The Effects of Testosterone on Lipid Profile

Ahmadi R, Fazlollahi S*

***Abstract*—** Sex steroids play multiple roles in the regulation of metabolism and physiological functions in the body. The aim of this study was to evaluate the effect of orchidectomy and testosterone replacement therapy on lipid profiles**.** In this experimental study , male rats were andomly divided to control, testosterone receiving, orchidectomised and orchidectomised testosterone receiving, olive oil receiving and sham groups. Testosterone enanthate (10 mg\kg) was injected daily. After 7 weeks, blood samples were prepared and lipid profile was assayed. Data were analyzed using ANOVA. The results showed a significant decrease in serum levels of triglyceride in orchidectomised testosterone receiving group compared with control animals (P<0.05). There was also significant decrease in serum levels of cholesterole in orchidectomised, testosterone and orchidectomised testosterone receiving groups compared with control animals (P<0.05). There was significant decrease in serum levels of VLDL in orchidectomised testosterone receiving group compared with control animals (P<0.05). The findings show that testosterone mayaeffect on some aspects of lipid profile**.**

***Index Terms*—** Orcidectomy، Testosterone، Lipid profile

I. Introduction

Lipid profile or lipid panel is a panel of blood tests that serves as an initial broad medical screening tool for abnormalities in lipids, such as cholesterol (CHOL) and triglycerides (TG) [1]-[3]. Abnormal changes of lipid profile can be as risk factors for cardiovascular disease [4],[5]. Testosterone is a steroid hormone and the most potent naturally occurring androgen that is formed by the interstitial cells of the testes, and possibly by the ovary and adrenal cortex, may be produced in nonglandular tissues from precursors such as androstenedione, and is used in the treatment of hypogonadism, cryptorchism, carcinomas, and menorrhagia [6]. Also changes in serum level of this hormone can have effects on biochemical factors such as lipid profile[7],[8]. The use of testosterone to enhance physical abilities may be the highest damage to organs such as heart, kidney, brain, liver, and muscle. The aim of this study was to evaluate the effect of orchidectomy and testosterone replacement therapy on lipid profiles..

II. Material And Methods

In this experimental study , male rats were andomly divided to control, testosterone receiving, orchidectomised and orchidectomised testosterone receiving, olive oil receiving and sham groups. Testosterone enanthate (10 mg\kg) was injected daily. After 7 weeks, blood samples were prepared and lipid profile was assayed. Data were analyzed using ANOVA.

Rahim Ahmadi (PhD) is with the Department of Physiology, Faculty of Basic Sciences, Islamic Azad University, Hamedan Branch, Hamedan, Iran. (e-mail: drrahahmadi@yahoo.com).

Sara Fazlollahi (*corresponding author) is with Department of Molecular and Cellular Sciences, Faculty of Advanced Sciences & Technology , Pharmaceutical Sciences Branch, Islamic Azad University, Tehran-Iran (IAUPS). (e-mail: S.fazollahi@yahoo.com)

III. Results

Figure I shows serum levels of TG in control, olive oil receiving and sham group. There was no significant difference between the groups.

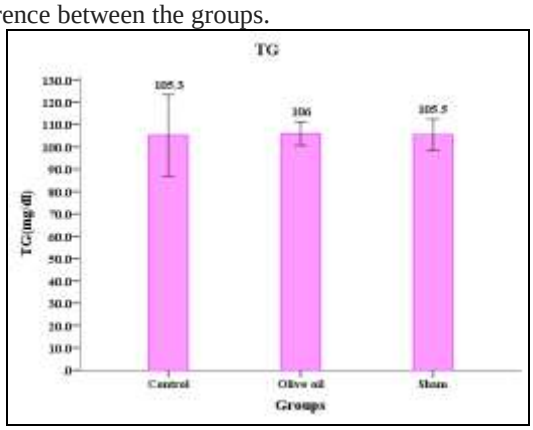

Fig I. Serum levels of TG in control, olive oil receiving and sham group.

Figure II shows serum TG levels in control, orchidectomised and orchidectomised testosterone receiving group. There was significant decrease in serum levels of TG in orchidectomised testosterone receiving group compared with control animals .

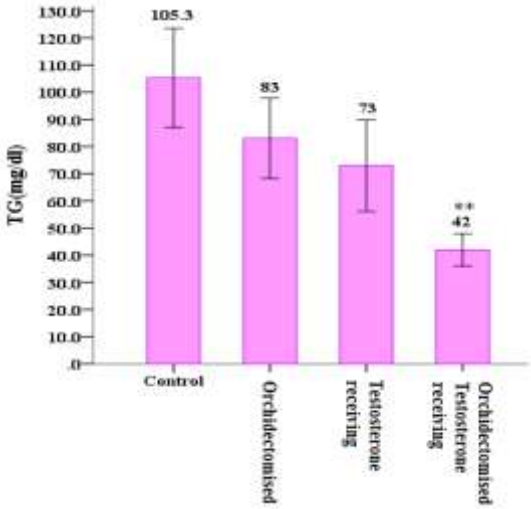

Figure II. Serum TG levels in control, orchidectomised and orchidectomised testosterone receiving group.

Figure III shows serum cholesterol (CHOL) in control, olive oil receiving and sham group. There was no significant difference between the groups.

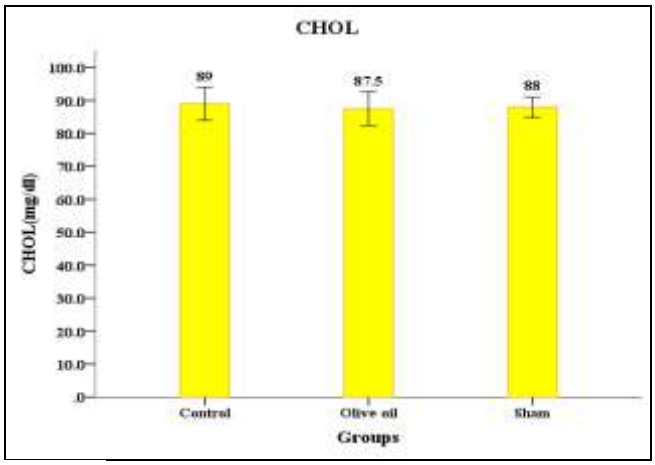

Figure III. Serum cholesterol (CHOL) in control, olive oil receiving and sham group.

Figure IV shows serum CHOL levels in control, orchidectomised and orchidectomised testosterone receiving group. There was significant decrease in serum levels of CHOL in orchidectomised, testosterone and orchidectomised testosterone receiving groups compared with control animals (P<0.05).

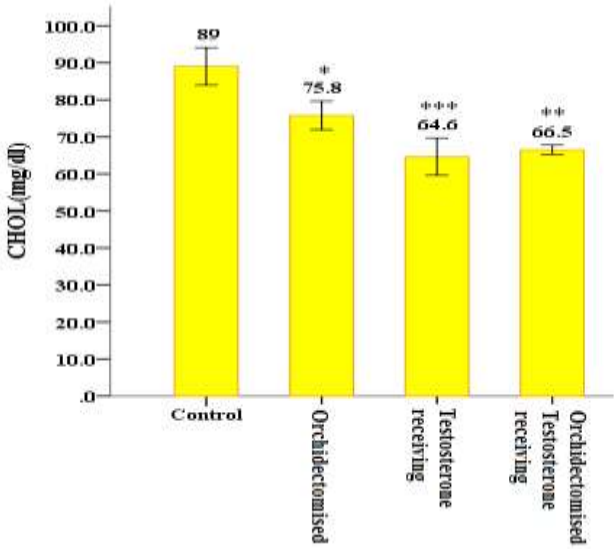

Figure IV. Serum CHOL levels in control, orchidectomised and orchidectomised testosterone receiving group.

Figure V shows serum HDL levels in control, olive oil receiving and sham group. There was no significant difference between the groups.

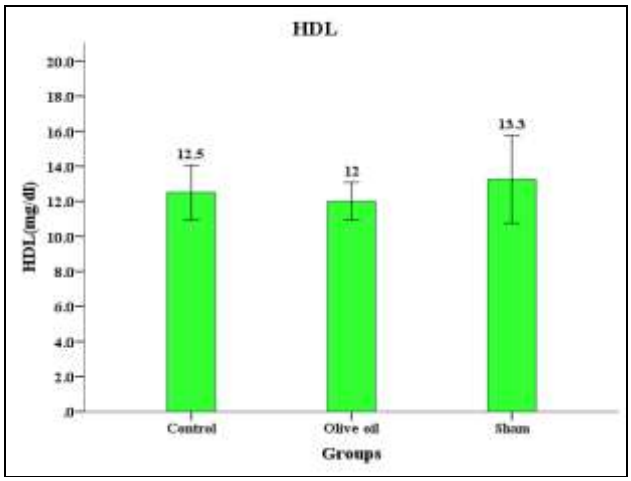

Figure V. Serum HDL levels in control, olive oil receiving and sham group.

Figure VI shows serum HDL levels in control, orchidectomised and orchidectomised testosterone receiving group. There was no significant difference between the groups.

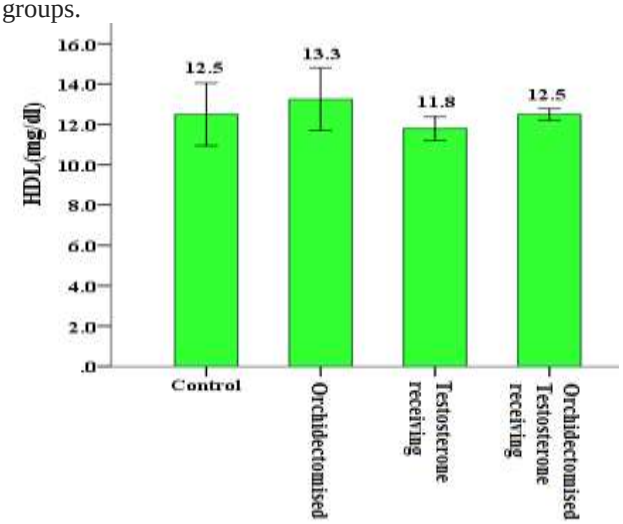

Figure VI. Serum HDL levels in control, orchidectomised and orchidectomised testosterone receiving group.

Figure VII shows serum VLDL levels in control, olive oil receiving and sham group. There was no significant difference between the groups.

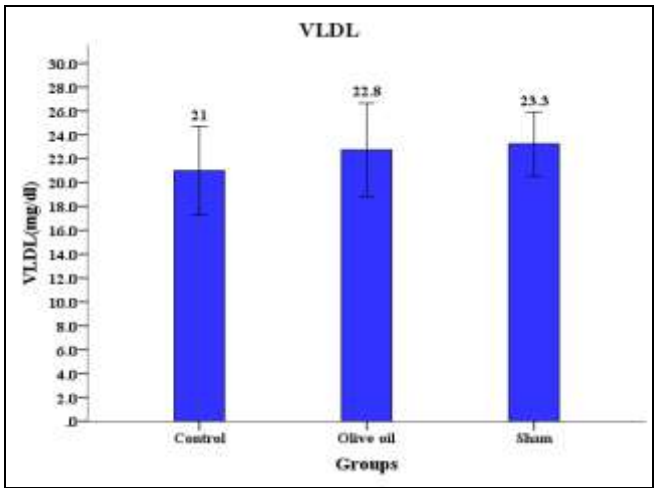

Figure VII. Serum HDL levels in control, olive oil receiving and sham group.

Figure VIII shows serum VLDL levels in control, orchidectomised and orchidectomised testosterone receiving group. There was significant decrease in serum levels of VLDL in orchidectomised testosterone receiving group compared with control animals (P<0.05).

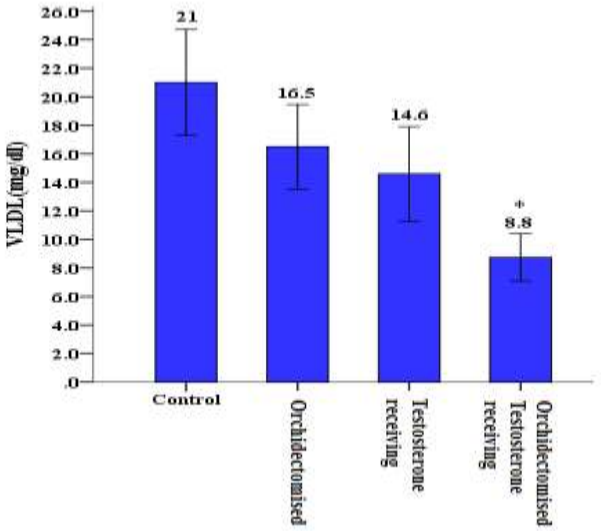

Figure VIII. Serum VLDL levels in control, orchidectomised and orchidectomised testosterone receiving group.

IV. Discussion

The disorders related to lipid profile have high prevalence and the costs of this disorders are extensive. [9],[10] Our findings showed a significant decrease in serum levels of triglyceride in orchidectomised testosterone receiving group and also significant decrease in serum levels of cholesterole in orchidectomised, testosterone and orchidectomised testosterone receiving groups.

Probably testosterone with stimulatory effects on thyroid gland might change the level of lipid profile since thyriod hormones with sex steroids have role in balance of body energy.[11]-[14].

V. Conclusion

We have shown that testosterone may affect on some aspects of lipid profile.

Acknowledgment

We appreciate all who helped us to exert the present study.

References

[1] Nordestgaard BG, Langsted A, Mora S, Kolovou G, Baum H, Bruckert E, et al. Fasting is not routinely required for determination of a lipidprofile: clinical and laboratory implications including flagging at desirable concentration cut-points-a joint consensus statement from the European Atherosclerosis Society and European Federation of Clinical Chemistry and Laboratory Medicine. European Atherosclerosis Society (EAS) and the European Federation of Clinical Chemistry and Laboratory Medicine (EFLM) joint consensus initiative. Eur Heart J. 2016 Jul 1;37(25):1944-58.

[2] Rosenblit PD. Common medications used by patients with type 2 diabetes mellitus: what are their effects on the lipid profile? Cardiovasc Diabetol. 2016 Jul 14;15(1):95

[3] Humerah S, Siddiqui A, Khan HF. Pattern of Altered Lipid Profile in Patients with Subclinical and Clinical Hypothyroidism and its Correlation with Body Mass Index. J Coll Physicians Surg Pak. 2016 Jun;26(6):463-6. doi

[4] Zhao Y, Delaney JA, Quek RG, Gardin JM, Hirsch CH, Gandra SR, Wong ND. Cardiovascular Disease, Mortality Risk, and Healthcare Costs by Lipoprotein(a) Levels According to Low-density Lipoprotein Cholesterol Levels in Older High-risk Adults. Clin Cardiol. 2016 Jul;39(7):413-20

[5] Fox KM, Wang L, Gandra SR, Quek RG, Li L, Baser O. Clinical and economic burden associated with cardiovascular events among patients with hyperlipidemia: a retrospective cohort study. BMC Cardiovasc Disord. 2016 Jan 14;16:13.

[6] Khera M.Testosterone Therapies. Urol Clin North Am. 2016 May;43(2):185-9

[7] Cai Z, Xi H, Pan Y, Jiang X, Chen L, Cai Y, Zhu K, Chen C, Xu X, Chen M. Effect of testosterone deficiency on cholesterol metabolism in pigs fed a high-fat and high-cholesterol diet. Lipids Health Dis. 2015 Mar 7;14:18

[8] de Bari O, Wang TY, Liu M, Portincasa P, Wang DQ. Estrogen induces two distinct cholesterol crystallization pathways by activating ERα and GPR30 in female mice. J Lipid Res. 2015 Sep;56(9):1691-700

[9] Lahtinen AM, Havulinna AS, Jula A, Salomaa V, Kontula K. Prevalence and clinical correlates of familial hypercholesterolemia founder mutations in the general population. Atherosclerosis. 2015 Jan;238(1):64-9

[10] Lahtinen AM, Havulinna AS, Jula A, Salomaa V, Kontula K. Prevalence and clinical correlates of familial hypercholesterolemia founder mutations in the general population. Atherosclerosis. 2015 Jan;238(1):64-9

[11] Liu J, Chen G, Meng XY, Liu ZH, Dong S. Serum levels of sex hormones and expression of their receptors in thyroid tissue in female patients with various types of thyroid neoplasms. Pathol Res Pract. 2014 Dec;210(12):830-5

[12] Šošić-Jurjević B, Filipović B, Renko K, Miler M, Trifunović S, Ajdžanovič V, Köhrle J, Milošević V. Testosterone and estradiol treatments differently affect pituitary-thyroid axis and liver deiodinase 1 activity in orchidectomized middle-aged rats. Exp Gerontol. 2015 Dec;72:85-98

[13] Zhang Y, Lu P, Zhang L, Xiao X. Association between lipids profile and thyroid parameters in euthyroid diabetic subjects: a cross-sectional study. BMC Endocr Disord. 2015 Mar 27;15:12

[14] Alvarez-Crespo M, Csikasz RI, Martínez-Sánchez N, Diéguez C, Cannon B, Nedergaard J, López M. Essential role of UCP1 modulating the central effects of thyroid hormones on energy balance. Mol Metab. 2016 Feb 10;5(4):271-82.