

Impact of Short-Term Antidepressant Use on Glycemic Control and Renal Function in Postmenopausal Women

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ABSTRACT

Background: Depression is a major health problem worldwide. Females are more likely to have depression throughout their lives, and the risk considerably rises after menopause.

Objective: the aim of this study was to determine the impact of short-term antidepressant use on glycemic control and renal function in postmenopausal women

Materials and method: The present cross-sectional study was carried out at the Department of Obstetrics and Gynecology and Psychiatry, Bacha Khan Medical College, Mardan Medical Complex Mardan from January 2025 to January 2026 after taking approval from the ethical board of the hospital. A total of 80 postmenopausal women of different aged groups who were taking various antidepressants drugs for ≥ 3 and < 6 months were included in this study and 80 postmenopausal women from the general population were selected as control. The PG were divided into two groups on the basis of treatment, SSRIS and TCAs. The demographic data was collected from the study participants while maintaining human dignity and following accepted protocols. Each participant provided fasting blood samples, which were then examined for biochemical markers employing standard kits & techniques. The Kinetic UV technique 13 was used for measuring the serum urea and serum creatinine was quantified using the modified Jaffe method 14 on an Erbamannheim Chemistry autoanalyser (Germany) using standard Erba kits. Serum values of urea (05-45 mg/dl) and creatinine (0.5-1.5 mg/dl) are considered normal in the HbA1c test. A fast ion-exchange resin separation technique was employed for HbA1c determination. For data analysis SPSS version 16 was used. The analyzed data were presented as mean \pm standard deviation (SD). Pearson's bivariate correlation analysis was conducted for the variable of interest. A two-tailed p value of < 0.05 was considered statistically significant.

Results: The mean Body mass index of the selective serotonin reuptake inhibitors, Tricyclic Antidepressants and Control groups were 29.50 ± 6.24 , 27.62 ± 6.67 and 25.39 ± 4.05 Kg/m² respectively. The mean age of the SSRIs, TCA and CG groups was 42.08 ± 7.17 , 44.30 ± 4.24 and 50.54 ± 6.72 years respectively. The SSRI group had a greater serum creatinine level compared to the TCA group but lower than the CG group. The SSRI group had a higher serum urea level compared to TCA and CG. SSRI had a higher mean fasting glucose level in comparison to TCA, but lower than the control group (84.46 ± 9.45 mg/dl). SSRI had a higher mean HbA1c level compared to TCA, but lower than CG. Results revealed that serum creatinine showed a significant negative association in the TCA group. There was no correlation between HbA1C & mean glucose levels in any of the patient groups. Serum urea and creatinine showed a significant association with age in the SSRI group, but not in the TCA group for urea.

Conclusion: The present study concluded that in postmenopausal women that short-term usage of SSRIs and TCAs minimize the incidence of diabetes and renal dysfunctions..

Keywords Impact; Short-Term Antidepressant; Glycemic Control; Renal Function.

How to cite this article: Fatima, Jamal I, Khan MM, Kazmi SAA, Zaman S, Kashif M. Impact of Short-Term Antidepressant Use on Glycemic Control and Renal Function in Postmenopausal Women. Int J Drug Deliv Technol. 2026;16(42s): 637-641. DOI: 10.25258/ijddt.16.42s.73

Source of support: Nil.

Conflict of interest: Nil.

INTRODUCTION

Depressive disorders remain a significant source of worldwide distress, with females having a greater frequency than males. Women being susceptible to depression during reproductive events, such as menopausal transition, premenstrual and postpartum, indicates a prospective relationship between hormonal variations and depressive symptoms.¹⁻² Females are more likely as males to have depression throughout their lives, and the risk considerably rises after menopause.³ Menopause is characterized by interruption of menstruation for 12 months in consecutive periods, caused by the depletion of the small number of ovarian follicles, which results in decreased release of progesterone and estrogen hormones. Irregular estrogen levels may influence the control of norepinephrine and serotonin, thereby contributing to depression development.⁴ Post-menopause is the physiological time that follows menopause, beginning with the last menstrual cycle and lasting till the end of life. Depression symptoms appear throughout perimenopause and remain after menopause. The prevalence of depression rises in the early postmenopausal period, with postmenopausal women having a higher incidence of severe depressed mood than perimenopausal women.⁵ Antidepressants relieve symptoms of depression by balancing chemical messengers in the brain. Chemical diseases can also affect mood and behavior.⁶ Early treatment with antidepressants for mild or simple depression aims to alleviate symptoms, but can lead to side effects if not effective.⁷ When prescribing an antidepressant, it's important to evaluate the patient's health state to prevent negative side effects. Antidepressants can have harmful consequences in certain individuals.⁸ Doctors and patients are becoming more aware of the negative effects of modern antidepressants, notably selective serotonin reuptake inhibitors (SSRIs), as opposed to earlier medications like tricyclic antidepressants (TCAs). It could have contributed to its popularity. Prescribers and patients are becoming more aware of the negative effects of modern antidepressants, notably selective serotonin reuptake inhibitors (SSRIs), as opposed to earlier medications like tricyclic antidepressants (TCAs). It could have contributed to its popularity.⁹ Recent studies suggest that antidepressants are not safe for long-term usage and may raise the risk of diabetes. Longer periods (24 months or more) increase the risk of diabetes.¹⁰⁻¹¹ In 2012, the National Center for Health Statistics discovered that persons taking antidepressants for depressed symptoms were not at risk for diabetes. This study employed increased blood test frequencies variability in the general population to analyze blood glucose levels in antidepressant users who had not recently had a blood glucose test, potentially preventing detection.¹² The present study was carried out to find out the impact of short-term antidepressant use on glycemic control and renal function in postmenopausal women.

MATERIALS AND METHOD

The present cross-sectional study was carried out at the Department of Obstetrics and Gynecology and Psychiatry,

Bacha Khan Medical College, Mardan Medical Complex Mardan from January 2025 to January 2026 after taking approval from the ethical board of the hospital. A total of 80 postmenopausal women (PG) of different aged groups who were taking various antidepressants drugs for ≥ 3 and < 6 months were included in this study and 80 postmenopausal women from the general population were selected as control (CG). The PG were divided into two groups on the basis of treatment, SSRIS (Selective Serotonin Reuptake inhibitors) and TCAs (Tricyclic Antidepressants). Individuals who had cardiac diseases, liver cirrhosis were not willing to participate in the study were excluded. Participants were selected using a random sampling method, and their consent was taken before including them in the study. The demographic data was collected from the study participants while maintaining human dignity and following accepted protocols. Each participant provided fasting blood samples, which were then examined for biochemical markers employing standard kits & techniques. The Kinetic UV technique¹³ was used for measuring the serum urea and serum creatinine was quantified using the modified Jaffe method¹⁴ on an Erbamannhein Chemistry autoanalyser (Germany) using standard Erba kits. Serum values of urea (05-45 mg/dl) and creatinine (0.5-1.5 mg/dl) are considered normal in the HbA1c test.¹³ A fast ion-exchange resin separation technique was employed for HbA1c determination. For data analysis SPSS version 16 was used. The analyzed data were presented as mean \pm standard deviation (SD). Pearson's bivariate correlation analysis was conducted for the variable of interest. A two-tailed p value of < 0.05 was considered statistically significant.

RESULTS

The mean Body mass index of the selective serotonin reuptake inhibitors, Tricyclic Antidepressants and Control groups were 29.50 ± 6.24 , 27.62 ± 6.67 and 25.39 ± 4.05 Kg/m² respectively. The mean age of the SSRIs, TCA and CG groups was 42.08 ± 7.17 , 44.30 ± 4.24 and 50.54 ± 6.72 years respectively. The SSRI group had a greater serum creatinine level (0.72 ± 0.29 mg/dL) compared to the TCA group (0.66 ± 0.08 mg/dL) but lower than the CG group (0.83 ± 0.20 mg/dL). The SSRI group had a higher serum urea level (31.16 ± 31.40 mg/dL) compared to TCA (20.39 ± 2.49 mg/dL) and CG (26.04 ± 6.67 mg/dL). SSRI had a higher mean fasting glucose level (80.86 ± 6.86 mg/dl) in comparison to TCA (75.87 ± 7.05 mg/dl), but lower than the control group (84.46 ± 9.45 mg/dl). SSRI had a higher mean HbA1c level (5.69 ± 0.57) compared to TCA ($5.46 \pm 0.50\%$), but lower than CG ($6.07 \pm 0.60\%$) as presented in **table 1**. A Pearson bivariate correlation analysis was applied for both the selective serotonin reuptake inhibitors and Tricyclic Antidepressants patient groups. Results revealed that serum creatinine showed a significant negative association (p-value = 0.04) in the TCA group. There was no correlation between HbA1C & mean glucose levels in any of the patient groups. Serum urea (p=0.001) and creatinine (p=0.01) showed a significant association

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with age in the SSRI group, but not in the TCA group for urea as presented in **table 2 and 3**.

Table 1. The baseline features of control and patient populations		
Groups	BMI (Kg/m ²) (Mean±S.D)	Age in years (± Mean±S.D)
Patient groups N=80		
Selective serotonin reuptake inhibitors N(50)	29.50 ± 6.24	42.08 ± 7.17
Tricyclic Antidepressants N(30)	27.62 ± 6.67	44.30 ± 4.24
Control group N(80)	25.39 ± 4.05	50.54 ± 6.72

Table 2. Biochemical variables for comparison in the study population				
PG N=80	Serum Urea (mg/dL) Mean ± S.D	Serum Creatinine (mg/dL) Mean ± S.D	HbA1c % Mean ± S.D	Average Glucose Level (mg/Dl) Mean ± S.D
SSRIs N(50)	29.16± 29.39	0.69 ± 0.27	5.65 ± 0.55	80.96 ± 7.85
TCA N(30)	20.39 ± 3.45	0.65 ± 0.08	5.43 ± 0.48	77.97 ± 7.04
CG(80)	26.06 ± 6.69	0.80 ± 0.20	6.05 ± 0.58	86.37± 8.34

Table 3. Pearson's bivariate correlation study of renal and diabetes indicators in PG					
PG N=80	Variables	Serum Urea (mg/dL) r(p)	Serum Creatinine (mg/dL) r(p)	HbA1c % r(p)	Average Glucose Level r(p)
SSRIs N(50)	Age	0.86** (0.001)	0.73*(0.01) -	- 0.01(0.93)	-0.03(0.93)
	Body mass index	-0.24 (0.44) -	-0.05 (0.89)	0.24(0.40)	-0.23(0.43)
	Duration in months	-0.24 (0.45) --	-0.35 (0.32)	0.33(0.24)	-0.32(0.24)
	Dosage in mg	-0.12 (0.72)	-0.02 (0.99)	0.20(0.48)	0.20(0.50)
TCA N(30)	Age	0.03 (0.96)	-0.73* (0.04)	0.55(0.18)	0.55(0.18)
	Body mass index	-0.02 (0.97)	0.34 (0.40)	0.69(0.07)	0.69(0.07)
	Duration in months	-0.35 (0.37)	-0.15 (0.72)	- 0.19(0.65)	0.19(0.65)
	Dosage in mg	0.16 (0.65)	0.49 (0.21)	0.11(0.82)	0.11(0.81)

DISCUSSION

The effects of the present wave of violence in Pakistan, as well as disturbance in social structure in society, are the major causes of psychological and mental disorders in our nation.¹⁴ The actual prevalence rate of mental diseases in Pakistan is unknown because there is no reliable data available. A few studies show a prevalence of 10% - 50%.¹⁵ Global studies have showed that while women live longer than males, they do not live healthier or better lives than men. Women are at a higher risk for developing anxiety, depression, and eating disorders. According to statistics,

women have a greater prevalence of depressive illnesses (41.9%) than males (29.3%). Women's anxiety and sadness are mostly caused by gender-specific tasks and obligations, as well as cultural and societal issues present in Pakistani culture. Other reasons of stress include gender discrimination, poverty, starvation, malnutrition, family preferences for a male kid, a lack of support from in-laws, and domestic abuse.¹⁶ In Pakistan, depression and anxiety affect around 34% of the population and are mostly caused by socioeconomic issues. About 33% of depressed patients take various anti-depressant medicines, such as Selective

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Serotonin Reuptake Inhibitors (SSRIs) and Tricyclic Antidepressants (TCAs).¹⁷ These medicines, when used over an extended period of time, can harm the kidneys and disrupt glucose metabolism. A research conducted by UK the general practice Research found that patients who had been using antidepressants for more than two years had an increased risk of diabetes.¹⁸ The present cross-sectional study was conducted to find out the impact of short-term antidepressant use on glycemic control and renal function in postmenopausal women.

A total of 80 postmenopausal women of different aged groups who were taking various antidepressants drugs for ≥ 3 and < 6 months were included in this study and 80 postmenopausal women from the general population were selected as control (CG). The PG were divided into two groups on the basis of treatment, SSRI (Selective Serotonin Reuptake inhibitors) and TCAs (Tricyclic Antidepressants). Our study revealed that the SSRI group had a greater serum creatinine level compared to the TCA group but lower than the CG group. The SSRI group had a higher serum urea level compared to TCA and CG. SSRI had a higher mean fasting glucose level in comparison to TCA, but lower than the control group. SSRI had a higher mean HbA1c level compared to TCA, but lower than CG. The findings of the current study are similar to the study conducted by Yousaf, et al.¹⁹ However, the study done by Pyykkonen et al found that there were no effects of antidepressant drugs on glucose levels in adults, which is not similar to our findings.²⁰ A UK General Practice Research Database research found that using them for over twenty-four months increases the risk of diabetes.²¹ Serum urea levels were greater in the SSRI group compared to TCA and CG. The SSRI group had greater serum creatinine levels than the TCA group, but lower than the CG group. Al Jurdi et al, Rej S et al, found no effect of antidepressant medication on renal health in elderly patients, while Van Wyck Fleet et al reported polyuria (2-5%), urinary urgency ($< 2\%$), urinary incontinence ($< 1\%$), and urinary retention ($< 1\%$) in their study subjects.²²⁻²³

Our findings revealed that serum creatinine showed a significant negative association in the TCA group. There was no correlation between HbA1C & mean glucose levels in any of the patient groups. Serum urea and creatinine showed a significant association with age in the SSRI group, but not in the TCA group for urea. These results are similar to the study conducted by Yousaf et al¹⁹ which further support our study. There are certain limitation of this study. The sample size was small and the time duration was short to include all individuals from the whole t province.

CONCLUSION

The present study concluded that in postmenopausal women that short-term usage of SSRIs and TCAs minimize the incidence of diabetes and renal dysfunctions.

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