

## RESEARCH ARTICLE

# The Combination Between Anti-depressant and Anti-diabetic Therapy Effects in Depressed Patients with Type 2 Diabetic Mellitus

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## ABSTRACT

The current study aims to evaluate the effect of medication types in dopamine and glycemic parameters in patients with type 2 diabetic mellitus (T2DM), anti-diabetic, anti-depressant and combination between them, also the types of drugs were depended, metformin, metformin with insulin, insulin only, metformin with alprazolam and other anti-depressant drugs. Results show non-significant differences in all variations, metformin elevated dopamine, insulin and HbA1c than other types, metformin with insulin treatment recorded moderate level of all parameters, also moderate levels was observed in metformin with anti-depressant drug treatment the other anti-depressant drug decreased in dopamine level and elevated fasting blood glucose (FBG), interventional radiology (IR) and hemoglobin A1c (HbA1c) than other types, the effects of medication types show non-significant differences among all groups, the anti-depressed cause elevation in FBG and IR while dopamine was decreased than other two groups. Diabetic with Anti-depressant drug causes decrease in dopamine than the group of anti-diabetic drug only. The antidiabetic drugs have poor activity to regulate glycemic parameters and dopamine was in higher level than other groups in present study, from these outputs can be concluded that the combination between anti-depressant and anti-diabetic therapy with suitable choosing of the drug may prevent disease complications and enhanced self-care of patients.

**Keywords:** Anti-depressant, Anti-diabetic, Combination, Depression with type 2 Diabetic Mellitus, Therapy.

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**Conflict of interest:** None

## INTRODUCTION

The anti-diabetic drugs included wide range of medications that suitable with diabetic types and severity, metformin and insulin are the major drugs of DM treatment in the world, Metformin is a buigiunide analogue is well tolerated used in DM2 treatment, studies proved that it has a wide ranging effects to other diseases treatment, metformin effected in the blood glucose decrements, insulin-like growth factor 1 (IGF-1) and insulin signaling, its made an environment similar to calorie restriction (CR) and as such many beneficial effects of CR can be reproduced by chronic Metformin treatment.<sup>1,2</sup> Another type of DM meications is insulin which sometimes used with metformine to treat DM patients, Insulin therapy (with or without additional agents) should be introduced in patients with newly identified T2DM and frankly symptomatic.<sup>3</sup>

On the other hand, diabetic patients suffering from depression, used anti-depressant and anti-diabetic drugs. The anti-depressant is different classes of drugs have slightly effects on target certain neurotransmitters to modulate behavior

and mood. The anti-depressant drugs that currently licensed are working to increase the neurotransmitters norepinephrine or/and serotonin in the synapse. These elevations were happening by different mechanisms, though antidepressant drugs target re-uptake by the nerve terminals.<sup>4</sup>

Atypical antidepressants have variant action mechanisms. For instance Bupropion inhibited the dopamine and norepinephrine reuptake at the presynaptic cleft,<sup>5</sup> alprazolam or zolam It is most commonly used in short-term management of anxiety disorders, specifically panic disorder or generalized anxiety disorder.<sup>6</sup>

The combination between depression and diabetes mellitus disease have been studied, these combinations may be affected on the biomarkers of depression and glycemic parameters for both diseases, there was complex associations among them.<sup>7,8</sup>

## METHODOLOGY

A cross sectional study was included diabetes mellitus patients suffered from depression disorder, patients attended to diabetic center of Al-Saader Medical City, that

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diagnosed by specialist physicians, data and sample were collected from all contributors after their approval, blood samples were transferred to clinical lab to detect glyceimic parameters included fasting blood glucose, glycated protein, insulin level, insulin resistance, insulin sensitivity and dopamine.

**Data Analysis**

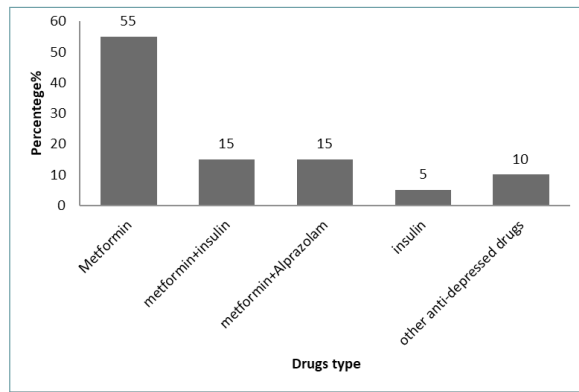
Data represented as mean ± se, ANOVA one way used to determine significant differences at  $p < 0.05$ .

**RESULTS AND DISCUSSION**

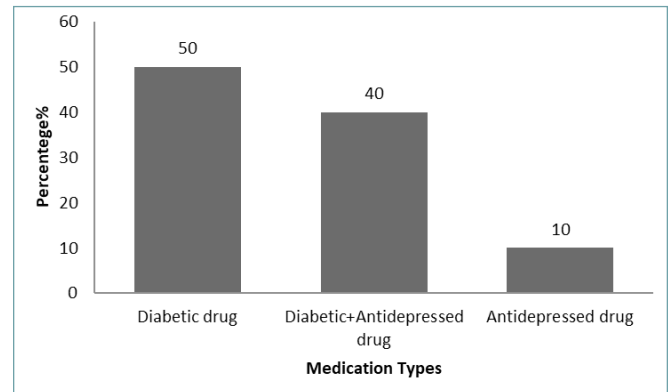
The current work deal with the effect of anti-diabetic drugs and anti-depressant drugs effects in the glyceimic parameters and dopamine level on diabetic patients suffered from depression disorder, results show that patients treated with metformin, metformin with insulin, metformin with alprazolam, insulin only and another anti-depressant drug included (olan and largactil). The distribution of patients according to types of drugs shows that the highest percentage of them was treated with metformin (55%) while the low percentage was treated with insulin only 5% (Figure 1). Table 1 shows the effect of drugs in glyceimic parameters and dopamine level, the other anti-depressant drug decreased in dopamine level and elevated FBG, IR and HbA1c than other types, metformin elevated dopamine, insulin and HbA1c than other types. Metformin with insulin treatment recorded moderate level of all parameters. Also moderate levels were observed in metformin with anti-depressant drug treatment. There were non-significant differences among groups.

The effect of anti-diabetic drugs in dopamine was studied. A study demonstrates that the use of bromocriptine (used in DM treatment) is considered as it decreases hypothalamic dopamine level within 2 hours of awakening and stopped excessive sympathetic tone within the central nervous system.<sup>9</sup> Since 1958, the Metformin has been a major drug for T2D treatment. Now other disease used metformin as a therapeutic option such as prevent renal development<sup>10</sup> cardiac<sup>11,12</sup> and neurological conditions,<sup>13</sup> hepatic.<sup>14</sup> Alprazolam has been found that improves glucose regulation in patients with a history of poor diabetes control during a short course of treatment.<sup>15</sup> The combination between metformine and aprazolam may be enhanced glucose regulation and dopamine increment. A study conducted by observed a statistically significant increment in striatal dopamine concentrations only with alprazolam.<sup>16-18</sup>

The medication types regardless of the types of drugs were studied, and the volunteers classified into three categories: Diabetic drugs, Diabetic + Anti-depressant drug and Anti-depressant drug. The distribution of study groups shows that (50, 40 and 10%), respectively (Figure 2). The effects of medication types show non-significant differences among all groups, the anti- depressed cause elevation in FBG and IR while dopamine was decreased than other two groups. Diabetic+ Anti-depressant drug causes decrease in dopamine than the group of anti-diabetic drug only. The anti-diabetic drugs have poor activity to regulate glyceimic parameters and dopamine was in higher level than other gorups in the present study (Table 2). The medication types are an important to prevent disease complications in both diabetic and depression



**Figure 1:** Distribution of study subjects according to drugs types



**Figure 2:** Distribution of study subjects according to medication types

**Table 1:** Means differences of glyceimic parameters and dopamine level according to types of drugs

Medication types	Dopamine Pg/mL	Insulin mg/mL	IR	IS	HbA1c%	FBG
Metformin	15.52 ± 5.36	1.68 ± 0.312	1.11 ± 0.25	0.39 ± 0.018	9.71 ± 0.76	282.27 ± 43.61
Metformin + insulin	10.66 ± 0.81	1.16 ± 0.60	0.55 ± 0.23	0.44 ± 0.03	9.11 ± 1.29	217.33 ± 26.11
Insulin only	15.96 ± 0.02	0.47 ± 0.03	0.32 ± 0.01	0.41 ± 0.00	13.20 ± 0.09	277.00 ± 0.01
Metformin + alprazolam	8.67 ± 2.10705	0.51 ± 0.040	0.30 ± 0.005	0.47 ± 0.002	8.80 ± 0.600	246.00 ± 21.93
Other Anti-depressant drug	5.77 ± 0.75	1.62 ± 0.84	2.00 ± 1.54	0.37 ± 0.062	9.35 ± 1.450	408.00 ± 173.00
Sig	0.853	0.237	0.222	0.257	0.279	0.605

ANOVA one way,  $p < 0.05$

**Table 2:** means differences of glycemc parameters and dopamine level according to types of drugs

Medication types	Dopamine Pg/mL	Insulin mg/mL	IR	IS	HbA1c%	FBG
Diabetic drug	15.69 ± 5.919	1.72 ± 0.34	1.10 ± 0.28	0.40 ± 0.020	9.28 ± 0.79	269.20 ± 48.06
Diabetic+ Anti-depressant drug	10.98 ± 1.28312	0.85 ± 0.241	0.52 ± 0.130	0.44 ± 0.016	10.13 ± 0.744	260.00 ± 18.58
Anti-depressant drug	5.77 ± 0.754	1.62 ± 0.84	2.00 ± 1.54	0.37 ± 0.06	9.35 ± 1.45	408.00 ± 173.00
Sig	0.592	0.114	0.080	0.273	0.539	0.337

disease, some antidepressant drugs have poor efficiency to glycemic control while several antidiabetic drug cannot enhance neurotransmitters thus the suitable medications strategies considered as an important factors in therapeutic options, a study deal with SSRIs drugs (luoxetine and sertraline) produced results consistent with reductions in glucose levels.<sup>17</sup> Other evidence indicated that the improvement of depression may be associated with improvements in self-care that contributed healing of disease.<sup>18</sup>

The variations among groups were non-significant because of some limitation of the present study, included sample number, difficulty of data obtain from depressed patients. Current output concluded that the combination between antidepressant and anti-diabetic with suitable choosing of drugs may be prevent disease complication and enhanced self-care of patients. Present study needs more investigations and genetic analysis to prove our results like genetic studies which may affect in current variables.<sup>19-21</sup>

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