REVIEW ARTICLE

# Correlation Between the Dopamine and ROS Levels in Depression Disorders

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**ABSTRACT**

Depression is one of the mode disorder diseases which recorded in high percentage in last years in the Iraqi population. The current study suggested to determine the correlation between dopamine level with reactive oxygen species (ROS) in depressed patients, results exhibit that ROS was higher in depressed patients than control in significant differences (p 0.000), dopamine decreased in patients in comparing with control in non-significant differences (p 0.273). The correlations among study variables in patient group were non-significant weak positive correlation between age and dopamine (r 0.033, p 0.894), non-significant inverse relation between BMI and dopamine (r -0.297, p 0.217), non-significant inverse weak correlation observed between Dopamine and ROS (r-0.069, p 0.780). The correlation between ROS and age was an inverse correlation (r -0.060, p 0.808) and with BMI weak positive correlation (r 0.190, P 0.790) in non-significant differences in both variables. In the control group the correlation between age and dopamine non-significant weak positive relation was observed (r 0.098, p 0.691). Non-significant inverse relation between BMI and dopamine (r -0.062, P 0.801), non-significant inverse weak correlation observed between Dopamine and ROS (r-0.064, p 0.794). The correlation between ROS and age was an inverse correlation (r -0.018, p 0.940) and with BMI inverse correlation (r -0.417, p 0.075) in non-significant differences in both variables. The current results concluded that the dopamine was slightly affected by ROS, age and BMI in depression patients.

**Keywords:** Dopamine, Depression disorder, Correlation, ROS.

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## INTRODUCTION

Oxidative stress is a complex phenomenon characterized by elevation in free radicals productions or decreased in degeneration, ROS or reactive oxygen species is one of the important types of free radicals groups consist of superoxide anion ($O_2^-$), hydroxyl anion ($^-OH$) and hydrogen peroxide ($H_2O_2$).[1-3]

Dopamine is one of the neurotransmitter has a major role in the brain regulation, behavior modulation, voluntary movement, motivation, prolactin production inhibition, sleeping, and other functions,[4] and it precursor of other related catecholamines such as norepinephrine and epinephrine.[5] The association between dopamine and oxidative stress have been described.[6,7] It is oxidize to form quinones and $H_2O_2$ which react with iron to form $^{\cdot}OH$,[8] thus dopamine contributed in elevation oxidative stress when antioxidant system decline, and this involvement if some disease like Parkinson's disease and depression disorders.[9,10]

The association of ROS with dopamine levels in depression disorder was suggested to study at present work in Iraqi patients as a pilot study.

## MATERIALS AND METHODS

A pilot study included 19 depressed patients and 19 healthy individuals as control group were enrolled in the present study, ethical approval of the environment and health ministry of Iraq was depended in sample and data collection. The ROS detected by colorimetric method, dopamine detection by ELIZA technique. Data represented as mean ± SE, independent T test and correlation coefficients used to significantly analyze at $p < 0.05$.

## RESULTS AND DISCUSSION

The current results show that non-significant differences in age ($p = 0.950$) and BMI ($p = 0.144$) between groups, ROS was higher in depressed patients than control in significant differences ($p > 0.000$), dopamine decreased in patients in comparing with control in non-significant differences ($p < 0.273$) (Table 1). The association of dopamine in the pathophysiology of depression have been studied.[11,12] Numerous studies focusing on the role of the dopamine system in depression converge on a down regulation of this system.[13]

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**Table 1:** mean differences of study variables for both groups

| *Variables* | *Depression Patients* | *Control* | *Sig* |
|---|---|---|---|
| Age | 38.10 ± 2.92 | 38.36 ± 2.94 | 0.950 |
| BMI | 24.98 ± 0.910 | 27.02 ± 1.01 | 0.144 |
| ROS | 105.20 ± 12.162 | 25.53 ± 1.93 | 0.00 |
| Dopamine pg/mL | 13.35 ± 0.915 | 21.91 ± 7.05 | 0.273 |

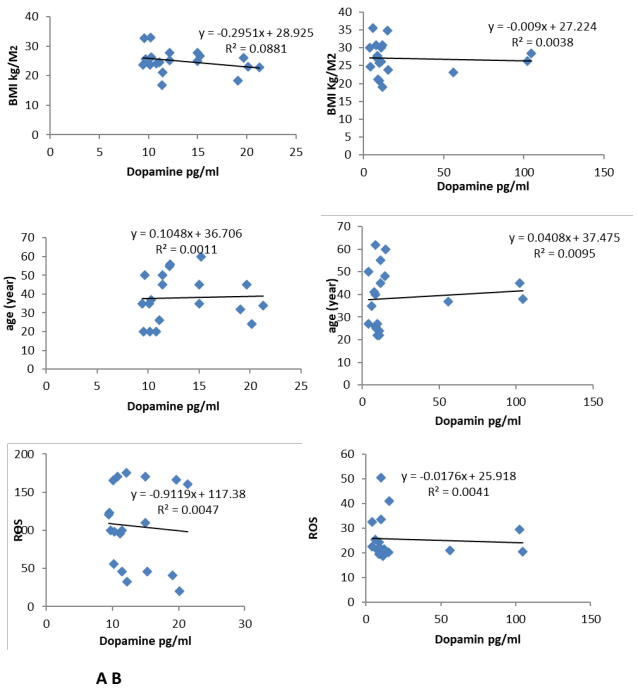


**Figure 1:** the correlation among dopamine level, age, BMI and ROS, A patient, B control

The correlation between dopamine and study variables were detected, in patient group non-significant weak positive correlation between age and dopamine (r 0.033, p > 0.894), non-significant inverse relation between BMI and dopamine (r -0.297, p > 0.217), non-significant inverse weak correlation observed between dopamine and ROS (r-0.069, p > 0.780) (Figure 1A). Also, the correlation between ROS and age was inverse correlation (r -0.060, p > 0.808) and with BMI weak positive correlation (r 0.190, p > 0.790) in non-significant differences for both variables (Figure 2 A).

In the control group the correlation between age and dopamine non-significant weak positive relation was observed (r 0.098, p 0.691). Non-significant inverse relation between BMI and dopamine (r -0.062, p > 0.801). Non-significant inverse weak correlation observed between Dopamine and ROS (r-0.064, p > 0.794) (Figure 1, B). However, the correlation between ROS and age was an inverse correlation (r -0.018, p 0.940) and with BMI inverse correlation (r -0.417, p 0.075) in non-significant differences for both variables (Figure 2B).

Studies found that the level of dopamine in the human striatum declines up to 50% with age.[14] the elevated level of dopamine was documented in young than older individuals.[15,16] Others found that the effect age in dopamine was occurred

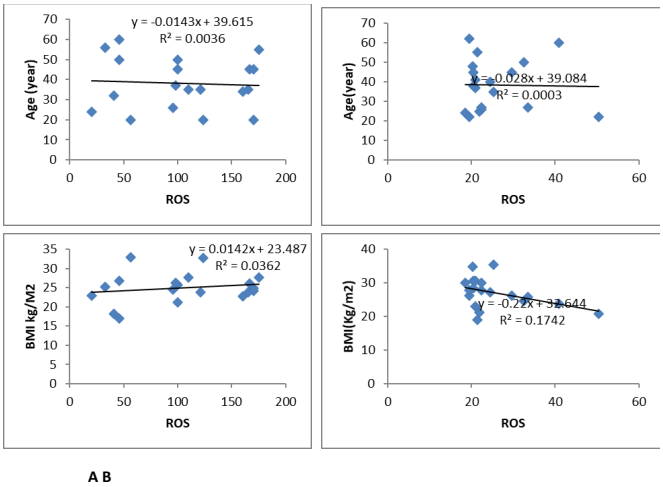


**Figure 2:** The correlation between ROS, Age and BMI in study groups, A Patients, B control group

by D2 dopamine receptor binding sites which mainly post-synaptically located was decrease with normal aging consequence with impaired of the presynaptic nigrostriatal dopaminergic neuronal system.[17]

The cellular and molecular mechanisms linking oxidative stress with dopaminergic neuron death are complex and not well characterized.[13] Decreased dopamine receptor function increases ROS activity and vice versa working in concert or independently of each other.[18] Different factor contributed in the relation of ROS with age or body mass index (BMI). The lifestyle is an important factor to enhance ROS regulation in the body which may be controlled in the harmful effect of ROS.[19] Nevertheless, the avoiding of chronic ROS exposure contributed in the lowering of oxidative stress effected, the association ROS with age observed by the aging of cell which loosed ability to repair damage and impaired antioxidant molecules to scavenge ROS.[20-22] The current study conclude that dopamine was slightly affected by age, BMI and ROS in depressed patients, ROS was also slightly affected by age and BMI in the patients group, for further investigations the present results need a wide spectrum of sample number of different Iraqi populations.

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