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Relation between different Oral Anti-diabetic Drugs to glycemic control Among Diabetic Patients in AlBaida City

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Abstract

Aims. the present study was undertaken to estimate the relation between different useable antidiabetic drug to HbA1c control among diabetic patients in Albayda city, Libya. **Method**. This study was conducted to interviewed 200 patients diagnosed with type 2 diabetes at main center for diabetes treatment in the Al-bayda city during period from April 2023 to August 2023 . Several parameters were detected, including age, sex, levels of (FBS, HBA1C), hypertension and name of antidiabitic drug Of 200 patients. **Result.**, 66% (n=132) , 34% (n=68) were female and male respectively, the mean age of 55 years (31-80) , The most diabetes patient age group was (51-60) years old followed by (61-70) years old (40.5% and 23.5% of the subjects). Around 51% of patients had diabetes less than five years ago. Hypertension was present in 41% of male and 49.5% of female subjects. Six antidiabitic drugs were studied, metformin is regarded as the drug of choice for most patients with type 2 diabetes, about 30% using it as single drug and 24.5% in combination with glyburide **Conclusion** combined metformin with other oral antidiabetic drugs as Amaryl and Gliburide was the better glycemic control than when using metformin alone.

Keywords: Diabetes mellitus, oral antidiabitic drugs, Hypertesion, weight.

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العلاقة بين الأدوية المضادة للسكري الفموية المختلفة وضبط نسبة السكر في الدم لدى مرضى السكري في مدينة البيضاء

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ملخص

الهدف من هذه الدراسة هي لتقدير العلاقة بين مختلف الأدوية المضادة للسكري الصالحة للاستخدام والسيطرة على HbA1c بين مرضى السكري في مدينة البيضاء، ليبيا. أجريت هذه الدراسة بمقابلة 200 مريض تم تشخيص إصابتهم بمرض السكري من النوع الثاني في المركز الرئيسي لعلاج مرض السكري في مدينة البيضاء خلال الفترة من أبريل 2023 إلى أغسطس 2023. تم الكشف عن العديد من العوامل بما في ذلك العمر والجنس ومستويات (FBS, HBA1C) وارتفاع ضغط الدم واسم المخدرات المضادة للسكري. من بين 200 مريض. النتيجة، 66 ٪ (ن=132)، 34 ٪ (ن=68) كانوا من الإناث والذكور على التوالي، ومتوسط العمر 55 سنة (31–80) ، وكانت الفئة العمرية الأكثر مريض السكري (51–60) سنة تليها (61–70) سنة (40.5 ٪ و 23.5 ٪ من المواضيع). كان حوالي 51 ٪ من المرضى يعانون من مرض السكري قبل أقل من خمس سنوات، وكان ارتفاع ضغط الدم موجودا في 41 ٪ من الذكور و 49.5 ٪ من الإناث. تمت دراسة ستة أدوية مضادة لمرض السكر، ويعتبر الميتفورمين الدواء المفضل لمعظم المرضى الذين يعانون من مرض السكري من النوع الثاني، حوالي 30 ٪ استخدموه كدواء واحد و 24.5 ٪ كتركيبة مع غليبوريد وتلخصت الدراسة الي ان الجمع بين الميتفورمين مع أدوية أخرى مضادة لمرض السكر عن طريق الفم مثل أماريل و غليبوريد كان أفضل للسيطرة على نسبة السكر في الدم من استخدام الميتفورمين وحده.

الكلمات الافتتاحية: داء السكري، الأدوية المضادة لمرض السكر عن طريق الفم ، ارتفاع ضغط الدم ، الوزن.

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Introduction

Diabetes mellitus [DM] is chronic a metabolic disease resulting from a dis-turbance in insulin secretion, insulin action, or both. Infrequent this deficiency of Insulin leads to increase in blood glucose level with abnormality changes in the metabolism of carbohydrate, fat and protein [1]

It is classified to Type 1 Diabetes Due to β-Cell Destruction that will Leading to Absolute Insulin Deficiency and Type 2 diabetes due to resistance to insulin action and an inadequate compensatory insulin secretory response [2], The type 2 diabetes mellitus is a common and increasingly prevalent disease and is thus a major public health concern worldwide. The International Diabetes Federation estimates that there are approximately 387 million people diagnosed with diabetes across the globe [3] , Most patients with this form of diabetes are obese, and obesity itself causes some degree of insulin resistance , The risk of developing this form of diabetes increases with age, obesity, and lack of physical activity. It happened mostly in patients with hypertension or dyslipidemia [4]

Nowadays diabetes mellitus type 2 affects more than 400 million people around the world, but in 2040 more than 640 million of people in the world will be expose to Type 2 diabetes mellitus (T2DM), The prevalence of diabetes mellitus type 2 is predictable to doubling within the next 20 years [5], the World Health Organization (WHO) has reported that there were 88 000 diabetic people in Libya in the year 2000. This propagation is evaluated to reach 245 000 by the year 2030 [6] To achieve good metabolic control in diabetes and keep long term, a combination of changes in lifestyle and pharmacological treatment is necessary [5], Before choice of pharmacologic agents, the non pharmacological agents must be stresss by physician considering diet modification, weight control and regular exercise. The choice of Pharmacological agent should be based on patient characteristics, the controlling of glucose level l in blood and cost considerations. It is useful to combine different types of oral antidiabetic drugs for more controlling of increasing of blood glucose in diabetic patient before insulin therapy becomes mandatory [7]. The major classes of oral antidiabetic

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medications include Metformin, sulfonylureas, meglitinide, thiazolidinedione (TZD), dipeptidyl peptidase 4 (DPP-4) inhibitors, sodium-glucose cotransporter (SGLT2) inhibitors, and α-glucosidase inhibitors [8]

Metformins are one of the most important classes of oral hypoglycemic drugs, is consider as the most common drug used in the first line therapy for diabetes mellitus. Metformin has been confirmed to be efficacious in lowering blood glucose, increasing insulin sensitivity, ofdecrease incidence cardiovascular and hypoglycemia risk, and is the only hypoglycemic agent to improve macro vascular outcomes and to reduce mortality rates in T2DM patients. The metformin action is mainly through reducing hepatic glucose output such as gluconeogenesis and glycogenolysis [9], The acute, reversible gastrointestinal adverse effects seen with metformin may be minimised by administration with or after food, and by using lower dosages, increased slowly where necessary [10]

The sulphonylureas act by triggering insulin release from the pancreatic β cell A specific site on the adenosine triphosphate (ATP)-sensitive potassium channels is occupied by sulphonylureas leading to closure of the potassium channels and subsequent opening of calcium channels. This results in exocytosis of insulin. Glibenclamide (glyburide), gliclazide, glipizide and glimepiride are the primary sulphonylureas in current clinical use for type 2 diabetes mellitus. [11]

So, the main action of metformin exerts its beneficial effects on glycemic control by increasing sensitivity of peripheral tissue to insulin, while the sulfonylurea drugs action is to enhance insulin secretion, whereas [12] ,The efficacy of metformin when used as monotherapy and in combination with a sulfonylurea drug should be equal [13] .Therefore, the present study was undertaken to estimate the relation between different useable antidiabetic drug to HbA1c control among diabetic patients in Albayda city, Libya.

Methodology:

This study carried out during the period between April and August 2023. The study population consisted of200 Libyan Diabetic

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patients with type 2 diabetes (132 female and 68 male). Diagnosis of diabetes was based on World Health Organization (WHO) criteria. In which If fasting blood glucose is 126 mg/dL or higher on two separate tests, diabetes is diagnosed**.** Demographic profiles including Gender, Age, diabetes duration, hypertension and name of antidiabetic drug.

Average of last fasting plasma glucose (FBS) ≤ 109 mg/dl or >110 mg/dl was recorded. Couple tests were analyzed using glucose(Photometer4040, German,(manual beam filter photometer)) and(Jenway6051 colorimeter manual, United kingdom) .Last HBA1C was estimated by using (Epithod 616 semi-automatic analyse for point care testing measuring HBA1c, Korean) and (Hemocue HBA1c501, Korean) The fully automated system provides reliable results straight way for efficient diabetes care.

Results

Over the 200 Libyan diabetic patients that our study about them there were 66% (n=132) of them were females while there were 34% (n=68) of them were males, the most of these patients were 114 of them on combination drugs of oral antidiabetic and 86 of them were on single drug using, while that 30.7 % (n=35) were males and 69.3% (n=79) were females on multiple drug using ,and there were 38.4% (n=33) of them males and 61.6% (n=53) of them females there were on single drug using (Table1)

Table 1: The percentage of gender and number of drug using

Frequency	Percent	single drug using	Multiple drugs using
Male	68 (34%)	33 (38.4%)	35(30.7%)
Female	132 (66%)	53 (61.6%)	79 (69.3%)
Total	200 (100%)	86 (100%)	114(100%)

The most of these diabetic patients age group was ranged between 51 to 60 years old with percentage 40.5% (n=81), And the least age group was 31-40 years old percentage with 6.5% (n=13),(as shown in table2), So as we mentioned there the most age group with diabetes was 51-60 years old and that were 29%(n=24) males while 70% (n=57) were females,In the other hand the least age group

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between 31-40 years old percentage with 30% (n=40) males and 69% (n=9) were females (as shown in table 2)

Table 2: The percentage of diabetic patient age group

Frequency	No. of patients	Percent
31-40yrs	13	6.5%
41-50yrs	39	19.5%
51-60yrs	81	40.5%
61-70yrs	47	23.5%
71-80yrs	20	10.0%

The most common single drug line that used as oral antidiabetic drug was metformin with percentage 30% (n=60) of the total diabetic patients followed by Amaryl with 7.5% (n=15) while there is 57% (n=114)of the patients that our study about not using single drug, And the least frequent drug was Diamicron with 0.5% (n=1). The last FBS results of single drug using patients that were more than 110 was for Metformin medicine (n=45) and the less than 109 results were for metformin also with (n=15).(as shown in table3). And the last HBA1c results of single drug using patients that more than 7 were for Metformin (n=39) and the less than 6.9 results was for metformin also (n=21). (as shown in table 3)

Table 3: Effect of single using drug on fasting blood sugar and HbA1c

		Gliburide	Metformin	Amaryl	Diamicron	Janumet
Last FBS	↓109	0	15	3	0	1
	↑110	7	45	12	1	2
last HbA1c	↓6.9	0	21	3	0	1
	↑7	7	39	12	1	2
TOTAL		7	60	15	1	3

In comparing with single drug using and multiple drugs using the most common line used in multiple drug using was Gliburide+Metformin combination with percentage 24.5% (n=49) followed by Metformin+Amaryl with 22% (n=44), While the least percentage used multiple drug was Ganumet+Amaryl with 1% (n=2). (as shown in table4). And the last FBS results of multiple drug using patients that were in less than 109 results were for

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Gliburide+Metformin with (n=26). (as shown in table4).The last HBA1c results of multiple drug using patients that was in the less than 6.9 results were for Gliburide+Metformin combination with (n=29).(as shown in table 4).

Table 4: Effect of multible using drugs on fasting blood sugar and HbA1c

		Gliburide + Metformin	Gliburide + Amaryl	Metformin + Amaryl	Diamicron + metformin	Ganumet + Amaryl
Last FBS	↓109	29	2	23	5	1
	↑110	20	3	21	9	1
last HbA1c	↓6.9	29	2	23	5	1
	↑7	20	3	21	9	1
Total		49	5	44	14	2

The cross tabulation of gender of patients with Hypertension we found there were 132 of these patients were females and that were 65 of had Hypertension with Diabetes Mellitus and 67 of them had not, While there were 68 of were males of them 28 of them had Hypertension with Diabetes and 40 of them hadn`t Hypertension.(as shown in table5)While the age group with Hypertension that was the age between 51-60 with the highest number of patients that had Hypertension or not with Diabetes Mellitus with total number 81, There were 43 of them had Hypertension in this age range and 38 of them hadn`t regardless the gender of the patients. (as shown in table6)

Table 5: The gender of diabetic patients and its relation to hypertension disease

		with HTN		Total
		Yes	No	
sex of patient	Male	28	40	68
	female	65	67	132
Total		93(46.5%)	107(53.5%)	200

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Table 6 :Age groups of diabetic patient regard to hypertension

		with HTN		Total
		Yes	No	
age in between	31-40	2	11	13
	41-50	12	27	39
	51-60	43	38	81
	61-70	27	20	47
	71-80	9	11	20
Total		93	107	200

Discussion:

Type 2 diabetes mellitus (T2DM) is an expanding global health problem, closely linked to the epidemic of obesity. Genetic factors contribute to the multiple pathophysiological disturbances that are responsible for impaired glucose homeostasis in T2DM.[14]

Our study carried on 200 patients, 68 (34%) male, and 132 (66%) females, Their ages ranges from 31-80 years . All patients were came for follow up to diabetic clinic center as cases of diabetes mellitus type 2 and the patients were received many types of oral antidiabetic drugs in different duration from one years to more than ten years HRCT is done to them, A 114 patients (57%) were incombination drugs therapy while 86 patients (43%) were in single therapy of oral antidiabetic drug .

in present study patients with type 2 diabetes who are received metformin only had inadequate glycemic control similar results were seen in studies of [15] ,So that usage of Janumet (metformin/ sitagliptin) as acombination therapy was efficacious and well because it will controlling blood glucose with decreasing complication [16]

The study revealed about 42% of diabetic patients (who were on combination therapy) treated by Gliburide/metformin because of they offer patients with more intensive glycemic control within a short period, also have a fewer side effects and less hypoglycemic episodes, the same results are presented by studies of [17]

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Around 38.5%% study group (on combination therapy) were on Amaryl/metformin, since they can supply each other, produce a curative effect synergistically, improve metabolic defect in type 2 diabetes mellitus and reduce blood glucose, the [18] had the same results.

During our study notice that about half of diabetics patient suffer from hypertension, this statement is in accordance with a study by UK Prospective Diabetes Study Group which stated that " the prevalence of hypertension in type 2 diabetes is higher than in general population, especially in middle age group of the patients. at the age of 55 around 40% of patients with type 2 diabetes are hypertensive, the proportion decreasing to 23.5% by age of 65 [19]

Conclusion:

Regarding on our study about oral anti-diabetic drugs therapy ,we found that the higher percentage single drug use was metformin followed by Amaryl , metformin was better one in glycemic control as a single drug treatment.When combined metformin with other oral antidiabetic drugs as Amaryl and Gliburide we demonstrate that the glycemic control become better than when using metformin alone.

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