

Rapport between Dyslipidemia and Serum Ferritin in Adolescents

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ABSTRACT

Background: Ferritin is associated with many cardiometabolic risk factors such as obesity, dyslipidemia, insulin resistance and hypertension both young and middle age subjects. We aimed to study the association between serum ferritin levels and dyslipidemia in adolescents.

Methods: We analyzed 60 students (30 boys and 30 girls) from local Medical Institute of Lahore city. Age range of subjects was 18-20 years. Duration of study was February 2018 to April 2018. A questionnaire was filled from consented students. Levels of serum cholesterol, triglyceride and their carries HDL- chol, LDI chol and VLDL was estimated by Auto analyzer. Serum ferritin was estimated by ELISA technique.

Results: Mean age of male / female was 19.8 and 19.6 years respectively. Mean BMI values were insignificantly high in male in comparison to female. Lipid level of female was more in female. However the levels of serum ferritin was more in male. A weak direct correlation was observed between serum ferritin and serum cholesterol in both gender. However, in male subjects a weak negative correlation of serum ferritin with serum triglyceride and serum HDL-cholesterol. Whereas in female the correlation between serum ferritin and HDL-chol was positive

Conclusion: Serum ferritin levels were significantly associated with major dyslipidemia parameters, more prominently in boys than in girls, and this association represents a cardiometabolic risk factor.

Keywords: Serum ferritin, dyslipidemia, adolescents

INTRODUCTION

Liver is a site of interaction between pathways of lipid and iron. However it is a debate of discussion that iron is related with lipogenesis in liver. It is proposed that iron is a cofactor of some enzyme that takes part in lipid metabolism and may have a role in secretion of lipid of liver (Ahmad 2012). Normally serum ferritin is directly linked stores of iron. Reduced level of serum ferritin may cause impaired erythropoiesis (Emokpae et al 2014)

Increased level of serum lipid may increase the risk of atherosclerosis and diseases of coronary artery (Yang 2015). Some studies revealed that risk of development of anemia is less in obese subjects (Qin 2013). However findings of some studies show that anemia is related with increased risk of cardiovascular event in overweight patients (Winther 2014; Shirvani 2017). It is suggested that increased lipid level with low ferritin (that lead to anemia) is mainly due to iron deficient diet¹ (Ahmad 2102). Some experimental studies found that mild to moderate depletion of iron /ferritin may cause reduce lipogenesis, hyperlipemia and raises the level of essential fatty acids in tissues of rat (Zaribaf 2014)

Assessment of serum ferritin or iron stores and lipid profile may help to prevent cardiovascular problems. It is experimentally proved that in mice poor iron diet may have an effect on lipid metabolis [Ozdemir 2007].

There is a need of assessment of level of serum ferritin, serum triglycerides, serum cholesterol and its carrier to investigate their relation. The relation between serum ferritin and lipid profile may be a factor of atherogenesis which may affect the health of our adolescent. Thus immense attention is needed. Study was

therefore design to find rapport between Dyslipidemia and serum ferritin in Adolescents.

Statistical Analysis: Data was analyzed by SPSS 20. Anthropometric and biochemical variables of subjects were expressed as mean±SD. Comparison of lipid profile of male adolescents with female adolescents was analyzed by student 't' test. Correlation between serum ferritin and lipid profile in both male / female was carried out by Pearson Correlation Coefficient. P<0.05 is considered as significant.

Table: Anthropometric and Biochemical profile in adolescents

Variables	Male(29)	Female (29)
Age (years)	19.8±1.23	19.6± 1.12
BMI (Kg/m ²)	24.4±4.45	23.83±2.64
Life style (Active / Sedentary)	10 active 19 Sedentary	11 active 18 Sedentary
Socioeconomic status	09 Upper class 20 middle class	08 upper class 21 middle class
Blood pressure (mm/Hg)	120 ± 25.50	
Diet	Mix diet / Junk diet	Mix diet / Junk diet
Serum Cholesterol (mg/dl)	193.25 ±10.04	226.15±33.98**
Serum Triglyceride (mg/dl)	192.75 ± 18.99	212.38 ±55.25
HDL- chol (mg/dl)	39.08 ±2.64	39.77 ± 3.96
LDL- chol (mg/dl)	115.62 ± 9.6	143.91±27.92**
VLDL (mg/dl)	36.55 ± 3.8	42.48 ± 11.05
Serum ferritin (ng/ml)	14.35 ± 3.5	12.38 ±3.41

Table 2: Correlation of serum ferritin with lipids

	Male	Female
Serum ferritin Vs Serum cholesterol	r = 0.07	0.11
Serum ferritin vs serum triglyceride	r= -0.30	0.01
Serum Ferritin vs HDL-chol	r= -0.09	-0.12

RESULTS

Anthropometric and Biochemical profile in adolescents are tabulated as table 1. Mean age of male / female was 19.8 and 19.6 years respectively. Mean BMI values were insignificantly high in male in comparison to female. Majority of male and female subject's life style was sedentary and belong to middle class with normal blood pressure.

Levels of serum cholesterol, triglyceride, LDL-chol and of VLDL was high in female subjects in comparison to male but significant difference (P<0.001) was only observed in case of serum cholesterol and its carrier LDL-chol. Level of serum ferritin was in-significantly high in male in comparison with female subject.

Correlation of serum ferritin with lipids was tabulated as table 2. It is observed that a weak positive correlation was observed between serum ferritin and serum cholesterol in both gender. However, in male subjects a weak negative correlation was observed between serum ferritin and triglyceride as well as between serum ferritin and HDL-cholesterol. In female subjects a weak positive correlation was observed between serum ferritin and serum triglyceride. However, a weak negative correlation was observed between serum ferritin and HDL-cholesterol.

DISCUSSION

Among adolescents and children the dyslipidemia along with obesity and other risk factors may be related with progression of atherosclerosis that may lead to serious cardiovascular consequences. Relationship between dyslipidemia and serum ferritin levels may serve as a predictive factor for cardiometabolic disease in adolescents. (Expert Pannels 2011).

Mean BMI values were insignificantly high in male in comparison to female. Majority of male and female subject's life style was sedentary and belong to middle class with normal blood pressure. A study also observed an association between increased BMI and level of serum ferritin was also observed in male adolescents [Jeon et al 2013]. It is demonstrated increased rate of dyslipidemia is observed in adolescents in Asian countries. The reason may be the routine use of diet of Western countries i.e. diet rich in sugar and fat and this may increase the risk of CVD and other disease [Kim 2006; Liao 2008].

According to our study dyslipidemia in female adolescents were high in comparison with male adolescents. Studies show a direct correlation between sex hormone and risk of CVD in female (Lambrinoudaki 2006; Das 2019). It is stated that during the age of adolescents, there is an alteration in the level of sex hormone and it may show altered metabolism of serum lipoprotein¹² (das 2019).

Our study found that the level of serum ferritin was insignificantly high in male in comparison with female subject. Gender difference in the level of serum ferritin may be explained by studies. It is proposed that sex hormones

like estrogen and testosterone may be related with serum ferritin. Study found that estrogen hormone regulated the expression of liver hepcidin via estrogen response element in the gene of hepcidin. An increase uptake of iron via estrogen is observed and this may compensate iron loss in the time of menstruation (Hou 2012). Though a study reported that increase level of testosterone, increases the level of serum ferritin by blocking hepcidin in men (Bachman 2010). Lately a study found an inverse association serum testosterone with serum ferritin (Liu 2013).

We observed that a weak positive correlation was observed between serum ferritin and serum cholesterol in both gender. However, in male subjects a weak negative correlation was observed between serum ferritin and triglyceride as well as between serum ferritin and HDL-cholesterol. In female subjects a weak positive correlation was observed between serum ferritin and serum triglyceride. However, a weak negative correlation was observed between serum ferritin and HDL-cholesterol.

A controversial issue is found between the level of serum ferritin and lipid profile⁶ (Shirwani 2017). According to some studies an inverse relationship was observed different lipid profile and serum ferritin (Bougle 2013; Sengsuk 2014). However some studies observed serum ferritin is directly related with lipid parameters. A data of study found the in children and adolescents reduced level of serum ferritin is related with dyslipidemia (Lee 2014; Zhu 2019). However a study noted no relationship of serum ferritin with lipid profile. Study proposed diet with low iron may cause loss of protein and energy, lead to hypo caloric diet and may cause increase lipid profile (Ece 1999).

Limitation of study: Study is limited with small number of adolescents. However it should be done in other age group also.

CONCLUSION

Dyslipidemia along with reduced serum ferritin level was observed in adolescents. It is therefore suggested to confirm this relation in large number of adolescents and also in other groups.

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