%).(72%) of the patients were Non-smokers, (27.2%) had uncontrolled blood pressure. Uncontrolled dyslipidaemia was seen in (7.1 %), uncontrolled hyperglycaemia was seen in (62.9 %), and Established CVD was positive in (23.2%). Those who are54 to74 years of age had multiple CVD risk factors were female patients, with long standing of history of diabetes (more than 10 years), had uncontrolled hyperglycemia (HBA1c>10g%), uncontrolled body weight, uncontrolled blood pressure, and dyslipidemia as well. Conclusion: This study shows that female diabetic patients have higher CVD risk factors than malediabetic patients sharing the same age and the same duration of diabetes. Themale diabetic Smokers have a significant CVD risk. Recommendation: increase the awareness of females' diabetic patients regarding the early symptoms of cardiovascular diseases, the importance of preventive measures against CVD risks of diabetes, and the importance of regular follow up especially in females.

Keywords: *Diabetes Mellitus; Body Mass Index*,CVD;*Cardio-Vascular Disease.*

Citation.. Elmiladi, Samia A , **Gender discrepancy in CardioVascular Disease prevalence & risk factors among diabetic patients at Tripoli – Libya (between 2013 & 2022).**

2022;16(2):https://doi.org/10.54361/ljmr.16207

Received: 28/07/22**accepted**: 15/08/22; **published**: 31/12/22
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Introduction:

Nearly 592 million individuals thought to be diabetic by the year 2035, as the prevalence of diabetes is expected to rise1, in relation to the expected increase in the world's, also the increase in the prevalence of overweight and obesity and the increasing lack of physical activity, however, North Africa, and the Middle East have the highest prevalence of diabetes, with rates ranging from 21–25 % in men and 21–32 % in women2, this difference between regions and sexes can be explained by substantial biological, socioeconomic and societal differences3. There is a well-known gender difference observed in the manifestations of cardiovascular disease (CVD). Where Men have a higher risk of coronary heart disease (CHD), compared with women, who are found to have a similar or greater propensity of developing stroke4,5, Cardiovascular disease is the most common underlying cause of death, accounting for 52 % of deaths in type 2 diabetes6, based on the result of largeanalysis of data from 64 cohorts, including nearly 900,000 patients of diabetes and more than 28,000 incident CHD events, showed that the presence of diabetes nearly tripled the risk of incident CHD in women, whereas it doubled the risk in men7. So, diabetes conferred a 44 % greater excess risk for incident CHD in women compared with men. This estimate is comparable to the 46 % excess risk for fatal CHD in women with diabetes found in a previous analysis 8, the explanation for these disparities might be the result of cardiometabolic risk in women such as obesity and overweight which are associated with higher levels of biomarkers of endothelial dysfunction, inflammation, and procoagulant state. Also, sex differences in the prescription and use of some cardiovascular drugs may play a role in an "existing" disparity.

AIM: To compare the CVD prevalence and assess the CVD risks between female and male patients with diabetes in the studied sample.

Methodology

A total of 1312 patients were enrolled in this study, only 1060 patients have completed the study, all patients (female and male) who attended the outpatient clinic at the National Diabetes Centre from Sep 2013 to April 2022,were included in this study. There demography data include the age, smoking habit, weight, height, Body Mass Index, blood pressure measurements, as well as fasting lipid profile,HBA1c measurements. Duration of diabetes, Assessment of cardiovascular disease in by

the history of previous cardio vascular events, the management of previous cardio vascular events either on conservative medical measures, or underwent diagnostic or intervention coronary Angio-catheterization.

Statistical analysis: hey were interviewed and examined using standardized methods, the data was Statistical analysis by SPP, for continuous variables are expressed as mean ± standard deviation and analyzed using descriptive statistics, Cross tabulation, Chi-square tests to calculate Pearson Chi-square, Asymp. Sig (2-sided) as p-value 95% confidence intervals (95% CI) with aP-value< 0.05 was considered statistically significant. All calculations were performed with Statistical v10.0 (StatSoft, Tulsa, OK, USA) or STATA v11 (Stat Corp LLC, College Station, Texas, USA).

Results

In our studyout of 1312 patients only 1060 patients completed the study, Females represent 65% of the studied sample, and theirmean age was 54.07±14.5 years. Their Bodyweight ranged from 44 kg to a maximum of 186 kg. according to the Body Mass Index for each patient, the patients were categorized into; underweight seen in 1.4%,normal BMI seen in 15.8%,and 78.55% have uncontrolled body weight (morbid obese). Theduration of diabetes among the studied sample, varying from newly discovered diabetes seen in (20.3%),and long standing diabetes more than ten years seen in (37.9%). About 72% of the patients were Non-smokers. Uncontrolled high blood pressure despite treatment present in 27.2%.Uncontrolleddyslipidaemia was present in 7.1 %. Uncontrolledhypergly camera was in 62.9 %.Established cardio-vascular disease was seen in 304 patients (23.2%). Those female patients who have multiple (more than 3) CVD risk factors there age ranged between 54 and 74 years. They have long standing diabetes more than 10 years and have uncontrolled hyperglycemia (HBA1c>10g %), uncontrolled body weight, uncontrolled blood pressure, and dyslipidemia. Our results were tabulated in to two main categories: category (A)shows the distributions of CVD risk factors in relation to the gender in Diabetic patients and category (B) shows the distributions of diabetic patients who got CVD in relation to the gender.

Category (A): Distributions of CVD risk factors in relation to the gender in Diabetic patients at National Diabetes Center (Tripoli-Libya 2013-2022)

Table (1): AgeGroup distribution;

	Female	Male	Total	
12- 32	82	27	109	0.188
33-53	328	168	49	
54-74	395	175	570	
75-95	76	44	122	
Total	**883**	**414**	**1297**	

Table (2): Duration of Diabetes;

	Female	Male	Total	
Newly diagnosed	167	99	266	0.079
2-5 years duration	96	47	143	
5-10 years duration	100	55	155	
>10 years duration	328	170	498	
			1062	
Total	**691**	**371**	**1062**	

Table (3): Glycaemic Control;

	Female	Male	Total	
HBA1c <6g%	69	16	85	0.000
HBA1c 6.5-7g%	111	39	150	
HBA1c 8-9g%	280	175	455	
HBA1c >10g%	230	141	371	
Total	**690**	**371**	**1062**	

Table (4): Fasting Lipid;

	Female	Male	Total	
Normal	90	52	142	0.341
Controlled with treatment	562	311	873	
Uncontrolled	37	8	45	
Total	**689**	**371**	**1060**	

Table (5): Smoking Habit;

	Female	Male	Total	
Non Smoker	798	156	954	0.000
Ex-smoker	2	104	106	
Passive	92	2	94	
Active	0	158	158	
Total	**892**	**420**	**1312**	

Table (6): BMI;

	Female	Male	Total	
Under weight	6	12	18	0.000
Normal	61	147	208	
Over weight	174	92	266	
Obese	201	66	267	
Morbid obese	242	53	295	
Total	**684**	**370**	**1054**	

Table(7): Blood Pressure Status;

	Female	Male	Total	
Normal Blood pressure	184	145	329	0.003
Controlled with treatment	286	136	422	
Uncontrolled	219	90	305	
Total	**689**	**371**	**1060**	

Category (B): the distributions of diabetic patients who got CVD in relation to the gender at National Diabetes Center (Tripoli-Libya 2013-2022).

Table (8): Age Group distribution;

Age Group	Female		Male		Chi-Square tests	
	Established CVD	**No**	**Established CVD**	**No**	**Female**	**Male**
Age:≤ 32	1	27	0	17	0.000	0.000
33-53	32	202	21	121		
54-74	118	235	66	97		
75≥	35	32	22	20		
Total	**186**	**496**	**109**	**255**		

Table(9): Duration of Diabetes;

Duration of diabetes	Female		Male		Chi-Square tests	
	Established CVD	**No**	**Established CVD**	**No**	**Female**	**Male**
Newly diagnosed	31	136	84	98	0.000	0.000
2-5 years duration	18	76	40	47		
5-10 yearsduration	19	80	37	55		
>10years duration	124	204	97	170		
Total	**192**	**496**	**258**	**370**		

Table(10): Glycaemic Control;

Glycaemic Control	Female		Male		Chi-Square tests	
	Established CVD	**No**	**Established CVD**	**No**	**Female**	**Male**
HBA1c <6	13	56	2	13	0.000	0.44
HBA1c 6.5-7	25	85	11	28	pearson chi square	0.364
HBA1c 8-9	71	208	51	124	0.005	0.19
HBA1c ≥10	83	147	48	93	likelihood Ratio	
					0.001	
					Linear by linear association	
Total	**192**	**496**	**112**	**258**		

Table(11): Fasting Lipid;

Dyslipidemia	Female		Male		Chi-Square tests	
	Established CVD	**No**	**Established CVD**	**No**	**Female**	**Male**
Normal	6	84	0	52	0.000	0.000
Controlled	172	389	109	201		
Uncontrolled even with drugs	14	23	3	5		
Total	**192**	**496**	**112**	**258**		

Table(12): Smoking Habit;

Smoking Habit	Female		Male		Chi-Square tests	
	Established CVD	**No**	**Established CVD**	**No**	**Female**	**Male**
Non Smoker	174	442	50	89	0.752	0.04
Ex-smoker	1	1	33	64		(pearson chi square
Passive	19	53	1	1		0.036
Active	0	0	28	104		(likelihood Ratio
						0.006
						Linear by linear association
Total	**192**	**496**	**112**	**258**		

Table(13): BMI;

BMI	Female		Male		Chi-Square tests	
	Established CVD	**No**	**Established CVD**	**No**	**Female**	**Male**
Underweight	4	3	3	9	0.041	0.312
Normal	8	52	42	105		
Overweight	44	130	30	61		
Obese	242	138	25	41		
Morbid obesity	72	170	11	42		
Total	**190**	**493**	**111**	**258**		

Table(14): Blood Pressure Status;

Blood Pressure Status	Female		Male		Chi-Square tests	
	Established CVD	**No**	**Established CVD**	**No**	**Female**	**Male**
normal	18	166	19	125	0.000	0.000
Controlled	110	175	59	77		
Uncontrolled	83	155	34	56		
Total	192	496	112	258		

Discussion:

In this study of nationally representative data from the National Diabetes Center (Tripoli-Libya) between 2013 and 2022, trends in CVD risk factors were different between the sexes, on the other hand, our data add to existing evidences that gender difference in diabetes-related diseases. Reductions in mean TC were lesser in

women than men, and increases in BMI were greater in women than men.

data from US adults between 2001 to 2004 and 2013 to 2016,several CVD risk factors were similar between male and females, but statistically significant were present in the trends in lipid and BMI levels. Reductions in lipid were lesser in women than men, and increases in BMI were greater in women than men. The control of hypertension, diabetes mellitus, and dyslipidemia remains suboptimal in both sexes, Men were less likely to have control of hypertension and diabetes mellitus, whereas women were less likely than men to have adequate control of dyslipidemia9.

In our series, the most prevalent diabetic patients who were at the age group between54and 74 years were females, but without any statically significance (0, 18)table (1), meanwhile the same age group patients have a higher numbers of established CVD 395 (30%) with high significance (0.000)(Table8).

In regards to the overall disease duration, our diabetic female patients with more than ten years disease duration shows higher presentation than men 328 (11%) (Table 2), moreover, these group of patients who got established CVD has a higher presentation than men(0,000) (Table 9).

HbA1c and Diabetes Mellitus

In our series, the mean levels of HbA1c in creased highly significant (0.000) in women in compare to men Table (3). On the other hand those female who don't have established CVD 496 (72%) have high HA1C was highly significant (0.000) in compare to those females who got established CVD 192 (38%) (Table10).

Zhang and his group found, there was no evidence of variations in sex differences in treatment and control rates by age, CVD status, or race10.

Diabetes and Dyslipidemia

The prevalence, treatment, and control of dyslipidemia for women and men, compared with men, women 562 (64%) were more likely to be treated and to have controlled dyslipidemia (Table 4).

A higher percentage of women 14 (30%) than men 3 (6%) with CVD had dyslipidemia, which is highly significant (0.000) whereas rates were similar for those without CVD (Table 11). Unlike our results, Zhang10,and his group found, there was the prevalence, treatment, and control of dyslipidemia increased over calendar periods for women and men and a higher percentage of men than women with CVD had dyslipidemia, whereas rates were similar for those without CVD.

Smoking

Non Smokers rates in women 798 (83%) are obviously lower than in men, without any

significance (0.7)Table (5), in relation to the established CVD Table (12), which is similar to the report from Zhang10, showing that smoking rates were 8 to 10 percentage points lower in women than in men.

Body Mass Index

Abnormal BMI in the form of overweight, obese, and morbid obesity are significantly increased (0.000) in women thanin menTable (6).

There were minimal differences in CVD status (0.04) Table (13), as seen by Zhang et al10.

Assessment of Blood Pressure

The prevalence, uncontrolled of hypertension is higher in women 219 (71%) than men which is significant (0.003) (Table 7).

Compared with men 112 (10%), women 192 (18%) were more likely to have established CVD (0.000)Table (14).

De Jong11and his group found, that the assessment of blood pressure, women were more likely to receive blood pressure screening and one study reported men being more likely to receive blood pressure screening

Our data add to existing evidence that gender difference in diabetes-related diseases suggest the need for further work to clarify the biological, behavioral, or social mechanisms involved.

The relative risk of diabetes-related CAD is substantially higher in women than in men12,

A recent systematic review and meta-analysis estimate the relative effect of diabetes on the risk of stroke significantly higher in women than in men13,

The reason for this global "female disadvantage" in diabetes remains unknown. Gender disparity in the treatment of cardiovascular risk factors in individuals with diabetes, is possibly involved14.

Other data suggest that the diabetes-related increased risk of cardiovascular disease in women may be due to the combination of both a deterioration in cardiovascular risk factor levels and undiagnosed and untreated, cardiovascular risk in the pre-diabetic state15.

Results from the UK General Practice Research Database the age-adjusted average BMI at diagnosis of diabetes was higher in women than in men, the Scottish data showed that HbA1c levels within 1 year of diagnoses were broadly similar in men and women, indicating that they were diagnosed at a similar stage of diabetes16.

Conclusion: The study clearly shows that female patients have higher CVD risk factors than diabetic male patients with the

same age groups and the same duration of diabetes. Smoking has a significant CVD risk in male patients.

Recommendation: More efforts need to increase education in female patients with diabetes regarding the importance of preventive steps for CVD in patients of diabetes, the regular follow up and early recognition of cardiovascular diseases risk factors in females is crucial.

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2. Conflicts of interest: There are no conflicts of interest.
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