

## ANALYSIS OF THE EFFECT OF THE ANTIDEPRESSANT SERTRALINE ON THE LENGTH OF QT INTERVAL IN PATIENTS WITH DEPRESSION AND ALCOHOL DEPENDENCE

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Primljen/Received 24. 11. 2018. god.

Prihvaćen/Accepted 14. 01. 2019. god.

**Abstract: Introduction and Aim:** Depression in psychiatry covers a large area of mental pathology and it is one of the most complex problems of modern medicine with broad implications for the health of the individual and the society as a whole. Depression is also a frequent companion of alcohol addiction. The aim of this study was to investigate the effect of the antidepressant drug sertraline on the length of QT interval in depressed patients with alcohol dependence. **Patients and methods:** This research included male patients (older than 18 years of age) suffering from alcohol addiction, who were also diagnosed with depression, that is, depressive disorder, at the beginning of hospitalisation, on the basis of DSM-IV (Diagnostic and statistical manual of mental disorders) criterion and positive Hamilton Rating Scale for Depression (HRSD). The study included 49 patients treated with antidepressant sertraline for 20 days. In our study, the global QTc interval (12 leads) was determined automatically by applying ECG device of the producer and type “Schiller Cardiovit AT-1”, which uses “SCHILLER ECG Measurement and Interpretation Software for Children and Adult ECGs”. Measured/empirical values of data were statistically processed in SPSS 16.0 programme package for Windows. Methods of descriptive statistics and methods of statistic testing of hypotheses were used. **Results:** In our study, in spite of the vulnerability of patients due to the heart damage and the liver dysfunction arising from alcohol consumption, as well as altered patients’ drugs metabolism, no elongation of QTc

interval resulting from the application of sertraline was established ( $p = 0.735$ ). The average prolongation of QTc interval of 1.633 ms was observed (95% CI = 8.005 ms, 11.270 ms). **Conclusion:** Our study does not indicate that the antidepressant drug sertraline has a statistically significant effect on the prolongation of the QT interval of depressed patients with alcohol dependence.

**Key words:** alcohol addiction, depression, comorbidity, QT interval, sertraline.

### INTRODUCTION

Depression in psychiatry covers a large area of mental pathology and it is one of the most complex problems of modern medicine with broad implications on the general health of the individual as well as on the society as a whole. Major depressive disorder is more frequent for alcohol addicts than in the general population (1). **The aim** of this study was to investigate the effect of antidepressant drug sertraline on the length of the QT interval of depressed patients with alcohol dependence.

### PATIENTS AND METHODS

This researched included male patients (older than 18 years of age) suffering from alcohol addiction and treated at the Department of Addictive Diseases of the Banja Luka Psychiatric Clinic of the University Clinical Centre of the Srpska Republic and the Psychiatric

Clinic of the University Clinical Centre in Novi Sad, in whom depression, that is, depressive disorder, was diagnosed at the very start of hospitalisation, on the basis of DSM-IV criterion (2) and positive Hamilton Rating Scale for Depression (3). The study included 147 patients, out of which 49 by a method of random selection were treated by the antidepressant sertraline. Due to the necessity of applying anxiolytics in relieving and preventing the symptoms of alcoholic abstinence syndrome in patients, anxiolytic in equal doses (bromazepam a 3 mg: 1,1,2) was applied in the course of research. Values of gamma-glutamyltransferase (GGT), as indirect indicators of the intensity of alcoholism and liver cell lesions (hepatocytes), as well as electrolyte status (Sodium, Potassium, Calcium and Magnesium) and values of creatine kinase isoenzyme MB (CK-MB) were determined in these patients at the beginning of the study and on the twentieth day upon admission to treatment. These parameters were determined in serum by applying Olympus AU680 chemical analyser (Olympus America Inc.; Centerville, Pa., USA).

In order to be included in the study, patients had to satisfy the following criteria: to have a clinically diagnosed alcohol addiction and to satisfy the criteria under DSM-IV for depressive disorders. It was also necessary for them to have normal referential values in electrolyte findings (Na, K, Ca, Mg), not to have heart rhythm disorders or diagnosed heart diseases. The referential values of electrolytes were the working referential values that are used at the Clinical Centre Banja Luka: Na 130-147 mmol/L; K 3.2-5.2 mmol/L; Ca 2.2-2.7 mmol/L, and Mg 0.5-1.1 mmol/L.

Patients who do not satisfy the above-stated criteria, patients with diagnosed congenital Long QT syndrome, Brugada syndrome, acute infective diseases, autoimmune and malign diseases, as well as patients who take the drugs which prolong QT interval, were not included in the study. The research was approved by the Ethical Committee of the Clinical Center Banja Luka, and the patients gave their written consent for participating in the study.

The existence of alcohol addiction and depression was assessed on the basis of autoanamnestically obtained data and clinical observation. DSM-IV criteria were used for the purpose of diagnosing alcoholic addiction and depression (2). Hamilton scale (HRSD: Hamilton Rating Scale for Depression) (3) was used for quantifying the weight of depression. The version containing 17 items was used. The weight of depression was determined pursuant to the following scoring system: a) 0-7 score is an indicator that depression is not present; b) 8-15 score speaks in favour of the existence of minor (slight) depression; c) score  $\geq 16$  speaks in favour of existence of major (high) depression.

Antidepressive therapy, that is, sertraline was applied with 49 patients during 20 days, whereby optimal doses of the antidepressant, i.e. doses recommended by the drug producer (sertraline a 50 mg 1,0,0) were used. Sertraline belongs to the group of selective serotonin reuptake inhibitors (SSRIs).

Long QT interval represents a marker of the development of ventricular arrhythmia (torsade de pointes-TdP) and sudden death. Electrocardiographic image (ECG finding) including the measurement of the length of QT interval was made with the patients in the course of hospitalisation in the stated time periods, namely: 1. at the beginning of the study, before the application of the relevant antidepressant at 11 a.m.; 2. on the 20th day after the application of the relevant antidepressant, at 11 a.m. The stated time matching the period of ECG check-up was done due to circadian changes in the electrophysiological changes of the heart (4). Due to the impact of the sine rhythm on the length of QT interval and for the adequate comparison between subjects, the QT interval is corrected by the value of the heart frequency, the so-called QTc interval (5). Because of deferred adaptation of the QT interval to the values of heart frequency, ECG measurement was done following the establishment of stable heart frequency (6). The measurement was done with patients in the resting (lying) position in the course of 20 seconds.

In our study, the global QTc interval (12 leads) (7, 8) was determined by an automatic application of ECG device of the producer and type "Schiller Cardiovit AT-1", which uses "SCHILLER ECG Measurement and Interpretation Software for Children and Adult ECGs" (developed by SCHILLER AG, Altgasse 68, CH-6341 Baar, Switzerland, see <http://www.schiller.ch>). Global QTc interval represents the interval with the earliest QRS onset and the latest T end in any lead. Global QRS complex in our study was shorter than 120 ms, which excludes the impact of extended depolarisation of ventricles on the length of QT interval. The analysis included patients with technically regular ECG findings (without interference, background noise, 'wondering' of the isoelectric line). Examination of automatic measurement by the coincidence of heart frequencies in V3 lead using the classical method was done. The patients with double and biphasic T waves were not included in the study, while the T wave amplitude was greater than 0.2 mV (7).

The measured/empirical data values were statistically processed in the SPSS 16.0 software package for Windows. Methods of descriptive statistics and methods of statistical hypothesis testing were used. As the methods of the first selection, parametric methods were used. In the case of a violation of the assumptions about the normality of the distribution and the homo-

geneity of the variance, the corresponding nonparametric methods were used. The control of variability and the confounding was performed by the repeated measures test and by the application of multifactor regression models with determining the degree of collinearity between the tested independent variables. Statistical conclusions are derived from 2-tailed p values, and significance levels  $p < 0.05$ .

## RESULTS

The average values of HRSD score in depressed patients with alcohol dependence, depending on the administration of sertraline are shown in Table 1.

Statistically significantly lower HRSD score values were ascertained after sertraline administration ( $p < 0.001$ ) (Table 1). To test the significance of the differences, the t test of the dependent samples was used, since the assumption about the normality of the differences was not disturbed (diff. HRSD score Shapiro-Wilk test:  $p > 0.05$ ).

The average values of gamma glutamyl transferase (GGT) in depressed patients with alcohol dependence are shown in Table 2.

A statistically significant reduction in serum GGT values of patients on the 20th day of study with a significance level of  $p < 0.001$  was ascertained. To test the significance of the difference, the sign test of pairs was used (Table 2). High values of standard deviation (SD) are the result of the presence of a large number of patients with high serum GGT values. The highest serum GGT was recorded in the group of patients before administration of the antidepressant (926.0 U / L).

The average values of creatine kinase isoenzyme MB (CK-MB) in depressed patients with alcohol dependence, depending on the administration of sertraline, are shown in Table 3.

A statistically significant decrease in the value of CK-MB, i.e. mitigation of the degree of myocardial damage was established on the 20th day of the study after administration of sertraline ( $p = 0.032$ ). To investigate the significance of the difference, Wilcoxon's rank test with a sign was used (Table 3).

Table 4 shows descriptive QT interval data for depressed patients with alcohol dependence prior to administration of sertraline.

There was no statistically significant correlation between the length of the QTc interval (prior to the ad-

**Table 1.** Average values of HRSD score in depressed patients with alcohol dependence, depending on the administration of sertraline

Antidepressant	HRSD score before administration		HRSD score after administration		Sig. p
	Mean	SD	Mean	SD	
Sertraline	18.33	7.928	9.71	4.082	< 0.001*

HRSD: (Hamilton Rating Scale for Depression)

\* t test of dependent samples

**Table 2.** Average values of gamma glutamyl transferase (GGT) in depressed patients with alcohol dependence, depending on the administration of sertraline

Antidepressant	GGT (U/L) before administration		GGT (U/L) after administration		Sig. p
	Mean	SD	Mean	SD	
Sertraline	115.655	146.2732	91.516	105.8785	< 0.001

**Table 3.** Average values of creatine kinase isoenzyme MB (CK-MB) in depressed patients with alcohol dependence, depending on the administration of sertraline

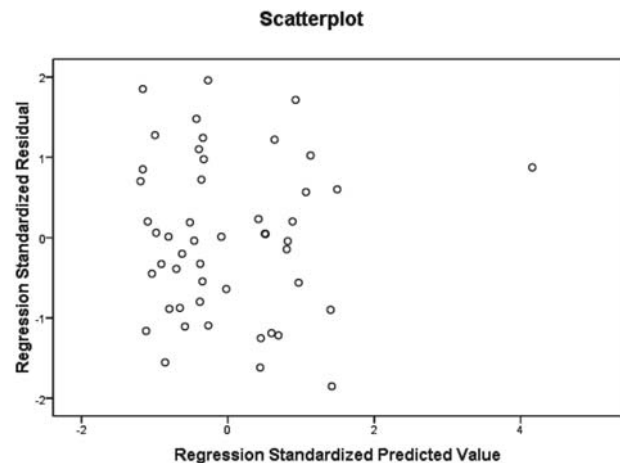
Antidepressant	CK-MB (ng/L) before administration		CK-MB (ng/L) after administration		Sig. p
	Mean	SD	Mean	SD	
Sertraline	15.00	4.730	14.47	4.686	0.032

**Table 4.** Length of QTc interval in depressed patients with alcohol dependence before administration of sertraline (global QTc Base)

### Descriptive Statistics

	N	Minimum	Maximum	Mean	SD
Global QTc Base (ms)	49	375	449	409.29	19.210

ministration of sertraline) and the serum GGT values (alcohol intensity) ( $p = 0.230$ ), serum CK-MB values (myocardial damage) ( $p = 0.869$ ) and HRSD score (intensity of depression) ( $p = 0.128$ ) (Table 5). The assumptions of the multiple linear models were satisfied: the normality of residual distribution (Shapiro-Wilk test  $p = 0.508$ ), homoscedasticity of residuals (Figure 1), and the absence of collinearity between independent variables (high value of the tolerance parameter and the low value of the variance inflation factor VIF). However, due to the low eigenvalue of 0.037 and the highest condition index of 9.440, we still tested the correlation between independent variables. Since the CK-MB residuals deviate from the normal distribution and show a negative asymmetry (skewness), they are transformed into a positive asymmetry (gamma distribution) by reflection. This was taken into account when interpreting the coefficients of the independent variables which have had reflected CK-MB (R\_CK-MB) for the dependent variable. The reflection was done in such a way that the CK-MB empirical value was subtracted from the maximum value of CK-MB enlarged for one unit ( $\max \text{CK-MB} + 1$ ). To test the significance of the difference, a generalized linear model of the gamma with log link and robust estimator was used. A statistically negative correlation of GGT and R\_CK-MB was ascertained (regression coefficient  $B = -0.0014$ ,  $p < 0.001$ ). That is, higher values of GGT are associated with higher values of CK-MB i.e. greater de-



**Figure 1.** Diagram of dissipation of standardized residuals of multiple linear regression model of dependence of QTc interval length in depressed alcoholic patients before the application of sertraline. The graph does not show dispersion of residuals to the side (fan out or fan in), and eo ipso heteroscedasticity

gree of damage to the myocardium. HRSD / R\_CK-MB correlation ( $p = 0.900$ ) and HRSD / GGT correlation ( $p = 0.980$ ) have not been ascertained.

Table 6 shows descriptive QT interval data for depressed patients with alcohol dependence after administration of sertraline.

The generalized linear model (subclass gamma with a log link- robust estimator) was used to test corre-

**Table 5.** Multiple linear regression model of the dependence of QTc interval length in depressed patients with alcohol dependence prior to administration of sertraline

#### Coefficients<sup>a</sup>

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig. p	Collinearity Statistics	
	B	Standard Error	Beta			Tolerance	VIF
(Constant)	395.262	11.176		35.366	< 0.001		
GGT	0.023	0.019	0.179	1.216	0.230	0.944	1.060
CK-MB	0.099	0.597	0.024	0.166	0.869	0.943	1.060
HRSD score	0.536	0.346	0.221	1.549	0.128	1.000	1.000

**GGT:** gamma glutamyl transferase (U/L)

**CK-MB:** creatine kinase isoenzyme MB (ng/L)

**HRSD:** Hamilton Rating Scale for Depression

**VIF:** variance inflation factor

a. Dependant variable: Global QTc Base (ms)

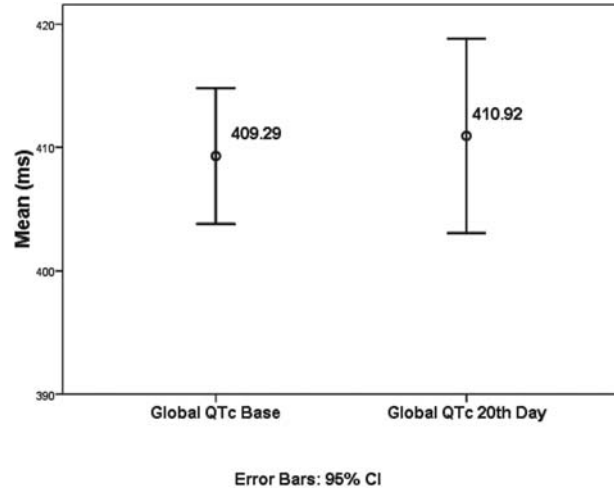
**Table 6.** Length of QTc interval in depressed patients with alcohol dependence after administration of sertraline (global QTc on the 20<sup>th</sup> day)

#### Descriptive Statistics

	N	Minimum	Maximum	Mean	SD
Global QTc 20 <sup>th</sup> Day (ms)	49	362	483	410.92	27.498

lationof the QTc interval length in depressed patients with alcohol dependence after administration of sertraline (in alcoholic abstinence). There was no statistically significant correlation between the length of QTc interval (after sertraline administration) and serum GGT (alcohol intensity) ( $p = 0.437$ ), serum CK-MB (myocardial damage) ( $p = 0.896$ ) and HRSD score (intensity of depression) ( $p = 0.309$ ) (Table 7). There was no statistically significant correlation between independent variables: GGT / R\_CK-MB ( $p = 0.295$ ), HRSD / R\_CK-MB ( $p = 0.990$ ), and HRSD / GGT ( $p = 0.502$ ). In those cases, a generalized linear model of the gamma with the log link and robust estimator was also used.

Since there is no statistically significant differences in patients' QTc intervals before and after administration of sertraline from the normal distribution (diff. QTc Shapiro-Wilk test:  $p = 0.182$ ), the t-test of the dependent samples (Paired-Samples T Test) was used. There was no statistically significant difference in QTc interval length after sertraline administration ( $p = 0.735$ ) (Table 8, Figure 2). The average QTc interval prolongation was 1.633 ms(95% CI = -8.005 ms, 11.270 ms). Therefore, prolongation of the QTc interval length greater than 11.270 ms in depressed patients



**Figure 2.** Length of QTc interval in depressed patients with alcohol dependence depending on the administration of sertraline

with alcohol dependence after administration of sertraline can be expected in 2.5% of cases.

**DISCUSSION**

After administration of sertraline, a statistically significant decrease in the creatinine kinase value of

**Table 7.** Generalized Linear Model of the dependence of the QTc interval length in depressed patients with alcohol dependence after administration of sertraline (in alcoholic abstinence)

**Parameter Estimates**

Parameter	B	Standard Error	95% Wald Confidence Interval		Hypothesis Test		
			Lower	Upper	Wald Chi-Square	df	Sig. p
(Intercept))	6.028	0.034	5.962	6.095	31516.763	1	< 0.001
GGT	0.00006	0.00007	- 0.00008	0.0002	0.603	1	0.437
CK-MB	0.0002	0.0017	- 0.003	0.004	0.017	1	0.896
HRSD score (Scale)	- 0.0019	0.0019	- 0.006	0.002	1.036	1	0.309

GGT: gamma glutamyl transferase (U/L)  
 CK-MB: creatine kinase isoenzyme MB (ng/L)  
 HRSD: Hamilton Rating Scale for Depression  
 Dependent variable: Global QTc 20th Day (ms)  
 Model: (Intercept), GGT, CK-MB, HRSD score  
 a. Computed Based on the Pearson Chi-Square.

**Table 8.** Significance of difference in length of QTc interval in depressed patients with alcohol dependence, depending on the administration of sertraline

**Paired Samples Test**

	Paired Differences					t	df	Sig. p (2-tailed)
	Mean (ms)	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Global QTc 20th day – Global QTc base	1.633	33.553	4.793	-8.005	11.270	0.341	48	0.735

isoenzyme MB (CK-MB) on the 20th day of the study was observed ( $p = 0.032$ ) (Table 3). This result would indicate the cardio-protective effect of sertraline on the reduction of myocardial damage of depressed patients with alcohol dependence. It should be kept in mind that the reduction of myocardial damage may also be due to the abstinence from alcohol of the patient group examined in hospital conditions. However, this information certainly requires further analysis and research.

Given the effect on the QTc interval, Sicouri et Antzelevitch (9) classify sertraline into a group of drugs that are poorly associated with torsade de pointes (TdP) and QTc prolongation (group 4), and venlafaxine, e.g. in group 2 (drugs for which there are reports that they are affiliated with TdP, but so far there is no reliable evidence that they cause TdP). For further clarification, group 1 belongs to drugs that can be claimed to cause TdP. Authors (10) indicate the safety of the use of sertraline, and negate their effect on the length of the QTc interval. They also highlight the safety of sertraline in patients who have suffered a myocardial infarction, which could also be explained by the results of our own study on the reduction of myocardial damage after administration of sertraline. Wenzel-Seifert et al. (11) in meta-analysis confirm the occurrence of TdP on paroxetine and venlafaxine, but not sertraline. Okayasu et al. (12) using the multiple regression model indicate the dependence of the prolonged QTc interval on the sole use of tricyclic antidepressants (amitriptyline:  $p < 0.05$  and clomipramine:  $p < 0.01$ ), on the use of the same drugs in the combination with antipsychotic drugs ( $p < 0.05$ ), and with the older age and female patients ( $p < 0.01$ ). Sertraline and paroxetine in that study did not show a statistically significant influence on the length of the QTc interval. In the study of Sala et al. (13) antidepressants (sertraline, paroxetine, venlafaxine) in combination with antipsychotic drugs prolonged QTc interval (Fisher Exact Test,  $p < 0.05$ ), but the monotherapy of antipsychotics did not. The limitation of that study is a small number of subjects (19 women in both groups) and the use of the other antidepressants in combination with antipsychotic drugs, which nevertheless do affect the length of QTc (other SSRIs e.g. citalopram, tricyclic clomipramine) (12, 14).

We see (from the presented literature) that sertraline is not associated with a significant prolongation of the QTc interval, that is, this effect is at least smaller than with other antidepressants from the SSRI group or tricyclics. Significant prolongation of the QTc interval occurs when sertraline is used in combination with other drugs known to prolong the QTc interval so that the isolated effect of sertraline remains unclear. The prolongation of the QTc interval is also due to poisoning or over dosage with sertraline. Thus PatanP et al. (15)

cite TdP in a female person (72 years old) due to the use of sertraline in combination with digoxin, sotalolol, and acenocoumarin. Boer et al. (16) present the case of prolongation of QTc interval after suicide over dosage with sertraline (2250 mg), diazepam (200 mg) and temazepam (400 mg). The QTc interval was 525 ms. Hohns et al. (17) cite an example of a sudden death of a patient (26 years old), with symptoms of paranoid schizophrenia, obsessive-compulsive disorder, major depression, sleep apnea syndrome and akathisia. Patient therapy included clozapine 100 mg twice daily (therapy started four years before death), risperidone 3 mg twice daily, sertraline 200 mg once daily, atenolol 50 mg twice daily, and lorazepam 0.5 mg four times daily. The authors assume that the cause of death is clozapine-induced cardiomyopathy (which is confirmed by an autopsy finding) or clozapine and / or sertraline-induced arrhythmia.

There are also studies that say the opposite, that higher doses of sertraline have not been associated by significant QTc interval changes. Barbey et Roose in meta-analysis (18) indicate a much lesser toxicity of SSRI antidepressant to an ECG finding in isolated poisoning compared to tricyclic antidepressants. It is interesting that poisoning with thirty times higher doses than the usual therapeutic daily dose was not accompanied by more pronounced symptoms. However, what these authors did not emphasize, and should bear in mind, is the pharmacokinetic properties of the drugs (e.g., time of absorption), as well as the implementation of early therapeutic poisoning measures that can explain the milder symptomatology of high-dose SSRIs. In combination with alcohol and other medicaments, the toxicity of these drugs increases significantly. Alderman (19) also excludes significant effects of sertraline on the length of the QTc interval in case of overdose. High doses of sertraline (200 mg) in combination with pimozide and cispripide did not cause QTc interval prolongation, although these drugs do prolong the QTc interval. The limitation of that study would be a small sample (fifteen patients in both examined groups).

Unlike the previous ones, in our study we examined the isolated effect of sertraline on the length of the QTc interval in the population of patients with alcohol dependence, for which data in the literature are missing. We also emphasize that the results refer to the therapy doses of sertraline that are recommended by the manufacturer (50 mg, 1.0.0). In our study for the control of alcohol abstinence syndrome, bromazepam was used, for which no effects were confirmed to prolong the QTc interval (20). Although the examined patients are susceptible to the effects of drugs that prolong the QTc interval, either due to the direct effects of alcohol, liver damage, or concomitant depression, no statisti-

cally significant difference in the QTc interval was observed after sertraline administration ( $p = 0.735$ ) in our study (Table 8, Figure 2). An average prolongation of the QTc interval of 1.633 ms was observed (95% CI = -8.005 ms, 11.270 ms).

## CONCLUSION

Higher serum gamma glutamyl transferase (GGT) concentrations (as a parameter that reflects the intensity of alcoholism) were statistically significantly associated with the higher creatine kinase isoenzyme MB (CK-MB) values, i.e. with the degree of damage to the myocardium. In depressed patients with alcohol dependence, after the administration of sertraline, a decrease in CK-MB was observed, what certainly requires further analysis and research. In our study a statistical probability of 2.5% indicates that the QTc interval prolongation will be greater than 11.270 ms after adminis-

tration of sertraline in the depressed patients with alcohol dependence.

## Abbreviations

**GGT** — gamma glutamyl transferase  
**CK-MB** — creatine kinase isoenzyme MB  
**HRSD** — Hamilton Rating Scale for Depression  
**SD** — standard deviation  
**VIF** — variance inflation factor

## DECLARATION OF INTEREST

The authors declare that there are no conflicts of interest.

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## Sažetak

# ANALIZA DEJSTVA ANTIDEPRESIVNOG LEKA SERTRALINA NA DUŽINU QT INTERVALA KOD DEPRESIVNIH PACIJENATA SA ALKOHOLNOM ZAVISNOŠĆU

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**Uvod i Cilj:** Depresija u psihijatriji pokriva veliko područje mentalne patologije i predstavlja jedan od najsloženijih problema savremene medicine sa širokim implikacijama na opšte zdravlje pojedinca i na probleme društva u celini. Depresija je i čest pratilac alkoholne zavisnosti. Cilj ovog istraživanja je bio da se istraži dejstvo antidepressivnog leka sertralina na dužinu QT intervala depresivnih pacijenata sa alkoholnom zavisnošću. **Bolesnici i metode:** Ovim istraživanjem obuhvaćeni su pacijenti muškog pola (stariji od 18 godina), oboleli od alkoholne bolesti kod kojih je na početku hospitalizacije na osnovu DSM-IV (Diagnostic and statistical manual of mental disorders) kriterijuma i pozitivne Hamiltonove skale za procenu depresije (HRSD) dijagnostikovana depresija tj. depresivni poremećaj. Studija je obuhvatila 49 pacijenata muškog pola kod kojih je ordiniran antidepressiv sertralin tokom 20 dana. U našoj studiji globalni QTc interval (12-odvodni) određivan je automatski primenom EKG

aparata proizvođača i tipa "Schiller Cardiovit AT-1" koji koristi "SCHILLER ECG Measurement and Interpretation Software for Children and Adult ECGs". Izmerene/empirijske vrednosti podataka statistički su obrađivane u SPSS 16.0 programskom paketu za Windows. Korišćene su metode deskriptivne statistike i metode statističkog testiranja hipoteza. **Rezultati:** Iako se radi o populaciji pacijenata osetljivoj na dejstvo lekova koji produžuju QTc interval, bilo zbog direktnog dejstva alkohola, oštećenja jetre ili intenziteta depresije, nije utvrđena statistički značajna razlika u dužini QTc intervala nakon ordiniranja sertralina ( $p = 0.735$ ). Uočeno je prosečno produženje QTc intervala od 1.633 ms (95% CI = -8.005 ms, 11.270 ms). **Zaključak.** Naša studija nije ukazala da antidepressivni lek sertralin utiče statistički značajno na produženje QT intervala depresivnih pacijenata sa alkoholnom zavisnošću.

**Cljučne reči:** alkoholna zavisnost, depresija, komorbiditet, QT interval, sertralin.

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