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RESEARCH ARTICLE

EFFECT OF METFORMIN ON WEIGHT REDUCTION AMONG DIABETIC AND NON-DIABETIC OBESE PATIENTS

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Key words:-

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Abstract

Context: Metformin is the first line treatment in type II diabetes mellitus. In addition, it was used for weight reduction in both diabetic and non-diabetic obese patients.

Aims: The aim of this study was to examine the efficacy of metformin in weight reduction among diabetic and non-diabetic obese patient in Benghazi, Libya.

Settings and Design: a cross-sectional study

Methods and Material: A hundred well-designed a cross-sectional survey was distributed from January to December 2020 and filled by diabetic and non-diabetic obese patients (66 and 34, respectively) in Benghazi city.

Statistical analysis used: SPSS statistics soft wear (Version 21.0; SPSS Inc.: Chicago, IL, USA).

Results: Results had shown that 66.7 % of diabetic obese patients were more than 50 years while 35.5 % of non-diabetic obese patients were 21-25 years. 1-5 kg was the weight reduction in both diabetic and non-diabetic obese patients (43.9 % and 38.2 %, respectively)

Conclusions: According to this study, metformin is an effective therapy to reduce weight in diabetic and non-diabetic obese patients. Further studies are needed with exact weight reduction.

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Introduction:-

Metformin is one of the most widely used medication for the treatment of type II diabetes mellitus (T2DM).^[1,2] Since its approval in the UK in 1958 and in the USA in 1995 (doses: 500- 2500 mg/day).^[3] According to the American Diabetes Association (ADA) and the European Association for the study of diabetes (EASD) guidelines, metformin is the first-line treatment for T2DM.^[4] It has been noticed that metformin causes weight reduction in type II diabetic patients due to suppresses endogenous glucose production and may also act as an insulin sensitizer.^[5] In non-diabetic patients, obesity is related to insulin resistance.^[6] Metformin has others health benefits separate of its effects on glucose and insulin levels; these include inhibition of platelet aggregation, antioxidant activity, weight reduction, effects on lipid parameters (total cholesterol, HDL-C, low-density lipoprotein cholesterol, and triglycerides), and arterial hypertension.^[7] Currently metformin become commonly prescribed for patients with polycystic ovary syndrome (PCOS), and its use has resulted in weight loss in those patients as well.^[8] Only one randomized controlled trial of high-quality diabetes prevention program has been shown that metformin had significantly reduced weight in non-diabetic patients.^[9] Mechanism of metformin action by decreasing intestinal

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glucose absorption, improving peripheral glucose uptake, lowering the fasting plasma insulin level, and increasing insulin sensitivity, which results in a reduction of blood glucose concentration without causing overt hypoglycaemia. The aim of this study was to examine the effects of metformin on weight reduction among two groups, which were diabetic and non-diabetic obese patients.

Subjects and Methods:-

Study design:

A cross sectional questionnaire was used to evaluate the efficacy of metformin in weight reduction in diabetic and non-diabetic obese patients among Benghazi population. A well-designed questionnaire was containing demographic questions; in addition, questions about metformin uses, duration, and diseases rather than diabetes. A hundred patients age ranged from 21 to more than 50 years were included from two outpatient clinics in Benghazi city. The questionnaire was distributed and filled by sixty-six diabetic patients at Diabetic Center (Benghazi, Libya), at the same time, the same questionnaire was sent to a nutritionist at Adamah clinic to fill with her patients. Thirty-four obese females who used metformin for the purpose of losing weight were included in this study, whether the weight gain was a result of diseases such as PCOS or without a specific disease. Unfortunately, due to COVID 19 pandemic, the researchers could not collect enough samples from non-diabetic obese patients. Patients' weights, before using metformin and at the time where the researchers collect data, were collected from their files while the patients were filling the questionnaire. The study period was from January to December 2020.

Ethics:

The study was approved by the Libyan international medical university research ethics committee.

Statistical analysis :

Data was collected and analyzed by using IBM® SPSS statistics soft wear (Version 21.0; SPSS Inc.: Chicago, IL, USA). Descriptive statistical analysis was conducted.

Results:-

A hundred patients were included in the study with 100 % response rate, which were 33 females and 33 males' diabetic obese patients and 34 females' non-diabetic obese patients. The majority (66.7 %) of diabetic patients were more than 50 years and 22.5 % were 46-50 years while the majority (35.5 %) of non- diabetic patients were 21-25 years old followed by 25.5% were 32-35 years (Table.1).

Table.1:- Age distribution among diabetic and non-diabetic obese patients.

Diabetes		Frequency	Percent %
Yes	Valid		
	21-25 years	1	1.5
	36-40 years	2	3.0
	41-45 years	4	6.1
	46-50 years	15	22.7
	> 50 years	44	66.7
	Total	66	100.0
No	Valid		
	21-25 years	12	35.3
	26-30 years	5	14.7
	31-35 years	9	26.5
	41-45 years	5	14.7
	Total	31	91.2
	Missing System	3	8.8
	Total	34	100.0

The results showed that 29 (43.9 %) of diabetic patients (21 patients aged > 50 years old) had weight reduction from 1 to 5 kg after using metformin while 27.3 % had not change in their weight. However, 11 (38.2 %) of non-diabetic

participants (9 of them were from 21-25 years old) had a weight loss of 1 to 5 kg and weight loss of 6 to 10 kg was reported by approximately 20.6 % of patients (Table.2).

Table.2:- Weight reduction in kilograms among diabetic and non-diabetic obese patients' groups after starting metformin.

Diabetes			Weight reduction in kg						Total	
			1-5 kg	6-10 kg	11-15 kg	16-20 kg	more than 20 kg	No change		weight increase
Yes	age group	21-25 years	1	0	0	0	0	0	0	1
		36-40 years	2	0	0	0	0	0	0	2
		41-45 years	2	1	0	0	0	1	0	4
		46-50 years	3	4	0	1	0	4	3	15
		> 50 years	21	2	0	1	1	13	6	44
Total			29	7	0	2	1	18	9	66
No	age group	21-25 years	9	1	1	0	0	1	0	12
		26-30 years	0	2	0	0	0	3	0	5
		31-35 years	2	3	1	2	0	1	0	9
		41-45 years	0	1	1	1	0	2	0	5
		Total			11	7	3	3	0	7

73.8 % of diabetic patients had been using metformin from 2 to 4 years, while the non-diabetic patients had been using it from 1 to 3 months (46.7 %) (Figure 1).

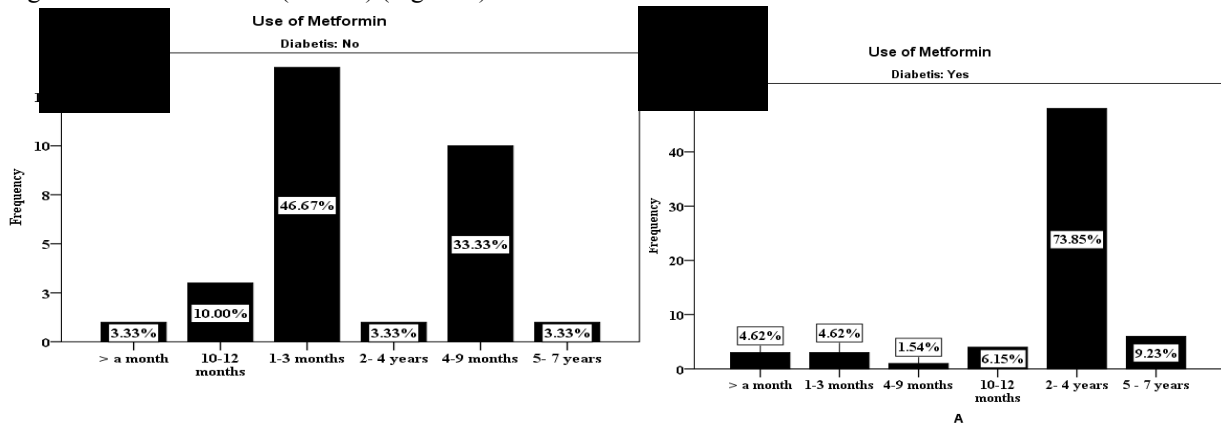


Figure.1:- Duration of using of metformin: (A) Diabetic (B) Non-diabetic obese patients.

The participants were asked if they suffer from any diseases: For diabetic patients: 27.3 % had hypertension, 3 % had hypothyroidism, 4.5 % had kidney diseases, 3 % had gout, and 3 % had asthma. While 29.5 % of non-diabetic patients had polycystic ovarian syndrome (PCOS).

A significant number of participants were found that they were not following any diet regime (80.3 % of diabetic patients and 55.9 % of non-diabetic obese patients) (Figure.2).

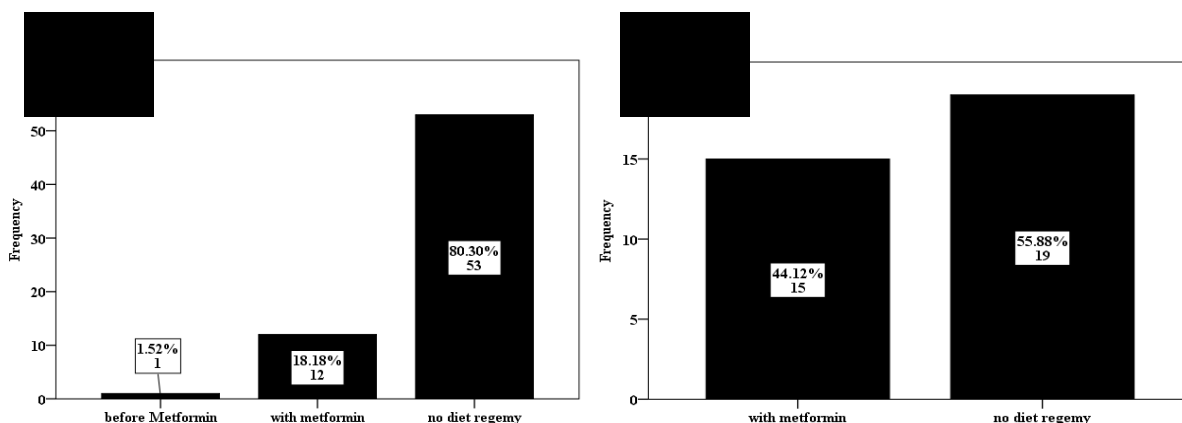


Figure.2:- Time of starting diet regime (A) diabetic patients (B) non-diabetic obese patients.

The last question showed that all diabetic obese patients had started metformin following physicians' prescription and all non-diabetic obese participants followed their nutrition's advice.

Discussion:-

Researchers have studied the effect of metformin on patients' weight in non-diabetic patients and others who had different diseases, some of them showed that metformin had significantly reduced weight in non-diabetic patients. [11] Other studies showed that it also reduces weight in type II diabetic patients, in which the average of weight loss was 5%. [12] In addition, many studies proved that metformin reduces weight in women with PCOS. [13]

This study represented the difference in weight reduction between diabetic patients and non-diabetic obese patients. A sample of 100 patients was collected, 66 of them were diabetic (33 males and 33 females) and 34 were non-diabetic female patients. The age of the most diabetic patients was more than 50 years old with percentage 66.7%, and non-diabetic patients' age ranged from 21 to 25 years with percentage 35.3%. The most weight reduction was 1-5 kg with percentage of 43.9% and 38.2% for diabetic patients and non-diabetic patients, respectively. Unfortunately, due to COVID-19 pandemic situation, researchers could not collect enough samples from non-diabetic obese patients. In addition, only patients from 21-25 years old were visiting the nutrition clinic while the patients, who were more than 50 years old, were afraid to visit the clinic because of coronavirus. Also, they could not find males patients at the clinic (Table.3).

Table.3:- Weight reduction in kilograms among males and females according to their diabetic and non-diabetic obese patients' groups.

Diabetes			Weight reduction in kg						Total	
			1-5 kg	6-10 kg	11-15 kg	16-20 kg	more than 20 kg	No change		weight increase
Yes	gender	Male	17	2	0	1	0	8	5	33
		Female	12	5	0	1	1	10	4	33
	Total		29	7	0	2	1	18	9	66
No	gender	Female	13	7	3	3	0	8	0	34
	Total		13	7	3	3	0	8	0	34

The patients were asked if they were on a diet regime with metformin administration or not. 18.2% of diabetic patients said "YES" while 81.8% said "NO". For non-diabetic patients 44.1% said "NO". Therefore, the diabetic patients who started dieting regime before metformin administration was 1.5% and none of non-diabetic patients started diet regime before administrating of metformin. In addition, the patients were asked if they suffer from any diseases. For diabetic patients, the answers were: 18 of them had hypertension, 2 had hypothyroidism, 3 had kidney diseases, 2 had gout, and 2 had asthma. While 10 of non-diabetic patients had PCOS.

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Conclusion:-

In summary, metformin is an effective medication for weight reduction in both diabetic and non-diabetic obese patients. Further studies are needed with exact weight reduction among both groups.

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