



Correlation of Non High Density Lipoprotein Cholesterol levels with neck circumference in non hypertensive euglycemic adults

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Abstract

Background: Neck circumference (NC) measurement is one of the simple screening measurements which can be used as an indicator of upper body fat distribution to identify obesity. Recently, non-HDL cholesterol (non-HDL-C) has become a commonly used marker for a blood lipid pattern associated with increased risk of heart disease.

Aim: The aim of this study is to Correlation of Non High Density Lipoprotein Cholesterol levels with neck circumference in non hypertensive euglycemic adults.

Methods: This study was conducted on a group of 100 participants (78 males and 22 females). All the participants were recruited from the master health checkup program of SRM medical college hospital.

Results: There was positive correlation of Neck circumference and Non High Density Lipoprotein Cholesterol. The NC in susceptible individuals was significantly correlate with Non High Density Lipoprotein Cholesterol ($P < 0.01$).

Conclusions: The positive correlation observed between Non HDL Cholesterol levels and neck circumference indicates that measurement of these parameters may help as an effective screening measure in better risk stratification in susceptible individuals.

Keywords: Neck circumference, Non High Density Lipoprotein Cholesterol.

Introduction

Non High Density Lipoprotein Cholesterol (Non HDL- C) levels quantify the cholesterol content present in all the atherogenic lipoproteins. Estimation of non HDL-C level is done by subtracting the HDL- C level from total cholesterol level. The advantage of estimating non HDL-C is that the analysis can be carried out in the non fasting state itself. In studies, researchers

have shown that non-HDL-C is a better and reliable indicator of coronary heart disease (CHD) risk than Low Density Lipoprotein (LDL-C) (Virani, 2011 & Virani et.al, 2012). Neck Circumference (NC) measurement is a simple screening method which can be used to identify overweight and obesity (Ben-Noun et, al, 2001). A positive correlation of neck circumference with insulin resistance and biochemical components of

the metabolic syndrome has been reported (Preis, et.al, 2010 & Stabe, et.al, 2013). Therefore this study has been carried out to examine the relationship between non HDL-C levels and neck circumference in a group of non hypertensive, euglycemic individuals.

Materials and Methods

This study was conducted on a group of 100 participants (78 males and 22 females). All the participants were recruited from the master health checkup program of our medical college hospital. Those who were on lipid lowering drugs, patients with Diabetes Mellitus, hypertension, liver, kidney, cardiovascular diseases and thyroid diseases were not be recruited for the present study. Patients with neck deformities or previous history of neck surgery with scar formation were also excluded from the study. The study was conducted after getting approval from the Institutional Ethics Committee (661/IEC/2014). Informed consent was obtained from all of the participants.

Venous blood was collected from all the participants. 3ml of blood collected in a plain serum vacutainer was allowed to clot and serum was separated by centrifugation at 3000 RPM for 10 minutes.

Total cholesterol (cholesterol oxidase) and High Density Lipoprotein- Cholesterol (HDL-C) (Direct method) were measured by using standard kits in Beckmann Coulter auto analyzer on the same day of sample collection.

Non HDL Cholesterol levels were calculated as follows:

$$\text{Non HDL Cholesterol} = \text{Total cholesterol} - \text{HDL Cholesterol}$$

The neck circumference measurements were made by one investigator using standard techniques as follows. NC was measured at mid-neck height, between mid-cervical spine and mid-anterior neck, to within 1 mm, with plastic tapes calibrated weekly All measurements were taken with the subjects standing upright and facing the

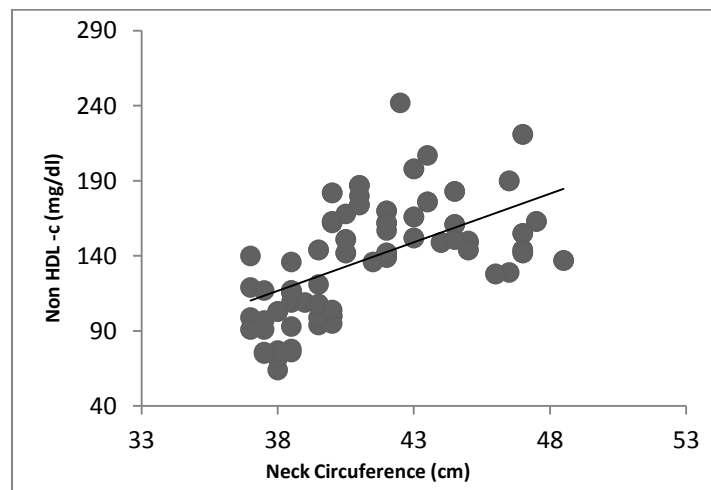
investigator, having their shoulders relaxed (Onat et.al, 2009). The correlation of non HDL cholesterol levels with neck circumference was analyzed using Pearson’s correlation coefficient.

Results

Table: 1 Correlation between Non HDL Cholesterol levels and neck circumference

Parameters	Mean ± SD Value	regression value	p value
Non HDL – C (mg/dl)	141.49 ± 36.7	0.57	p < 0.01
Neck circumference (cm)	41.84 ± 3.24		

Figure: 1 Correlation between Non HDL Cholesterol levels and neck circumference



We examined relationship between Non High Density Lipoprotein Cholesterol levels and Neck Circumference (NC). The linear regression analysis was carried out on a scatter plot of Non High Density Lipoprotein Cholesterol levels and Neck Circumference (NC). The Pearson's correlation coefficient was determined. The significantly positive correlation found between Non High Density Lipoprotein Cholesterol levels and Neck Circumference (NC) in patients with (Fig: 1) susceptible individuals (r = 0.57, P < 0.01).

Discussion

Non HDL Cholesterol represents the total risk due to the atherogenic lipoproteins (Naveed Sattar et.al, 2004). Neck circumference was found to be a better tool to predict incident cardiovascular

disease as compared to BMI and waist circumference (Preis et.al, 2010). Hence we attempted to study the association between these two parameters for better risk identification.

Jiang R et al studied the atherogenic risk in a group of 746 diabetic men and concluded that Non HDL Cholesterol and apoB are more indicative of the occurrence of risk of cardiovascular risk (Jiang et.al, 2004).

In a prospective study involving 921 diabetic women, estimation, non HDL Cholesterol levels predicted cardiovascular risk (Schulze et.al, 2004).

A significant association was observed between Non HDL Cholesterol levels in fasting blood glucose levels in subjects with impaired fasting glycemia (Vinodhini et. al, 2013)

Neck circumference is a marker of upper body subcutaneous adipose tissue deposition (Aswathappa et. al, 2013). NC does not show diurnal variation and can be considered as a reliable marker of obesity. The release of free fatty acid from the upper body subcutaneous fat is found to be more when compared with the lower body fat deposit (Abeer Atef et. al, 2015).

In a study conducted in 2009 in a group of 490 volunteers, the neck circumference was found to be associated with cardiometabolic risk factors (Sarah Rosner Preis et.al, 2013). The limitations of this study are that it has been carried out in a small geographic location and has not included participants in various clinical settings.

Conclusion

The positive correlation observed between Non HDL Cholesterol levels and neck circumference indicates that measurement of these parameters may help as an effective screening measure in better risk stratification in susceptible individuals.

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