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CAN LIPID PROFILE BE USED AS BIOMARKER PREDICTORS OF CARDIOVASCULAR RISKS IN MALE AND FEMALE CHILDREN UNDER AGE 11 YEARS, AS IT DOES FOR MIDDLE AGE AND ELDERLY?

Hussain Al – Wandawi[1], Hadi Mahdi Salih[2], Ahmad Arak Kamil[2], Ali Wahad Enad[2] and Mustafa Nazim Rafeek[2]

[1]Principal Investigator, Department of Pharmacy, AL- Yarmouck Private University College, Baghdad, Iraq.
[2]Final Year Undergraduate Students, A L–Mustaqbal University College, Hila, Iraq.

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***Corresponding author: Hussain Al – Wandawi**

Principal Investigator, Department of Pharmacy, AL- Yarmouck Private University College, Baghdad, Iraq.

ABSTRACT

Heart disease is the most frequent condition in elderly. Within this age group, cardiovascular disease will remain the leading cause of death. Heart failure, coronary heart disease (CHD), artery disease and arterial fibrillation are some of the common sequences and reasons. In the last three decades lot of information emerged to show that middle – age and elderly are not the only groups affected by cardiovascular disease (CVD), but children and adolescents as well. Some children have a higher risk for coronary artery disease than others especially if they have family history of heart disease. Some other children are born with congenital heart disease, a type of heart disease that children are born with, usually caused by heart defect that are present at birth. Still other children acquire some risk factors due to sedentary lifestyle, and unhealthy food. With the exception of aging process and inherited - cardiovascular – problems, many others risk factors can be modified if diagnosed and treated early in life, if not, it can lead to heart and circulatory diseases. Screening for CVD at childhood and adolescence stages is one of the effective measures for modifying risk factors for CVD later in life. The results presented in this study; suggest that lipid profile (lipid panel) measurement of children under age 2 years is not recommended for prediction of cardiovascular risk later in life, although it may be required under certain conditions. However, in children age 2 to 5 years and 5 to 10 years such screening is found to be indicative for highlighting some risk factors which if not treated early in life may lead to health problems later in life. Moreover, such early prediction of CVD risks, may help in chaining unhealthy sedimentary life style related to CVD later in life. This investigation has also been extended to include males and females from the same community to explore the prevalence of cardiovascular risks at mid - aged and in elderly. The results revealed that elderly are at higher risk of CV compared to persons at their middle age persons. ***Objective:*** *The objective of this study was to find out whether lipid profile measurement of children can be useful for cardiovascular risks prediction later in life, or one that can be used to identify children who benefit from treatment.*

KEYWORDS: *Lipid profile, cardiovascular risk predictors, in male and female children, middle age, and elderly.*

INTRODUCTION

Cardiovascular diseases (CVDs) are the number one cause of death globally. More people die annually from CVDs than from any other causes (GBD, 2015, WHO, 2017). It is indisputable that the attribute risk of cardiovascular disease is highest in the senior populations (Kannel, 2002, Griffith et al., 2004, Yazdanyar and Newman, 2009, Steenman and Lande, 2017, Rodgers et al., 2019). However, aging is an inevitable part of life and unfortunately poses the largest risk factor for cardiovascular disease (North and Sinclair, 2012). With aging, there is an incremental acquisition of several cardiovascular disease (CVD) risk factors in an individual's lifespan, but when these risk factors are incorporated in multivariable regression model, age will still an independent risk factor (Dhingra and Vasan, 2012). It has been reported that 50% of all heart failure diagnoses and 90% of all heart failure deaths occurring

in the segment of the population over age 70, therefore, heart failure is largely considered as a disease of the elderly (Strait and Lakatta, 2012). Although, the clinical manifestations of cardiovascular disease (CVD), such as myocardial infarction, stroke, and peripheral vascular disease, seem to appear from middle age, the process of atherosclerosis can begin early in childhood as deposits of cholesterol and its ester, referred to as fatty streaks in the Tunica intima **(**Newman et al.**,** 1986**,** McGill, 2000, Hong, 2010, Zachariah 2012). The cardiovascular risks are usually associated with gender and aging(Jones et al., 2019). Moreover, fatty streaks have been found to occur in the aorta of premature fetuses, particularly among those mothers with hypercholesterolemia (Paliniski and Napoli, 2002). The heart disease mortality in men accelerates at a relatively young age, but in women the risk shows a steep increase at approximately 60 years of age. These data emphasize the need to identify and prevent risk factors for CVD, especially in women in their mid-life years (Mikkola et al., 2013). On the other hand, high triglycerides and cholesterol in blood may contribute to hardening of the arteries or thickening of the artery walls (arteriosclerosis) which increases the risk of stroke, heart attack and heart disease. The plasma lipid contents that can be measured with a lipid panel are classified by their density into high - density lipoproteins cholesterol (HDL- C), low- density lipoproteins cholesterol (LDL- C), very low-density lipoproteins cholesterol (VLDL - C) and non-high density lipoproteins cholesterol (non – HDL- C). Cholesterol is a waxy, fat - like substance that's found in all the cells in the body and exerts negative serious effects on cardiovascular system if exceeds certain level. The liver is the major site of cholesterol synthesis, together with intestine make about 80% of endogenous cholesterol, and only about 20% in the blood stream comes from food **(**Arnold and Kwiterovich, 2003, Corliss, 2019). Thus, cholesterol balance is achieved both by synthesis in the body and by absorption in gastrointestinal tract (Cohen, 2008). However cholesterol cannot pass the blood–brain barrier, and its presence in the brain is due to local synthesis (BjÖrkhem and Meaney, 2004). A triglyceride is a type of fat obtained mostly from the food, but the body also produces it when it converts excess calories to fat for storage. Among other lipid profile - related compounds are; Low – lipoprotein cholesterol (LDL – C). High density lipoprotein cholesterol (HDL – C), and lately (non – HDL – C). As far as children concerned, the issue is not as was before. In the past, doctors felt that children and adolescents were at little risk for developing high cholesterol levels and other risk factors for heart disease until later in life. Now it is known that children and adolescents may have high blood cholesterol and develop atherosclerosis (McGill et al., 1997, Berenson et al., 1998, McGill et al., 2001, Nicklas et al., 2002, Hong, 2010, Saunders et al., 2014, Dwyer, 2019). This may be attributed to the current sedentary life style, like, less vigorous activities, prolong TV viewing, obesity, consuming high fat – rich food, and sugar junk food (Powell et al., 1987, Robinson, 1999, Warren et al., 2010, Grontved and Hu, 2011, Ford and Casperson, 2012, Young et al., 2016**).** In our study, non – HDL – C is given consideration it deserves, because it is a measure of all atherogenic lipoproteins, that is, LDL and its precursors such as, very low density lipoprotein and intermediate density lipoprotein including remnant lipoproteins. Moreover, non - HDL- C correlates highly with total Apo lipoprotein B levels (Ballantyne et al., 2001, Fruchart et al., 2013, Ghodsi, 2017, Wang et al., 2018). *Therefore, in the present study, along with other parameters, non – HDL cholesterol was also considered.*

MATERIALS AND METHODS

In collaboration with hospital medical staff at different locations, samples for lipid profile tests were obtained from volunteers of different age and gender groups attending the hospital for minor health complain, non - related vascular disease (children for scheduled for vaccination, routine checkup or on school entrance certificates. Based the age, various techniques were used to collect blood samples. *Samples were measured in collaboration between our lab technicians and hospital staff following the same standard methodology employed in the same hospital for easy follow up studies in future. Assessment of the results was carried out using online computer program. Due to nature of this study difficulty of employing fasting procedure in children), expecting glycerides levels far below 400 mg / dL., and we found nonfasting method can be reliable and precise which was also been recommend by others (Vance and Vance, 2002, Gaziano, 2012, Nordestgaard et al., 2016).*

RESULTS AND DISCUSSION

In the controversy to the previous medical opinion, lot of information emerged during the last decades to show that middle – age and elderly are not only the age groups affected by CVD, but children and adolescents as well. The accumulated data also have linked the adverse levels and patterns of lipids and lipoproteins to initiation and progression of the atherosclerotic process in children and adolescents. However, no studies conducted linking absolute levels of lipid and lipoproteins in childhood to incident CVD in adult life. However, evidences, suggested that atherosclerosis and other cardiovascular pathogenesis have life - long trajectories, and that reducing risks at an early age can reap rewards in later years (Hong, 2010, Zachariah, 2014). Based on these and other relevant studies, an expert panel sponsored by (NHLBI) endorsed by (AAP) issued comprehensive guidelines on cardiovascular health and risk reduction in children and adolescents(De Jesus, 2011). According to the guidelines, c*hildren generally do not need many laboratory screening tests but some tests such as lipid profile test early in their early lifespan may helping them develop healthy habits, like eating well and being active, could prevent serious and costly health problems like cardiovascular diseases as they grow older. The current guidelines call for universal screen of children age 9 – 11 and again 17 – 19. It is now an agreed upon concept*

that in children under age 2 years, lipid profile testing is not advised. In children age 2 – 10 years, testing is advised if their other risk factors for heart disease such as diabetes, high blood pressure, obesity, exposure to cigarette smoke, or family history of these or others including early coronary disease, early coronary artery disease or lipid disorder, kidney disease or other chronic inflammatory disease. To fill the gap between the age of lactation and up to 10 years we conducted this study. The background data necessary for later discussion are presented in (Tables 1 - A to 5 – A), and the interpretation of their contents are presented in (Tables 1 - B- to 5 – B) and summarized in (Table – 6). The results (presented in table 1 – B show that lipid profile screening for children age 6 month to 2 years may not be necessary as a predictor for cardiovascular risks later in life, but may be of value in the presence of multiple risk factors. For children age 2 - 5 years (Table – 2 - B), the risk – level of CVD risk calculated (Table – 6) were as follows: very low (16.66%), low risk (75.00%), average risk (8.33%). The results presented in (Table - 3- B) for children age 5 – 10 years, the levels of risk were as follows; low risk (100%). The possible use of lipid profile as risk predictor was invested in two older age categories, 30 to 45, and 45 – 60 years. Cardiovascular disease and cancer are the leading cause of morbidity and aging is the only risk factor that cannot be prevented. Our study show unquestionable results that in adults and elderly, cardiovascular risks increase with age. In persons age 30 to 45 years, low risk, average risk, and moderate risk have accounted to 5.5%,44%, and 50 % respectively, compared to age group 45 to 60, where, low risk accounted to (0%), average risk (38.40 %), and moderate risk (61.%). These results show that cardiovascular disease is progressing with age not only because of aging process but because several other age – related chronic diseases affecting the elderly. Attention should also may be paid to life style of the elderly, where physical activity and nutrients are important issues.(Lachman et al.,2018).

Tables = 7 tables – see bellow (please check carefully).

Table – 1 - A. Lipid profile of male and female children age 6 month to 2 years.

Subject No.	Gender	Age	TC	HDL-C	LDL-C	Non HDL-C	TGs	TC/HDL-C	TGs/HDL-C	LDL-C/HDL-C	HDL-C/LDL-C
1	Male	6 m	159.7	54.4	90.0	105.3	79.0	2.43	1.45	1.65	0.60
2	female	6 m	164.9	45.8	102.0	119.1	82.4	3.66	1.80	2.27	0.45
3	female	13 m	145.6	43.5	96.9	102.1	70.8	3.55	1.63	3.23	0.45
4	Male	15 m	150.0	42.2	92.6	107.8	75.2	3.56	1.78	2.19	0.46
5	Male	17 m	164.2	44.6	103.2	118.6	82.1	3.68	1.84	2.31	0.43
6	Male	17 m	150.1	41.0	93.6	109.1	78.1	3.66	1.19	2.28	0.44
7	Male	18 m	160.2	49.1	95.1	111.1	81.0	3.26	1.65	1.94	0.52
Average		14.5	156.8	46.3	94.9	110.4	79.1	3.32	1.58	2.07	0.49
Average		9.5	155.3	44.7	99.5	110.6	76.6	3.61	1.72	2.76	0.45

Table – 2 –A. Lipid profile of male and female children age 2 to 5 years.

Subject No.	Gender	Age	TC	HDL-C	LDL-C	Non HDL-C	TGs	TC/HDL-C	TGs/HDL-C	LDL-C/HDL-C	HDL-C/LDL-C
1	male	2 Yr.	159.8	45.4	98.4	114.4	79.9	3.52	1.76	2.17	0.46
2	male	3 Yr.	172.0	54.4	110.9	117.6	82.3	3.16	1.51	2.04	049.
3	female	3Yr.	167.1	47.1	103.0	120.0	84.4	3.55	1.79	2.19	0.46
4	male	3.5	160.6	52.5	91.9	108.1	81.0	3.06	1.54	1.75	0.57
5	male	3.5	155.2	50.1	90.0	105.5	76.2	3.10	1.52	1.80	0.56
6	male	3.5	153.8	48.5	90.1	105.3	75.9	3.17	1.57	1.86	0.54
7	female	4.0	153.8	43.5	99.3	115.0	78.3	3.63	2.27	1.61	0.44
8	male	4.0	160.3	44.3	99.6	116.0	81.9	3.62	2.25	1.85	0.45
9	female	4.5	149.0	66.2	88.2	82.8	73.0	3.23	1.91	1.58	0.52
10	male	4.5	157.2	41.0	1007	116.2	77.9	3.83	2.46	1.90	0.41
11	male	4.7	170.5	70.6	85.7	99.9	71.0	2.42	1.21	1.01	0.82
12	male	5.0	154.2	47.2	92.2	107.0	72.0	1.96	1.92	1.53	0.51
Average		3.7	141.9	50.4	96.3	110.0	77.6	3.09	1.75	1.77	0.53
Average		3.9	156.6	52.3	96.8	105.9	76.0	3.47	1.98	1.79	0.47

Table – 3 –A. Lipid profile of male ane female children age 5 to 10 years.

Subject No.	Gender	Age	TC	HDL-C	LDL-C	Non HDL-C	TGs	TC/HDL-C	TGs/HDL-C	LDL-C/HDL-C	HDL-C/LDL-C
1	female	5.5Yr.	163.1	47.1	99.6	116.0	82.0	1.63	1.74	3.46	0.47
2	male	5.6Yr.	160.4	51.3	94.3	109.1	74.3	3.13	1.45	1.84	0.54
3	female	6.0Yr.	167.0	58.2	92.0	108.8	84.0	2.82	1.44	1.58	0.63
4	female	7.0Yr.	160.1	66.3	77.4	93.8	81.9	2.42	1.24	1.17	0.86
5	female	8.0Yr.	162.2	40.0	105.6	122.2	82.0	4.05	2.05	2.64	0.38
6	male	8.0Yr.	157.3	41.1	101.0	116.2	76.8	3.83	1.87	2.47	0.41
7	Female	8.4Yr.	175.2	52.3	106.3	122.9	83.1	3.35	1.59	2.03	0.49
8	male	9.0Yr.	171.0	45.8	108.8	125.2	82.0	3.73	1.79	2.38	0.48
9	female	9.0Yr.	209.0	76.3	102.6	124.6	110.2	2.74	1.44	1.34	0.74
Average		7.5Yr.	162.9	46.1	101.1	116.8	77.7	3.56	2.17	2.23	0.46
Average		7.3Yr.	172.8	56.7	97.3	94.0	87.2	2.84	1.58	2.04	0.60

Table – 4 – A. Lipid profile of middle – age (30 – 45) male and females.

Subject No.	Gender	Age	TC	HDL-C	LDL-C	Non HDL-C	TGs	TC/HDL-C	TGs/HDL-C	LDL-C/HDL-C	HDL-C/LDL-C
1	*male*	*31.0Yr.*	*196.0*	*42.0*	*138.0*	*154.0*	*82.0*	*4.67*	*1.95*	*3.29*	*0.30*
2	*male*	*31.0Yr.*	*181.0*	*34.0*	*136.0*	*147.0*	*74.3*	*5.32*	*2.19*	*4.00*	*0.25*
3	*female*	*32.0Yr.*	*123.0*	*38.0*	*50.0*	*85.0*	*84.0*	*3.24*	*2.21*	*1.32*	*0.76*
4	*female*	*35.0Yr.*	*162.0*	*23.0*	*84.0*	*139.0*	*82.0*	*7.04*	*3.57*	*3.65*	*0.27*
5	*male*	*35.0Yr.*	*150.0*	*57.0*	*92.0*	*93.0*	*82.0*	*2.63*	*1.44*	*1.61*	*0.62*
6	*male*	*37.0Yr,*	*135.0*	*46.0*	*81.0*	*89.0*	*110.0*	*2.93*	*2.39*	*1.76*	*0.57*
7	*female*	*38.0Yr.*	*204.0*	*57.0*	*146.0*	*147.0*	*78.0*	*3.58*	*1.37*	*2.56*	*0.39*
8	*female*	*39.0YR.*	*212.0*	*42.0*	*169.0*	*170.0*	*262.0*	*5.05*	*6.24*	*4.02*	*0.25*
9	*male*	*40.0Yr.*	*220.0*	*50.0*	*142.0*	*166.0*	*92.0*	*4.40*	*1.84*	*2.84*	*0.35*
10	*female*	*40.0Yr.*	*216.0*	*27.0*	*162.0*	*189.0*	*100.0*	*8.00*	*3.70*	*6.00*	*0.17*
11	*male*	*40.0Yr.*	*223.0*	*46.0*	*177.0*	*177.0*	*42.0*	*4.85*	*0.91*	*3.85*	*0.26*
12	*male*	*40.0Yr.*	*185.0*	*38.0*	*131.0*	*147.0*	*46.0*	*4.87*	*1.21*	*3.45*	*0.29*
13	*female*	*41.0Yr.*	*220.0*	*30.0*	*150.0*	*190.0*	*96.0*	*7.33*	*3.20*	*5.00*	*0.20*
14	*male*	*41.0Yr.*	*162.0*	*30.0*	*111.0*	*132.0*	*73.0*	*5.40*	*2.43*	*3.70*	*0.27*
15	*male*	*42.0Yr.*	*162.0*	*27.0*	*115.0*	*135.0*	*127.0*	*6.00*	*4.70*	*4.26*	*0.24*
16	*male*	*43.0Yr.*	*162.0*	*34.0*	*102.0*	*128.0*	*81.0*	*4.77*	*2.28*	*3.00*	*0.33*
17	*female*	*44.0Yr.*	*169.0*	*30.0*	*100.0*	*139.0*	*138.0*	*5.63*	*4.60*	*3.33*	*0.30*
18	*male*	*45.0Yr.*	*227.0*	*34.0*	*158.0*	*193.0*	*88.0*	*6.68*	*2.59*	*4.65*	*0.22*
Average		*36.64*	*182.09*	*39.82*	*124.82*	*141.91*	*81.21*	*4.81*	*2.55*	*3.22*	*0.34*
Average		*38.43*	*186.57*	*35.29*	*123.00*	*151.29*	*119.71*	*5.85*	*3.33*	*3.69*	*0.32*

Table 5 – A. Lipid profile of elderly males and female age (45 – 60 years).

Subject No.	Gender	Age	TC	HDL-C	LDL-C	Non HDL-C	TGs	TC/HDL-C	TGs/HDL-C	LDL-C/HDL-C	HDL-C/LDL-C
1	*male*	*47.0Yr.*	*231.0*	*30.0*	*162.0*	*201.0*	*115.0*	*7.70*	*3.83*	*5.40*	*0.19*
2	*male*	*49.0Yr,*	*258.0*	*50.0*	*173.0*	*208.0*	*119.0*	*5.16*	*2,38*	*5.16*	*0.29*
3	*female*	*50.0Yr.*	*231.0*	*30.0*	*177.0*	*201.0*	*77.0*	*7.70*	*2.57*	*5.90*	*0.17*
4	*female*	*50.0Yr.*	*138.0*	*23.0*	*81.0*	*115.0*	*96.0*	*6.00*	*4.17*	*6.32*	*0.28*
5	*male*	*50.0Yr.*	*193.0*	*50.0*	*135.0*	*143.0*	*34.0*	*3.86*	*0.68*	*2.70*	*0.37*
6	*female*	*52.0Yr.*	*289.0*	*42.0*	*216.0*	*247.0*	*104,0*	*6.88*	*2.48*	*5.14*	*0.19*
7	*male*	*57.0Yr.*	*181.0*	*27.0*	*138.0*	*154.0*	*27.0*	*6.70*	*1.00*	*5.11*	*0.20*
8	*male*	*57.0Yr.*	*131.0*	*27.0*	*73.0*	*104.0*	*131.0*	*4.85*	*4.85*	*2.70*	*0.37*
9	*female*	*57.0Yr.*	*154.0*	*27.0*	*119.0*	*127.0*	*92.0*	*5.70*	*3.41*	*4.41*	*0.23*
10	*female*	*58.0Yr.*	*173.0*	*42.0*	*127.0*	*131.0*	*30.0*	*4.12*	*0.71*	*3.02*	*0.33*
11	*female*	*60.0Yr.*	*177.0*	*42.0*	*131.0*	*135.0*	*27.0*	*4.21*	*0.64*	*3.12*	*0.13*
12	*male*	*60.0Yr.*	*247.0*	*42.0*	*181.0*	*205.0*	*84.0*	*5.88*	*2.00*	*4.31*	*0.23*
13	*female*	*60.0Yr.*	*258.0*	*5.0*	*185.0*	*208.0*	*73.0*	*5.16*	*1.46*	*3.70*	*0.27*
Average		*53.3*	*206.8*	*37.7*	*143.7*	*152.5*	*85.0*	*4.88*	*2.32*	*4.23*	*0.28*
Average		*55.3*	*202.9*	*36.6*	*148.0*	*166.3*	*71.3*	*5.42*	*2.21*	*4.52*	*0.23*

Table – 6. Percentage of Cardiovascular risk assessment for different age groups.

Age Group	*VLCVD risk*	*LCVD risk*	*Average CVD risk*	*Moderate CVD risk*
6 to 18 Month	*0*	*100*	*0*	*0*
2 to 5 years	*66.7*	*15.0*	*8.3*	*0*
5 to 10 years	*0*	*100*	*0*	*0*
30 to 45 years	*11.1*	*11.1*	*27.8*	*50.0*
45 to 60 years	*0*	*7.7*	*30.8*	*61.2*

Table – 7 (.Interpretation of results presented in Tables 1 – 6)

Subject No *Gender:* ***Female*** *Age – m/y* *Cardiovascular Risk Assessment*

1. *6 m*

TC/HDL- C ratio : 2.94 *Low risk for CVD*
LDL- C/HDL - C ratio : 1.65 *Average risk for CVD*
TGs/HDL- C ratio : 1.45 *Low risk for CVD*
TC-HDL-C = 159.7 - 54.4 = 105.30 *Healthy level(less than 120mg/dL).*

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2 . *6 m*

TC/HDL-C ratio: 3.60 *Low risk for CVD*
LDL-C/HDL-C : 2.23 *Average risk for CVD*
TGs/HDL-C ratio: 1.80 *Low risk for CVD*
TC-HDL-C = 164.9 -45.8 = 119.1 *Borderline (near healthy leve)*

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3 . *13 m*

TC / HDL- C ratio : 3.35 *Low risk for CVD*
LDL-C/ HDL-C ratio: 2.23 *Average risk for CVD*
TGs/ HDL-C ratio: 1.62 *Low risk for CVD*
TC- HDL-C=145.6-43.5=102.1 *healthy level*

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4 . ***Gender: male*** *15 m*

TC / HDL- C ratio : 3.55 *Low risk for CVD*
LDL-C/HDL- C ratio : 2.19 *Average risk for CVD*
TGs/ HDL-C ratio : 1.78 *Low risk for CVD*
TC-HDL- C = 150-42.5=107.5 *Healthy level*

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5. *Gender : male* *17m* *Cardiovascular risk assessment*

TC/HDL-C ratio: 3.68 Low risk for CVD
LDL-C/HDL-C ratio : 2.31 *Average risk for CVD*
TGs/HDL-C ratio:1.84 *Low risk for CVD*
TC-HDL-C=164.2 - 44.6=119.6 *Near borderline*

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6. *Gender : male* *17m*

TC/HDL-C ratio : 3.66 *Low risk for CVD*
LDL-C/HDL-C ratio : 2.28 *Average risk for CVD*
TGs/HDL-C ratio : 1.90 *Low risk for CVD*
TC-HDL-C = 150.1 – 41.0 =109.1 *Healthy level*

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7. *Gender: male* *18 m*

TC/HDL-C ratio: 3. 26 *Low risk for CVD*
LDL-C /HDL-C ratio: 1.94 *Average risk for CVD*
TGs/HDL-C ratio : 1.65 *Low risk for CVD*

Table 2-B. Interpretation of lipid profile of children age 2 to 5 years results presented in Table 2 –A

Subject No.	Gender: male	Age/ month/ year	Cardiovascular Risk assessment
1.		24 m	
TC/HDL-C ratio: 3.52			Low risk for CVD
LDL-C/HDL-C ratio: 2.17			Average risk for CVD
TGs/HDL-C ratio: 1.76			Low risk for CVD
TC – HDL – C = 159 – 45.4 = 114.4			Low risk for CVD
2.	Gender: male	36m	
TC/HDL-C ratio: 3.16			Very low risk for CVD
LDL-C/ HDL-C ratio: 2.04			Average risk for CVD
TGs/HDL-C ratio: 1.51			Low risk for CVD
Non– HDL – C = 172.0 -54.4 = 117.6			Healthy level
3.	Gender: female	36m	
TC/HDL-C ratio : 3.55			Low risk for CVD
LDL-C/LDL-C ratio : 2.19			Average risk for CVD
TGs/HDL-C ratio : 1.79			Low risk for CVD
TC- HDL – C = 167.1 - 47.1 = 120			healthy borderline level
4.	Gender: male	42m	
TC/HDL-C ratio: 3.06			very Low risk for CVD
LDL-C/HDL-C ratio: 1.75			Average risk for CVD
TGs / HDL-C ratio: 1.54			Low risk for CVD
TC –HDL - C = 160.6 – 52.5 =108.1			Healthy level
5.	Gender: male	42m	
TC / HDL – C ratio: 3.10			Low risk for CVD
LDL-C / HDL-C ratio: 1.80			Average risk for CVD
TGs / HDL-C ratio: 1.52			Low risk for CVD
TC-HDL-C = 155.2 – 50.1 = 105.1			Healthy level
6.	Gender: male	42m	
TC / HDL – C ratio : 3.17			Average risk for CVD
LDL – C / HDL-C ratio : 1.86			Average risk for CVD
TGs:/ HDL-C ratio : 1.56			Low risk for CVD
TC – HDL – C = 153.0 – 48.5 =105.3			Healthy level
7.	Gender: female	48m	
TC / HDL – C ratio: 3.63			Low risk for CVD
LDL – C / HDL – C ratio: 2.27			Average risk for CVD
TGs / HDL – C ratio: 1.79			Risk for CVD
TC – HDL – C = 158.8 – 43.8 = 115.0			Healthy level
8.	Gender: male	48 m	
TC / HDL-C ratio: 3.62			Low risk for CVD
LDL – C / HDL – C ratio : 2.25			Average risk for CVD
TGs / HDL – C ratio: 1.85			Low risk for CVD
TC – HDL – C = 160.3 – 44.3 = 116.0			Healthy level

9.	Gender: female	53m
TC / HDL – C ratio: 2.25		Low risk for CVD
LDL C / HDL- C ratio: 1.33		Average risk for CVD
TGs / HDL – C ratio : 1.10		Low risk for CVD
TC – HDL - C = 149.0 – 66.2 = 82.8		Healthy level (ideal)
10.	Gender: male	53m
TC / HDL-C ratio: 3.83		Low risk for CVD
LDL –C / HDL – C ratio: 2.46		Average risk for CVD
TGs / HDL – C ratio :1.90		Low risk for CVD
TC – HDL – C = 157.2 – 41.0 =116.2		Healthy level
11.	Gender: male	55m
TC / HDL – C ratio: 3.83		Low risk for CVD
LDL – C / HDL –C ratio: 2.42		Average risk for CVD
TGs / HDL – C ratio: 1.01		Low risk for CVD
TC HDL – C = 170.5 – 70.6 = 99.9		Healthy level
12.	Gender: male	60 m
TC / HDL – C ratio: 3.27		Low risk for CVD
HDL –C / HDL – C ratio: 1.95		Average risk for CVD
TGs / HDL – C = ratio: 1.53		Low risk for CVD
TC – HDL – C = 154.2 – 47.2 = 107.0		Healthy level

Table- 3 – B .Interpretation of results presented in Table 3 – A.

Subject No.	Gender: female	Age	Cardiovascular Risk Assessment
1.		65m	
TC / HDL – C ratio: 3.46			Low risk for CVD
LDL – C / HDL – C ratio: 2.11			Average risk for CVD
TGs / HDL – C ratio: 1.74			Low risk for CVD
TC – HDL – C = 163.I -47.1 = 116.0			Healthy level
2.	Gender: male	66 m	
TC / HDL – C ratio: 3.13			Low risk for CVD
LDL – C / HDL – C ratio: 1.84			Average risk for CVD
TGs / HDL – C ratio: 1.45			Low risk for CVD
TC –HDL – C = 160.4 – 51.3 = 109.1			Healthy level
3.	Gender : female	72m	
C / HDL – C ratio: 2.87			Low risk for CVD
LDL – C / HDL – C ratio: 1.58			Average risk for CVD
TGs / HDL – C ratio: 1.44			Low risk for CVD
TC – HDL –C =167 – 58.2 = 108.8			Healthy level
4.	Gender: female	84m	
TC / HDL – C ratio: 2.14			Low risk for CVD
LDK – C / HDL – C ratio: 1.17			Average risk for CVD
TGs / HDL – C ratio: 1.24			Low risk for CVD
TC – HDL – C = 160.1 – 66.3 = 93.8			Healthy level
5.	Gender: female	96m	
TC / HDL- C ratio: 4.05			Low risk for CVD
LDL – C / HDL – C ratio : 2.64			Average risk for CVD

TGs / HDL – C ratio: 2.05	Low risk for CVD
TC – HDL – C = 162.0 - 40.0 = 122	healthy borderline

……

6.	Gender: male	99m
TC / HDL – C ratio: 3.83		Low risk for CVD
LDL C / HDL – C ratio: 2.46		Average risk for CVD
TGs / HDL – C ratio: 1.87		Low risk for CVD
TC – HDL – C = 157 – 41 = 116		Healthy level

……

7.	Gender: female	100 m
TC / HDL – C ratio: 3.35		Low risk for CVD
LDL – C / HDL – C ratio: 2.03		Average risk for CVD
TGs / HDL – C ratio: 1.59		Low risk for CVD
TC – HDL – C = 175.2 – 52.3 = 129.		Unhealthy-borderline

……

8.	Gender: male	108m
C / HDL – C ratio: 3.73		Low risk for CVD
LDL – C / HDL – C ratio : 2.38		Average risk for CVD
TGs / HDL – C ratio : 1.79		Low risk for CVD
TC – HDL – C = 171.0 – 45.8 =125.2		Healthy level

……

9	108 m
TC / HDL – C ratio : 2.63	Low risk for CVD
LDL – C / HDL – C ratio : 1.34	Average risk for CVD
TGs / HDL – C ratio : 1.35	Low risk for CVD
TC – HDL – C = 200.9 – 76.3 = 124.6	Healthy level

……

Table - 4 – B. Interpretation of results for adults, age 30 – 45 years, presented in Table 4 - A

Subject No .	Age	Cardiovascular Risk Assessment
1.	Gender: male	31 Yr.
TC / HDL – C ratio: 4.67		Average risk
LDL – C / HDL – C ratio: 3.29		Average risk for CVD
TGs / HDL – C ratio: 1.10		Low risk for CVD
TC – HDL – C = 196.0 – 42.0 = 154.0		Unhealthy level

……

2.	Gender: male	31 Yr.
TC / HDL – C ratio : 5.32		Moderate risk for CVD
LDL – C / HDL – C ratio : 4.00		Moderate risk for CVD
TGs / HDL – C ratio : 1.35		Low risk for CVD
TC – HDL – C = 181.0 -34.0 = 147 mg / dL		Unhealthy level

……

3.	Gender: female	32Yr.
TC / HDL – C ratio : 3.34		Low risk for CVD
LDL –C / HDL – C ratio : 1.32		Low risk for CVD
TGs / HDL – C ratio : 3.03		Average risk for CVD
TC – HDL – C = 123.0 -38.0 = 85		Healthy level

……

4.	Gender: female	35Yr.'
TC / HDL – C ratio: 7.04		Moderate risk for CVD
LDL – C / HDL – C ratio: 3.65		Moderate risk for CVD
TGs / HDL – C ratio: 6.50		High risk for CVD

TC – HDL – C = 162.0 – 23.0 = 139 .O healthy borderline

……

5. Gender: male 35 Yr.
TC / THDL- C ratio: 2.63 Very low risk for CVD
LDL – C / HDL- C ratio : 1.61 Average risk for CVD
TGs / HDL- C ratio: 1.61 Low risk for CVD
TC – HDL – C = 150.0 – 57.0 = 93.0 Healthy level

……

6. Gender: male 37 Yr.
TC / HDL- C ratio : 2.93 Very low risk for CVD
LDL – C / HDL – C ratio : 1.76 Low risk for CVD
TGs / HDL – C ratio : 0.83 Low risk for CVD
TC - HDL – C : 89 Healthy level

……

7. Gender: male 38Yr
TC / HDL – C ratio: 5.05 Average risk for CVD
LDL – C / HDL – L ratio: 4.02 Average risk for CVD
TGs / HDL – C ratio: 6.24 Average risk for CVD
TC – HDL – C = 204 – 57 = 147 Unhealthy level

……

8. Gender: male 39 Yr.
TC – HDL – C ratio : 4.40 Moderate risk for CVD
LDL – C / HDL – C ratio : 2.84 Moderate risk for CVD
TGs / HDL- C ratio : 1.84 Low risk for CVD
TC - HDL – C = 212 – 42 = 170 Highly unhealthy

……

9. Gender: female 40 Yr.
TC / HDL – C ratio : 8.00 High risk for CVD
LDL – C / HDL – C ratio: 6.00 High risk for CVD
TGs / HDL – C ratio: 2.70 Moderate risk for CVD
TC – HDL = 216.0 – 27.0 = 189 highly unhealthy level

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10. Gender: male 40 Yr.

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TC / HDL –C ratio: 4.85 Moderate risk for CVD
LDL – C / HDL – C ratio: 3.85 Moderate risk for CVD
TGs / HDL – C ratio: 0.91 Low risk for CVD
TC - HDL – C = 223 – 46 = 177 mg / dL Highly unhealthy level

……

11. Gender: male 40 Years
TC / HDL – C ratio: 4.87 Moderate risk for CVD
LDL - C / HDL – C ratio: 3.45 Moderate risk for CVD
TGs / HDL – C ratio: 1.21 Low risk for CVD
TC – HDL – C = 223 – 46 = 177 mg / dL Very high unhealthy level

……

12. Gender: female 40 Yr.
TC / HDL – C ratio : 7.33 High risk for CVD
LDL – C / HDL – C ratio: 5.00
TGs / HD L – C ratio : 3.20
TC – HDL –C = 220 – 30 = 190 Very high unhealthy level

……

13 Gender: male 41 Yr.
TC / HDL –C ratio : 5.40 High risk for CVD
LDL – C / HDL – C ratio: 3.70
TGs / HDL-C ratio: 2.43
TC – HDL – C = 220 – 30 = 190 mg / d L Highly unhealthy level
……

14. Gender: male 41 Yr.
TC / HDL - C ratio : 6.00 High risk for CVD
LDL – C / HDL – C ratio : 0.71
TGs / HDL – L ratio : 4.70
TC – HDL – C = 162 - 30 = 132 mg / dL Healthy level - borderline
……

15. Gender: male 42Yr.
TC / HDL – C ratio: 4.76 Moderate risk for CVD
LDL – C / HDL – C ratio: 3.00
TGs / HDL – C ratio: 2.38
TC –HDL C = 162 – 27 = 135 mg / dL Healthy level - borderline
……

16 Gender: female 43
……
TC / HDL ratio: 5.63 High risk for CVD
LDL – C / HDL- C ratio : 3.33
TGs / HDL – C ratio: 4.6
TC – HDL – C = 162 – 34 = 128 mg / dL 139 mg / dL Healthy borderline
borderline……

17 Gender: male 45Yr.
TC / HDL – C ratio : 6.68 High risk for CVD
LDL - C / HDL – C ratio : 4.64
TGs / HDL – C ratio : 2.59
TC –HDL –C = 169 – 30 = 139 mg / Dl

18. Gender: male 45Yr.
TC / HDL C
LDL / HDL C
TGs / HDL- C
TC – HDL – C : 227 - 34 = 193mg / Dl Highly unhealthy level
……

Table – 5 - B. Risk Assessment of results presented in Table – 5 A.

Subject.	Gender	Age / Yr.	Risk assessment of CVD
No.	Gender:		
1	Male	47 Years	
TC / TDL - C ratio : 7.70			Moderate risk for CVD
LDL – C / HDL –C ratio : 5.50			Moderate risk for CVD
TGs / HDL- C ratio : 3.83			Average risk for CVD
TC – HDL-C = 231,0 – 30 = 201.0			Highly unhealthy
2	2		M
49 Years			
TC / HDL- C ratio : 4.76			Average risk for CVD
LDL – C / HDL-C ratio : 3.46			Average risk for CVD

TGs / HDL ratio : 2.38			Average risk for CVD
TC – HDL – C = 258 .0 – 50.0 =208			Highly unhealthy
3	F	50 Years	
TC / HDL –C ratio : 7.70			Moderate risk for CVD
LDL – C / HDL- .ratio : 5.90			Moderate risk for CVD
TGs / HDL- C ratio : 2.57			Average risk for CVD
TC – HDL – C = 231.0 - 30 = 201			Highly unhealthy
4	F	50 Years	
TC / HDL –C ratio : 6.0			Moderate risk for CVD
LDL – C / HDL ratio : 3.52			Moderate risk for CVD
TGs / HDL –C ratio : 4.17			High risk for CVD
TC – HDL – C = 138.0 - 23.0 = 115			Healthy level
5	M	50 Years	
TC / HDL- C ratio : 3.86			Low risk for CVD
LDL -C/ HDL- C ratio :RAGE2.70			Average risk for CVD
TGs / HDL- C ratio : 0.68			Low risk for CVD
TC – HDL - C = 193.0 – 50.0 = 143			Unhealthy level
6	F	52 Yrs.	
TC / HDL - C ratio : 6.88			Moderate risk for CVD
LDL – C / HDL – C ratio : 5.14			Moderate risk for CVD
TGs / HDL –C ratio : 2.48			Average risk for CVD
TC – HDL – C = 289 - 42 = 247			Highly unhealthy level
7	M	57 Yrs.	
TC / HDL –C ratio : 6.70			Moderate risk for CVD
LDL – C / HDL – C ratio : 5.11			Moderate risk for CVD
TGs / HDL – C ratio : 1.00			Low risk foe CVD
TC – HDL – C = 181 – 27 = 154			highly unhealthy level
8	M	57Yrs	
TC HDL – C ratio : 4.85			Average risk for CVD
LDL – C / HDL – C ratio : 2.70			Average risk for CVD
TGs / HDL –C ratio : 4.85			High risk for CVD
TC – HDL – C = 131 – 27 = 104			Healthy level
9	F	57 Yrs.	
TC / HDL – C ratio : 5.70			Moderate risk for CVD
LDL – C / HDL – C ratio : 4.41			Moderate risk for CVD
TGs / HDL – C ratio : 3.41			Average risk for CVD
TC – HDL- C = 154 – 27= borderline			Healthy level –

10		F	58
TC / HDL-C ratio : 4.12			Average risk for CVD
LDL – C / HDL – C ratio : 3.02			Average risk for CVD
TGs / HDL-C ratio : 0.71			Low risk for CVD
TC –HDL – C =173 – 42 = 131			Healthy level-borderline
11		F	60
TC / HDL – C ratio: 4.21			Average risk for CVD
LDL – C / HDL – C ratio :3.12			Average risk for CVD
TGs / HDL – C ratio : 0.64			Low risk for CVD
TC – HDL- C = 177 -42 = 135			Unhealthy level
12	M		61 .
TC / HDL – C ratio: 5.88			Moderate risk for CVD
LDL- C / HDL- C ratio = 4.31			Moderate risk for CVD
TGs / HDL- C ratio = 2.00			Low risk for CVD
TC – HDL-C = 247 – 42 = 135			Unhealthy level
13	Gender: female		60 Years
TC / HDL-C ratio: 5.16			Moderate risk [111 for CVDL- C
LDL-C / HDL – C ratio : 3.70			Moderate risk for CVD
TGs / HDL – C ratio: 1.46			Low risk for CVD
TC – HDL – C = 258 – 50 = 208			Unhealthy level-high

Table – 6. Percentage of Cardiovascular risk assessment for different age groups.

Age Group	*VLCVD risk*	*LCVD risk*	*Average CVD risk*	*Moderate CVD risk*
6 to 18 Month	0	100	0	0
2 to 5 years	66.7	15.0	8.3	0
5 to 10 years	0	100	0	0
30 to 45 years	11.1	11.1	27.8	50.0
45 to 60 years	0	7.7	30.8	61.2

CONCLUSION

Based on results of this study, it may be concluded that in children age less than 2 years, lipid profile testing cannot be considered as a predictor of CVD later in life unless potential risks factors for CVD are discovered or serious illness is manifested. For Children age 2- 5 and 5 - 10 years, a full lipid profile can be an important part of the child's health information later in life., and also have some benefits for those children currently affected by unhealthy sedimentary life style. The results of this study have also shown that for children age 6 month to 10 years in both gender all parameters which are usually of concern as cardiovascular risk were well beyond their reference levels. In middle – age and elderly, the variation in the levels of these parameters in both males and females were quite clear, and manifest strongly with progress in age,. Thus in elderly (males and females) these, parameters were higher compared to middle aged.

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