

Comparison of Lipid Reducing Properties of Escitalopram and Citalopram: A Pilot Study on Animal Model

Ashique Ali Arain^{1*}, Ali Abbas¹, Qamar Zaman Phul² and Mashkoor Ahmed Ansari³

¹Department of Pharmacology, Isra University Hyderabad, Sindh, Pakistan

²Department of Pharmacology, Bilawal Medical College Jamshoro, Sindh, Pakistan

³Department of pharmacology, Bhattai Dental College, Mirpur Khas, Sindh, Pakistan

*Corresponding Author: Ashique Ali Arain, Assistant Professor Department of Pharmacology, Isra University Hyderabad, Sindh, Pakistan.

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Abstract

Background: Citalopram and Escitalopram are the members of the selective serotonin reuptake inhibitors (SSRIs), a group of antidepressants having excellent results worldwide. Additional properties of drugs have been observed for many agents expanding their spectrum of uses. Many studies suggested the lipid lowering potential of the SSRIs we focused to compare the two enantiomers Escitalopram and citalopram in this pilot study in experimental animals.

Methodology: This experimental work was undertaken over 1 month at animal house of Agriculture University of Tando Jam on animals chosen through non-probability sampling. Rats were divided into three groups A (Control Group), B (Citalopram group) and C (Escitalopram group). Samples for lab analysis of lipid profile were obtained following sacrifice of animals. Serum TAGs, LDL, HDL and Total cholesterol were measured by Hitachi automated analyzer. Statistics were not applied due to smaller sample.

Results: Group A (Control group) total cholesterol was 114 mg/dl, LDL was 13.4 mg/dl, TGs were 206 mg/dl and HDL was observed 15 mg/dl. Group B (Citalopram Group) Cholesterol 93 mg/dl, LDL 12 mg/dl, TGs 115 mg/dl while HDL was 18 mg/dl. Group C (Escitalopram group) Cholesterol 89 mg/dl, LDL 13.3 mg/dl, TGs 129 mg/dl while HDL was 21 mg/dl. There was significant difference between control group and Citalopram and Escitalopram in all parameters but there was no significant difference between Citalopram and Escitalopram except TGs which were more reduced by Citalopram.

Conclusion: Both Escitalopram and citalopram possess lipid reducing properties and there is no significant difference between the two agents.

Keywords: Citalopram; Escitalopram; Triglycerides; High Density Lipoprotein; Low Density Lipoprotein

Introduction

Increased levels of the circulating lipids in the blood are known as hyperlipidemia [1]. There are different types of lipid abnormalities. (1) Type I commonly known as Familial hyper chylomironemia with underlying pathology of lipoprotein lipase deficiency marked by increased TGs. (2) Type IIA or Familial hypercholesterolemia fault lies in the synthesis LDL receptor. (3) Type IIB also termed as Familial combined hyperlipidemia resulting from excessive VLDL production by liver. (4) Type III also called Familial dys beta lipoproteinemia is due mutation of apolipoprotein E resulting into increased production and decreased utilization of IDL-C. (5) Type IV or Familial hypertriglyceridemia is Caused by increased production while reduced consumption of VLDL and TGs. (6) Type V or Familial mixed

hypertriglyceridemia is the consequence of reduced removal and over production of VLDL and Chylomicron [2,3]. Treatment option for Dyslipidemia include 1. HMG-Co-A Reductase Inhibitors also known as statins like Atorvastatin and Simvastatin. 2. Fibrates Gemfibrozil and Fenofibrate. 3. Vitamin B3 Nicotinic Acid. 4. Sequestrants of the bile acids like Cholestyramine. 5. Inhibitors of the absorption of cholesterol, Ezetimibe and Orlistat. 6. Omega-3-fatty acids like Docosahexaenoic Acid and Eicosapentaenoic Acid [3]. Dyslipidemia results into atherosclerosis leading to stroke at an early as age of 35years. Asia has a prevalence for Ischemic stroke that is 182 - 342/100000 while 3.5 - 5.5 million deaths/year occur due to stroke underlying pathology of dyslipidemia [4]. Atherosclerosis has many risk factors like smoking, obesity, dyslipidemia and depression [5]. Recommendations suggest assessing lipid profile regularly in patients at risk of atherosclerosis [6]. Many researchers have pointed out that depression is associated with dyslipidemia making them more violent and susceptible to suicide [7]. Vaan Reed Dortland (2010) from Netherland also reported abnormal lipid pattern in depression [8]. High levels of total cholesterol, LDL-cholesterol as well triglycerides were observed by Liang Y, Yan Z., *et al.* (2014) in depressive patients [9]. Common antidepressants are SSRIs (selective serotonin reuptake inhibitors), Tricyclic antidepressants (TCAs), mono amine oxidase inhibitors (MAOIs), Selective serotonin norepinephrine inhibitors (SNRIs), and atypical antidepressants. SSRIs are most popular as they are safe, more tolerable, cheaper and due to their spectrum of indication other than depression like premature ejaculation [10,11]. Escitalopram an enantiomer derivative of Citalopram both having 80% bioavailability, half- life of 27 - 32 hours and 33 - 38 hours making them administered once daily at a dose ranges of 10 - 20 mg/day to 20 - 60 mg/dl respectively [12]. Although escitalopram is more advantageous than citalopram therapeutically but we tried to explore and compare the effects of the two on lipid profile if any. It will further help the physicians to treat the patients of depression, dyslipidemia and ischemic heart diseases with suitable choice as needed.

Methodology

Samples of blood were obtained after animal sacrifice Lipid studies were performed according to methodology previously published [13].

Results

Group A (Control group) total cholesterol was 114 mg/dl, LDL was 13.4 mg/dl, TGs were 206 mg/dl and HDL was observed 15 mg/dl. Group B (Citalopram Group) Cholesterol 93 mg/dl, LDL 12 mg/dl, TGs 115 mg/dl while HDL was 18 mg/dl. Group C (Escitalopram group) Cholesterol 89 mg/dl, LDL 13.3 mg/dl, TGs 129 mg/dl while HDL was 21 mg/dl. There was significant difference between control group and Citalopram and Escitalopram in all parameters but there was no significant difference between Citalopram and Escitalopram except TGs which were more reduced by Citalopram.

Parameters	Group A (Control Group)	Group B (Citalopram Group)	Group C (Escitalopram Group)
Total Cholesterol (mg/dl)	114.0	93.0	89.0
HDL-Cholesterol (mg/dl)	15.0	18.0	21.0
LDL-Cholesterol (mg/dl)	13.4	12.0	13.3
Triglyceride (mg/dl)	206.0	115.0	129.0

Table 1: Comparison between lipid profile of three groups (ABC).

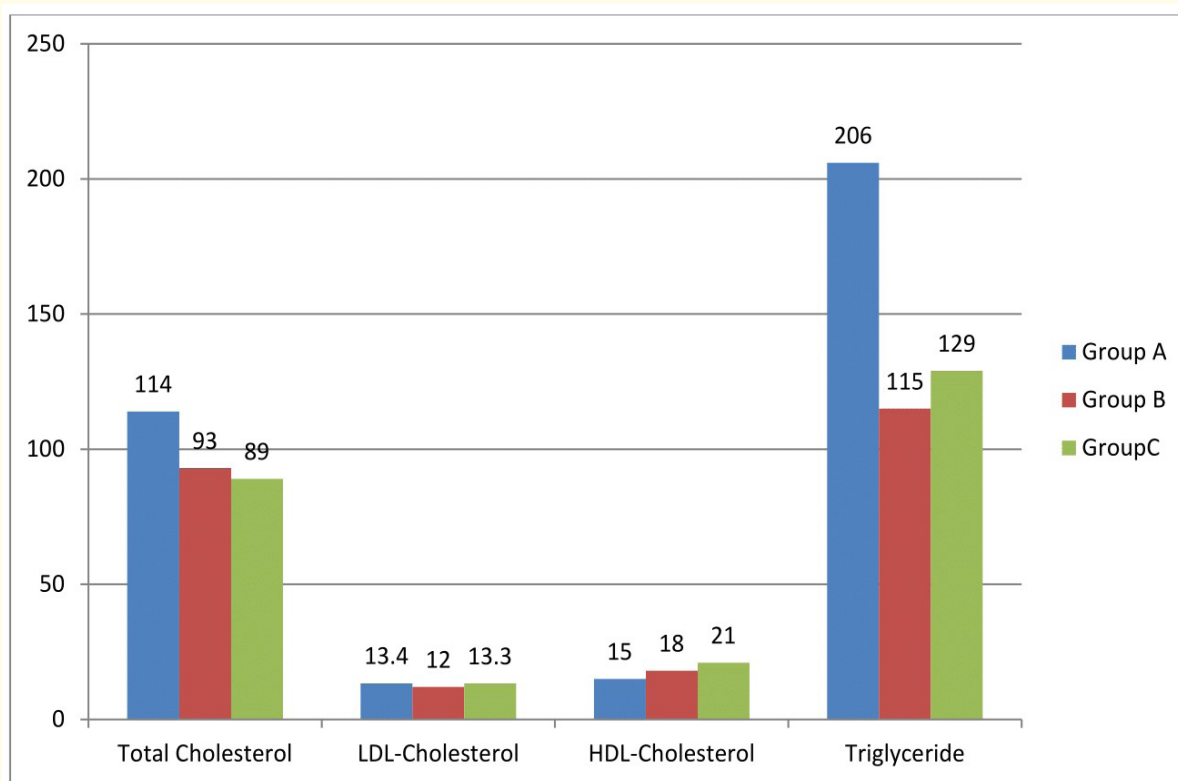


Figure 1: Bar charts of Comparison between lipid profile of three groups (ABC).

Discussion

SSRIs (Serotonin reuptake inhibitors) use is very common due to excellent results and these drugs have gained interest of researchers to look deeply into their potential benefits other than depression. As far as serum total cholesterol is concerned there is contrast between Jana Radojkovic, *et al.* (2016) study and our results with no significant reduction but TGs were significantly reduced in the same study that was consistent to what we found [14]. That may be attributed to his diabetic population he worked upon. However Amina Unis, *et al.* (2014) declared a significant reduction in LDL, TGs and total cholesterol 6 weeks escitalopram treated animals that lies consistent with us but HDL reported by her was inconsistent to our observations [15]. Results by M Beyazyaz, *et al.* (2013) are also supportive to present observations in terms of HDL, LDL and total cholesterol but elevated TGs were reported by him falling in contrast with our findings [16]. HDL cholesterol is a good cholesterol studies discussed either suggest elevation or non-significant reduction is in the favor of the two drugs along with the significant reduction in the other lipid parameters. All mentioned researches has difference among them like wise animal and human difference, Dyslipidemia induced and non- induced difference, diabetic and non-diabetic experimental population difference, good glycemic and poor glycemic control difference similarly our study also accompanied many weaknesses but we were working some other aspects of the two drugs sample were drawn from a smaller sample to fit into the pilot study. Hopefully this smaller study will lead to some bigger projects detailing the mechanism, difference and genomic aspects the SSRIs.

Conclusion

Parameters of lipid profile (TC, LDL, TGs) are significantly reduced in experimental animals both on Escitalopram and citalopram however no significant difference between the two drugs was found.

Recommendations

1. The use of Escitalopram and citalopram in depressive patients with dyslipidemia and vice versa.
2. Exact mechanism responsible for lipid reducing effects of the two agents.
3. To confirm the current findings on the large scale project study with induced dyslipidemia.

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