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**Relation of** **Lipid panel and Blood pressure**

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**Abstract**

Arterial hypertension and dyslipidemia are two of the most prevalent cardiovascular risk factors in the general population and their relationship has become a central focus for cardiovascular disease prevention. The objectives of this study were to evaluate the differences of lipid profile, blood pressure (BP) profile and the influence of risk factors in a group of patients with essential arterial hypertension. 60 patients with essential hypertension have been evaluated. We analyzed: the cardiovascular risk factor profile, with specific accent on the lipid parameters.

**Introduction**

Hypertension is not only an important worldwide public health challenge, but also a major contributor to the global burden of disease and death. The global prevalence of hypertension is on the rise, 26.4% in 2000 and is expected to reach 29.2% by 2025 (1). The prevalence is reported to be as high as 44.7% among adults aged 35–75 years. Hypertension is a multifactorial disease, with various influencing factors interacting with each other. Therefore, identification of risk factors for hypertension and effective early prevention are essential to lower the public health burden. It is well-known that hypertension and dyslipidemia are the two major risk factors accounting for cardiovascular disease (4). Clinically, hypertension and dyslipidemia often coexist, which may be associated with the fact that they share the same pathophysiological mechanisms, such as endothelial dysfunction (5) and obesity (6). Furthermore, it has been shown that there is a synergistic effect between hypertension and dyslipidemia, indicating that the risk of death and cardiovascular events is significantly higher in patients with both disorders than the combined risk of hypertension and dyslipidemia alone (7). Hence, the association between dyslipidemia and hypertension, further studies are required. Previously, it is shown that dyslipidemia is closely related to the development of hypertension, but most of them have focused on Europe and the Americas (8–12), with relatively few and still inconsistent findings in Asia (13, 14). Therefore, to further accumulate evidence in Asian populations.

**Background:**

A **lipid profile** or **lipid panel** is a panel of blood tests used to find abnormalities in lipids, such as cholesterol and triglycerides. The results of this test can identify certain genetic diseases and can determine approximate risks for cardiovascular disease, certain forms of pancreatitis, and other diseases.

Lipid panels are usually ordered as part of a physical exam, along with other panels such as the complete blood count (CBC) and basic metabolic panel (BMP)

**What are the five tests in a lipid panel?**

A lipid panel measures five different types of lipids from a blood sample, including:

* **Total cholesterol**: This is your overall cholesterol level — the combination of LDL-C, VLDL-C and HDL-C.
* **Low-density lipoprotein (LDL) cholesterol**: This is the type of cholesterol that’s known as “bad cholesterol.” It can collect in your blood vessels and increase your risk of cardiovascular disease.
* **Very low-density lipoprotein (VLDL) cholesterol:** This is a type of cholesterol that’s usually present in very low amounts when the blood sample is a fasting samples since it’s mostly comes from food you’ve recently eaten. An increase in this type of cholesterol in a fasting sample may be a sign of abnormal lipid metabolism.
* **High-density lipoprotein (HDL) cholesterol**: This is the type of cholesterol that’s known as “good cholesterol.” It helps decrease the buildup of LDL in your blood vessels.
* **Triglycerides**: This is a type of fat from the food we eat. Excess amounts of triglycerides in your blood are associated with cardiovascular disease and pancreatic inflammation.

### What is a lipid panel used for?

Healthcare providers use lipid panels to help assess someone’s cardiovascular health by analyzing cholesterol in their blood and to help diagnose other health conditions.

Reasons a provider may order a lipid panel include:

* As a routine test to determine if your cholesterol level is normal or falls into a borderline-, intermediate- or high-risk category.
* To monitor your cholesterol level if you had abnormal results on a previous test or if you have other risk factors for heart disease.
* To monitor your body’s response to treatment, such as cholesterol medications or lifestyle changes.
* To help diagnose other medical conditions, such as liver disease.

### When the lipid panel blood test are done?

There are several reasons why you may need a lipid panel blood test. Healthcare providers use lipid panels often for screen and monitoring purposes.

If you have one or more risk factors for cardiovascular disease, your provider may suggest frequent screening through the use of a lipid panel to try to catch elevated cholesterol levels before you have symptoms. Risk factors for cardiovascular disease include:

* Being over age 45 if you’re a man or you were assigned male at birth and over 50 if you’re a women or you were assigned female at birth.
* Having a high cholesterol result on a previous test.
* Smoking cigarettes.
* Having obesity.
* Not getting enough physical activity.
* Having high blood pressure (hypertension).
* Having diabetes or prediabetes.
* Having a first-degree relative, such as a parent or sibling, who developed heart disease at an early age (under 55 in males and under 65 in females).

Children can also have high cholesterol, so your child may need a lipid panel blood test. Cholesterol levels in children are linked to three factors: heredity, diet and obesity. In most cases, kids with high cholesterol have a parent who also has elevated cholesterol.

While providers mostly use lipid panels for screening or monitoring cholesterol levels, providers sometimes use them as part of the diagnostic process for certain health conditions that can affect your lipid levels, including:

* Pancreatitis.
* Chronic kidney disease.
* Hypothyroidism.

If you’re experiencing symptoms of any of these conditions, your provider may have you undergo a lipid panel blood test.

### Requirement of lipid panel test:

In most cases, you need to fast for 10 to12 hours before your lipid panel blood test. Fasting means not eating or drinking anything except water. In some cases, getting a lipid panel test without fasting is possible.

In any case, it’s important to ask your healthcare provider in advance about whether you need to fast before the test. Always follow the instructions that your provider gives you. If your provider has instructed you to fast and you accidentally break the fast (eat), please let your provider know because the test is not as useful without fasting.

**Normal Range lipid panel results:**

The optimal level (measured in milligrams per deciliter of blood — mg/dL) for each of the four standard tests in a lipid panel are as follows:

* **Total cholesterol**: Below 200 mg/dL.
* **High-density lipoprotein (HDL) cholesterol**: Above 60 mg/dL.
* **Low-density lipoprotein (LDL) cholesterol**: Below 100 mg/dL (For people who have diabetes: Below 70 mg/dL).
* **Triglycerides**: Below 150 mg/dL.

If your results are higher or lower than the target range, they may be classified as borderline-, intermediate-, or high-risk for cardiovascular issues. In general, higher-than-normal levels of total cholesterol, LDL and triglycerides and lower-than-normal levels of HDL can increase your risk of cardiovascular disease.

It’s rare to have abnormally low levels of cholesterol. If you do, it’s usually due to a health condition that’s causing malnutrition.

**Abnormal lipid panel results:**

If your lipid results reveal that you have high levels of total cholesterol, LDL and/or triglycerides and/or low levels of HDL, it doesn’t necessarily mean that you have a medical condition or need treatment.

A healthy cholesterol range for you may depend on many factors. Your healthcare provider will take into consideration the following factors when interpreting your lipid panel results:

* Your age.
* Your overall health.
* Your medical history.
* Your current medications.
* Other risk factors you may have for cardiovascular disease.

Many providers use a special risk calculator using these factors to determine if you need further tests or treatment. If you have questions about your results, don’t be afraid to talk to your provider.

**Relation between Hypertension and Lipid profile:**

Hypertension is the leading direct cause of death in the world and one of the most important risk factors for cardiovascular disease (CVD). Elevated blood pressure (BP) often coexists with lipid disorders and is an additional factor that increases CV risk. Nowadays, we are able to distinguish low density lipoproteins (LDL) and high density lipoproteins (HDL) subfractions. Except LDL also HDL small subfractions can increase the risk of CV events. Therefore, we aimed to investigate the associations between changes of lipoprotein subfractions and the risk of hypertension development.

**Material and Methods**

The current prospective study included patients previously diagnosed with arterial hypertension according to the doctor report. Patients were referred from Rizgary Hospital. Exclusion criteria were acute onset of CVD, other acute medical problems or secondary hypertension. This study was carried out in accordance with hospital laboratory.

**Results:**

The Table (1) show the lipid panel test result for 60 patients diagnosed with hypertension, 29 female and 31 males are included in this study.

Table (1)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| No. | Age | Total | (TGs) | (HDL)  | (LDL)  | sex |
| 1 | 47 | 277 | 77 | 61 | 132 | female |
| 2 | 58 | 299 | 79 | 45 | 160 | female |
| 3 | 60 | 213 | 204 | 72 | 155 | female |
| 4 | 45 | 214 | 130 | 84 | 144 | female |
| 5 | 40 | 183 | 104 | 54 | 109 | Male  |
| 6 | 53 | 145 | 123 | 84 | 129 | female |
| 7 | 36 | 210 | 145 | 68 | 135 | female |
| 8 | 48 | 139 | 196 | 82 | 128 | male |
| 9 | 62 | 164 | 171 | 55 | 134 | male |
| 10 | 57 | 120 | 150 | 51 | 68 | female |
| 11 | 52 | 208 | 494 | 47 | 98 | female |
| 12 | 33 | 210 | 103 | 84 | 153 | male |
| 13 | 47 | 212 | 170 | 86 | 124 | male |
| 14 | 57 | 214 | 189 | 48 | 128 | female |
| 15 | 51 | 195 | 271 | 86 | 145 | female |
| 16 | 27 | 155 | 168 | 90 | 128 | male |
| 17 | 59 | 220 | 160 | 70 | 132 | male |
| 18 | 38 | 220 | 11 | 78 | 152 | female |
| 19 | 36 | 255 | 130 | 87 | 115 | male |
| 20 | 65 | 187 | 150 | 86 | 155 | male |
| 21 | 39 | 237 | 89 | 83 | 170 | female |
| 22 | 31 | 217 | 347 | 19 | 128 | male |
| 23 | 38 | 186 | 426 | 33 | 68 | male |
| 24 | 42 | 143 | 77 | 60 | 68 | female |
| 25 | 51 | 229 | 193 | 41 | 149 | male |
| 26 | 53 | 150 | 191 | 37 | 75 | female |
| 27 | 36 | 163 | 221 | 44 | 74 | male |
| 28 | 44 | 259 | 138 | 47 | 184 | male |
| 29 | 62 | 279 | 193 | 86 | 98 | male |
| 30 | 26 | 154 | 184 | 55 | 63 | female |
| 31 | 85 | 181 | 172 | 41 | 105 | female |
| 32 | 45 | 191 | 177 | 50 | 112 | male |
| 33 | 48 | 163 | 113 | 76 | 64 | male |
| 34 | 44 | 216 | 151 | 46 | 139 | female |
| 35 | 20 | 140 | 176 | 42 | 57 | female |
| 36 | 35 | 182 | 343 | 26 | 68 | male |
| 37 | 41 | 240 | 364 | 25 | 72 | female |
| 38 | 37 | 205 | 160 | 40 | 87 | female |
| 39 | 42 | 190 | 120 | 54 | 100 | female |
| 40 | 49 | 249 | 350 | 20 | 130 | male |
| 41 | 39 | 190 | 180 | 25 | 150 | male |
| 42 | 43 | 250 | 280 | 38 | 98 | female |
| 43 | 51 | 360 | 200 | 30 | 190 | female |
| 44 | 80 | 250 | 180 | 45 | 140 | female |
| 45 | 70 | 280 | 230 | 40 | 142 | male |
| 46 | 63 | 210 | 140 | 60 | 120 | female |
| 47 | 45 | 240 | 216 | 129 | 45 | male |
| 48 | 49 | 300 | 145 | 120 | 60 | female |
| 49 | 53 | 180 | 200 | 240 | 40 | female |
| 50 | 29 | 260 | 210 | 160 | 95 | male |
| 51 | 32 | 190 | 184 | 120 | 40 | male |
| 52 | 38 | 197 | 133 | 51 | 119 | male |
| 53 | 57 | 215 | 311 | 163 | 98 | male |
| 54 | 32 | 180 | 76 | 109 | 57 | female |
| 55 | 23 | 187 | 340 | 35 | 183 | female |
| 56 | 64 | 77 | 301 | 94 | 38 | male |
| 57 | 51 | 160 | 88 | 45 | 104 | male |
| 58 | 38 | 216 | 178 | 45 | 142 | male |
| 59 | 24 | 264 | 192 | 63 | 138 | male |
| 60 | 28 | 243 | 168 | 78 | 102 | male |

**Discussion:**

This study provides evidence that baseline levels of lipids, particularly total cholesterol and HDL, are associated with increased levels of arterial hypertension, expressed by higher values of BP or the grade of arterial hypertension. Though there is a lot of research over this topic, the precise biological mechanism by which lipids may give rise to elevations in BP still present some evidence gaps. Genetic and cross-sectional studies suggested a connection between dyslipidemia and hypertension. Hypertensive individuals have a higher prevalence of dyslipidemia and 12% of subjects with early-onset hypertension have an increased frequency of lipid disorders. At first, smooth muscle cell hypertrophy and collagen deposition come as a consequence to high cholesterol levels leading to arterial stiffness translated to elevated systolic BP.

**References:**

1. Kearney PM, Whelton M, Reynolds K, Muntner P, Whelton PK, He J. Global burden of hypertension: analysis of worldwide data.
2. Lancet. (2005) 365:217–23. doi: 10.1016/S0140-6736(05)17741-1 2.
3. Lu J, Lu Y, Wang X, Li X, Linderman GC, Wu C, et al. Prevalence, awareness, treatment, and control of hypertension in China: data from 1·7 million adults in a population-based screening study (China PEACE Million Persons Project).
4. Lancet. (2017) 390:2549–58. doi: 10.1016/S0140-6736(17)3 2478-9 3. Tang N, Ma J, Tao R, Chen Z, Yang Y, He Q, et al. The effects of the interaction between BMI and dyslipidemia on hypertension in adults. Sci Rep. (2022) 12:927. doi: 10.1038/s41598-022-04968-8 4.
5. Ke C, Zhu X, Zhang Y, Shen Y. Metabolomic characterization of hypertension and dyslipidemia. Metabolomics. (2018) 14:117. doi: 10.1007/s11306-018-1408-y
6. Selwyn AP, Kinlay S, Libby P, Ganz P. Atherogenic lipids, vascular dysfunction, and clinical signs of ischemic heart disease. Circulation. (1997) 95:5–7. doi: 10.1161/01.CIR.95.1.5 6.
7. McGill JB, Haffner S, Rees TJ, Sowers JR, Tershakovec AM, Weber M. Progress and controversies: treating obesity and insulin resistance in the context of hypertension. J Clin Hypertens. (2009) 11:36–41. doi: 10.1111/j.1751-7176.2008.00065.x
8. Neaton JD, Wentworth D. Serum cholesterol, blood pressure, cigarette smoking, and death from coronary heart disease. Overall findings and differences by age for 316,099 white men. Multiple Risk Factor Intervention Trial Research Group. Arch Intern Med. (1992) 152:56–64. doi: 10.1001/archinte.152.1.56 8.
9. Borghi C, Veronesi M, Bacchelli S, Degli Esposti D, Cosentino E, Ambrosioni E. Serum cholesterol levels, blood pressure response to stress and incidence of stable hypertension in young subjects with high normal blood pressure. J Hypertens. (2004) 22:265–72. doi: 10.1097/00004872-200402000-00009