CASE STUDY

Beta-Thalassemia, Hyperlipoproteinemia(a), and Metabolic Syndrome: Its Low-Cost Holistic Therapy

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ABSTRACT

Metabolic syndrome (MS) is an emerging global health problem. Although studies highlighting its genetic, lipid, and cardiometabolic associations have been described in detail, the exact cause for these associations is not clear. The authors describe, in this study, the case of a patient who, along with his family members, had clinical evidence of MS. In addition, this patient also exhibited \( \beta \)-thalassemia minor and hyperlipoproteinemia(a). Lipoprotein (Lp(a)) levels diminished significantly following therapy with bark-stem powder of *Terminalia arjuna*, an ancient remedy recommended for angina pectoris. The co-existence of these conditions, reflecting both a genetic link and a significant reduction in Lp(a) levels amounting to 24.71% following the administration of *T. arjuna*, prompted the authors to report on this case.

INTRODUCTION

Generally, the genetic basis of thalassemia is a result of autosomal recessive inheritance, whereas \( \beta \)-thalassemia minor may also exhibit an autosomal dominant inheritance. Hyperlipoproteinemia(a) is also considered to be a genetic disorder, possibly resulting from autosomal dominance. However, the genetic factors responsible for metabolic syndrome (MS), including interorgan, environmental, and dietary interactions, are still, as yet, to be fully explored.

In this paper, we report on a 50-year-old man, a native of the Sindh province of Pakistan, who was observed as pale and hypertensive. The patient presented with a past history of gout involving the left great toe, and was a nonsmoker and occasional drinker. He was already on antihypertensive (amlodipine, 5 mg once-daily), hypouricemic (allopurinol, 100 mg once-daily), and hyolipidemic (fenofibrate, 160 mg once-daily) drugs for the last 6 months. The pedigree profile of the patient revealed that his mother, brothers, and children all had an increased body mass index (BMI), central obesity, hypertension, and prediabetes/diabetes (Fig. 1). The patient himself had class I obesity (BMI, 28 kg/m\(^2\)), a dominantly central waist–hip ratio (WHR, 1.04), and hypertension (blood pressure, 140/100 mmHg). His hemoglobin was 9.9 g/dL, and his reticulocyte count was 2%. A peripheral smear showed anisocytosis, microcytic hypochromic anemia, and reticulocytosis. The patient’s fetal Hb (HbF) and HbA\(_2\) were 1% and 5.4%, respectively, his fasting blood sugar 81 mg/dL, and his uric acid 7 mg/dL. The patient’s total cholesterol was 254 mg/dL, his triglycerides 298 mg/dL, his HDL 40 mg/dL, his LDL 120 mg/dL, and his lipoprotein(a) [Lp(a)] 51.8 mg/dL, whereas his comprehensive lipid tetrad index was 98021. An electroencephalo-
graph and chest X-ray were unremarkable, and the patient’s urine examination was normal.

In view of the patient’s increased HbA₂, low hemoglobin, and a peripheral picture suggestive of hemolytic anemia, a diagnosis of β-thalassemia minor was made. The patient’s elevated Lp(a) suggested hyperlipoproteinemia(a), whereas his central obesity indicated insulin resistance. Raised uric acid, hypertriglyceridemia, elevated cholesterol, and low HDL coupled with an increased waist-hip ratio and hypertension all suggested a diagnosis of MS.

The patient was advised on lifestyle modifications comprised of regular walking, restriction of salt and saturated fat in conjunction with a low-carbohydrate, fiber-rich diet, and hematinics, and was continued on amlodipine, allopurinol, and fenofibrate. In addition, we also put him on the capsulated oral bark-stem powder, *Terminalia arjuna*, 500 mg 3 times daily.

### Table 1. NCEP and WHO Definitions of Metabolic Syndrome

<table>
<thead>
<tr>
<th>NCEP</th>
<th>WHO</th>
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<tr>
<td><em>At least three of the following:</em></td>
<td>Hyperinsulinemia (upper quartile of the nondiabetic population or fasting plasma glucose ≥ 110 mg/dL (6.1 mmol/L) and</td>
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<tr>
<td>Fasting plasma glucose ≥ 110 mg/dL (6.1 mmol/L)</td>
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<tr>
<td>Abdominal Obesity</td>
<td>Abdominal Obesity</td>
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<tr>
<td>Waist girth &gt; 102 or &gt; 94 cm in genetically susceptible</td>
<td>waist–hip ratio &gt; 0.90 or</td>
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<tr>
<td>BMI ≥ 30</td>
<td>BMI ≥ 30</td>
</tr>
<tr>
<td>waist girth ≥ 94 cm</td>
<td>waist girth ≥ 94 cm</td>
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<tr>
<td>Dyslipidemia</td>
<td>Dyslipidemia</td>
</tr>
<tr>
<td>Triglycerides ≥ 150 mg/dL (1.7 mmol/L)</td>
<td>Triglycerides ≥ 150 mg/dL (1.7 mmol/L)</td>
</tr>
<tr>
<td>HDL cholesterol &lt; 40 mg/dL (1.04 mmol/L)</td>
<td>HDL cholesterol &lt; 35 mg/dL (0.9 mmol/L)</td>
</tr>
<tr>
<td>BP ≥ 130/85 mmHg or medication</td>
<td>BP ≥ 140/90 mmHg or medication</td>
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NCEP, National Cholesterol Education Program; WHO, World Health Organization; BP, blood pressure.
MS, also known as syndrome X, has been under constant review since its inception. In MS, there is a high incidence of its various features in Indians, compared to the western population, and the prevalence of MS is growing in both the adult and pediatric populations. Although the World Health Organization (WHO), National Cholesterol Education Program (NCEP) and ATP III have proposed their criteria for labeling MS on anthropometric, clinical, and biochemical parameters, to date, there remains no medical consensus on MS (Table 1).

Hyperlipoproteinemia(a) has a genetically linked, possibly autosomal, dominant inheritance and confers an increased risk of coronary artery disease (CAD). Lp(a) measurement for CAD risk has been considered as essential in Indians showing central obesity, insulin resistance, and glucose intolerance. Those patients exhibiting elevated Lp(a) levels combined with central obesity need effective therapeutic interventions, as such factors may hasten the process of accelerated atherosclerosis. A phenotypic expression of familial hypercholesterolemia was noted in a Sardinian population bearing the β-thalassemia trait, and it was observed that the LDL-lowering effect of the β-thalassemia trait might slow the development and progression of coronary atherosclerosis. Because β-thalassemia minor and hyperlipoproteinemia(a) both share an autosomal dominant inheritance, their concurrence with MS, in our case, was also noteworthy.

The therapeutic objectives for treating the MS are: to correct obesity, encourage physical activity, and to treat associated lipid as well as nonlipid risk factors, including hypertension. We also know that Lp(a) levels are generally not influenced by diet, age, gender, exercise, environmental conditions, or treatment with the conventional lipid-lowering drugs. Currently, no effective therapy exists for elevated Lp(a), except niacin and aspirin. The bark of the T. arjuna tree has a long history of use as a cardiac tonic and has been indicated in the treatment of CAD, heart failure, hypercholesterolemia, and for the relief of anginal pain. Additionally, T. arjuna has been found to have Lp(a)-lowering effects in a few CAD patients. Taking a clue from this observation, T. arjuna (500 mg 3 times daily) was started in the case reported on in this paper. Lp(a) levels decreased from 51.8 to 39 mg/dL after 6 months of T. arjuna therapy.

A combination of β-thalassemia minor, hyperlipoproteinemia(a), and coexisting metabolic syndrome in the presence of a strong family history pointed toward genetic factors in our patient. It also warranted steps for early detection and prevention of these conditions among his siblings and offspring. The Lp(a)-lowering effect of T. arjuna merits further investigation with a larger sample group.

REFERENCES

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