



METABOLIC SYNDROME

&

YOGA THERAPY

Nezihe Alibaba

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Abstract

The clustering of several metabolic and cardiovascular disease risk factors has been termed the metabolic syndrome. The metabolic syndrome seems to result from a collision between susceptible "thrifty genes" and a society characterized by an increased prevalence of obesity and a sedentary lifestyle. The typical patient is characterized by abdominal obesity, a varying degree of glucose intolerance, dyslipidemia and often hypertension. The components of the metabolic syndrome are associated with insulin resistance, disturbances of coagulation and fibrinolysis, endothelial dysfunction and elevated markers of sub-clinical inflammation. (1)

This paper focuses mainly on the medical and holistic view of the condition. It considers medical, alternative and yogic therapies. The consequences of the metabolic syndrome are important risk factor for cardiovascular disease, premature death and diabetes. The metabolic syndrome constitutes a major challenge for public health professionals in the field of preventive medicine since most of the adults seem to be affected by the syndrome. Lifestyle changes could have a profound influence on the syndrome and its development. Yoga therapy is one of the preventive methods of the metabolic syndrome.

Table of Contents

Abstract	2
Metabolic Syndrome	4
Description	4
Causes	4
Medical view	4
Holistic view	4
Signs & Symptoms	5
Diagnosis & Tests.....	6
Treatment Options	6
Common Medical Prescriptions	6
Natural & Alternative Treatments	8
Yoga Therapy View – Chakra Focal Point of Condition	9
Yogic Dietary and Lifestyle Recommendations.....	9
Dietary Recommendations for Metabolic Syndrome	10
Exercise Recommendations for Metabolic Syndrome.....	12
Asana & Pranayama & Meditation Recommendations for Metabolic Syndrome	12
Conclusion	17

Metabolic Syndrome

Description

Metabolic syndrome is a name for a group of risk factors that occur together and increase the risk for coronary artery disease, stroke, and type 2 diabetes.

Causes – Medical View

Metabolic syndrome is becoming more and more common in the world. Researchers are not sure whether the syndrome is due to one single cause, but all of the risks for the syndrome are related to obesity. The two most important risk factors for metabolic syndrome are; extra weight around the middle and upper parts of the body, and the body may be described as "apple-shaped.", and insulin resistance, in which the body cannot use insulin effectively. Insulin is needed to help control the amount of sugar in the body. As a result, blood sugar and fat levels rise. Other risk factors include aging; genes that make you more likely to develop this condition; hormone changes; and lack of exercise. People, who have metabolic syndrome often have two other problems that can either, cause the condition or make it worse: excess blood clotting and low levels of inflammation throughout the body.

Causes – Holistic View

Metabolic Syndrome, also known as insulin resistance syndrome, and Syndrome X hinders a person's ability to effectively metabolize simple dietary carbohydrates (such as sweets, pastas, breads, and many highly processed foods). Due to the chronic over-consumption of refined sugars, simple carbohydrates, and trans-fats, the body's cells develop a resistance to insulin (a hormone produced by the pancreas that helps the body's cells convert glucose to energy). When the body's cells reject insulin, the body cannot convert glucose to energy effectively. This results in high blood sugar levels, a precursor for type 2 diabetes. In addition, Metabolic Syndrome sufferers tend to have high LDL cholesterol (bad cholesterol), low HDL cholesterol (good cholesterol), high triglycerides (blood fats), high blood pressure, and excess body fat around the mid section — all of which are risk factors for heart disease and stroke.

The Metabolic Syndrome



FOR MEN:

- Waist Circumference \geq 40 Inches
- Triglycerides \geq 150 mg/dL
- HDL Cholesterol $<$ 40 mg/dL
- Blood Pressure \geq 130/85 mm Hg
- Fasting Glucose \geq 100 mg/dL

FOR WOMEN:

- Waist Circumference $>$ 35 Inches
- Triglycerides $>$ 150 mg/dL
- HDL Cholesterol $<$ 50 mg/dL
- Blood Pressure $>$ 130/85 mm Hg
- Fasting Glucose $>$ 100 mg/dL

According to the American Heart Association and the National Heart, Lung, and Blood Institute, metabolic syndrome is present if a person has three or more of the following signs:

- Blood pressure equal to or higher than 130/85 mmHg
- Fasting blood sugar (glucose) equal to or higher than 100 mg/dL
- Large waist circumference (length around the waist):
 - Men - 40 inches or more
 - Women - 35 inches or more
- Low HDL cholesterol:
 - Men - under 40 mg/dL
 - Women - under 50 mg/dL
- Triglycerides equal to or higher than 150 mg/dL

- Thick blood (also known as hypercoagulability, Antiphospholipids, and Hughes Syndrome)
- Pro-inflammatory state (elevated C-reactive protein in the blood)

Diagnosis & Tests

The following tests and procedures are carried out in order to find out if a person has the Metabolic Syndrome;

- Blood Pressure Reading — A cuff is placed around the upper arm and inflated, while a healthcare professional determines the diastolic and systolic blood pressure. High blood pressure can be one indicator of the possibility of Metabolic Syndrome.
- Fasting Glucose Tolerance Test — A simple blood test taken after fasting (usually 12 to 14 hours of fasting is required before the test is taken), which measures the amount of glucose (sugar) in the blood.
- C-Reactive Protein Test — A simple blood test that measures C-reactive protein levels in the blood. High C-reactive protein levels indicate the presence of systemic inflammation, usually found in those who suffer from Metabolic Syndrome.
- Lipid Profile — Those who have Metabolic Syndrome exhibit low HDL (good) cholesterol, high LDL (bad) cholesterol and high triglyceride levels. A simple blood test taken after fasting for 12 to 14 hours can determine lipid levels. The lipid profile includes:
 - Total cholesterol
 - HDL cholesterol (good cholesterol)
 - LDL cholesterol (bad cholesterol)
 - Triglycerides

Treatment Options – Common Medical Prescriptions

The goal of treatment is to reduce the risk of heart disease and diabetes. The doctor will recommend lifestyle changes or medicines to help reduce your blood pressure, LDL cholesterol, and blood sugar. People with metabolic syndrome have an increased long-term risk for developing cardiovascular disease and type 2 diabetes. Many of them are prone to these complications listed below;

- Atherosclerosis
- Diabetes
- Heart attack
- Kidney disease
- Nonalcoholic fatty liver disease
- Peripheral artery disease
- Stroke

Sometimes medications are necessary to stabilize severe cases of high blood pressure, high cholesterol, or inadequate blood sugar control. These medications should be used after all attempts are made to correct diet and physical inactivity.

Prescription medications can cause depletion of important nutrients, interact negatively with other prescriptions or over-the-counter drugs, and produce a wide range of side effects.

The following is a list of commonly used drugs to treat the cluster of symptoms of Metabolic Syndrome:

- Weight-loss drugs – Commonly used appetite suppressants include Sibutramine (Meridia[®]) and orlistat (Xenical[®]).
- Insulin sensitizers – Thiazolidinediones and metformin (Glucophage[®], Glucophage XR[®]) decrease insulin resistance.
- Aspirin – Doctors may prescribe aspirin to reduce the risk of heart attack.
- Medications to lower blood pressure – The major types of medications used to control high blood pressure include diuretics, angiotensin-converting enzyme (ACE) inhibitors, calcium channel blockers, and beta blockers.
- Medications to regulate cholesterol – Medications such as niacin, statins, and fibrates can improve the good cholesterol levels and lower the bad cholesterol levels. Statins, such as the top-selling Lipitor[®] and Zocor[®], interfere with the body's production of Coenzyme Q₁₀. CoQ₁₀ is a popular heart medication in Japan. Interestingly, the highest concentrations of the antioxidant CoQ₁₀ are found in vital organs such as the heart and the pancreas. CoQ₁₀ which is produced naturally by the body, diminishes with increasing age, and many

healthcare professionals recommend a CoQ₁₀ supplement when taking statin drugs, particularly for older patients.

Treatment Options – Natural & Alternative Treatments

As part of the comprehensive program of nutrition, exercise, and lifestyle modification, patient may want to consider some of the products listed below to help support the health of his/her energy production system.

- Magnesium Supplements
- B Complex Vitamin Supplements
- Complete Daily Mineral Vitamin Supplements
- Vitamin C Supplements – Vitamin C increases metabolism, promotes weight loss, and boosts energy production by making carnitine, the amino acid responsible for transporting fat to mitochondria for conversion to energy. Vitamin C is an essential vitamin that plays a critical role in supporting heart function and overall cardiovascular health.
- Probiotic Supplements – Helps to restore balance of essential friendly bacteria after antibiotic use, alleviate digestive disorders, enhance synthesis of B-vitamins, and absorb calcium, copper, iron, and magnesium better
- L-Theanine Supplements – To help reduce stress and anxiety, promote relaxation without drowsiness, and improve learning and concentration.
- L-Tryptophan Supplements – Replenishes serotonin so you can sleep—and better manage pain and stress.
- Glucose Supplements– Promote healthy blood sugar levels and cholesterol levels with powerful herb extracts, antioxidants and vital minerals.
- Organic Extra Virgin Coconut Oil – Add healthy fats back into your diet and help speed metabolism.
- Carnitine Supplements- Increase your vitality and promote good cardiovascular health with this effective L-carnitine blend.
- CoQ₁₀ – A powerful cellular energizer that dissolves fast for greater absorption and a more highly effective antioxidant.

- B-12 Methylcobalamin – Replenish deficiency, boost healthy energy production, and maintain mental and emotional well-being.
- Systemic Enzyme Supplements– Helps reduce pain and swelling and keeps your blood flowing smoothly.
- Nattosyn – Fights fibrin build-up and keeps blood flowing smoothly—with the most potent fibrinolytic enzyme available.

Yoga Therapy View – Chakra Focal Point of Condition

Yoga therapy is all about bringing the body, mind, emotions, diet and daily routine into balance. Metabolic syndrome is no different from any other malaise and is the result of disharmony at the physical, psychological, emotional, intellectual, environmental and/or hereditary levels. A holistic approach towards healing, repair and rejuvenation can restore peace, health and balance.

The manipura (solar plexus) chakra is associated with digestion and metabolism at the physical level. This chakra is located above the navel and below the chest and is governed by the fire element. Therefore, this chakra governs the digestive system, skin, pancreas, skin and the breath. It also influences the liver, gall bladder and peripheral nervous system. The manipura chakra is a focal point for our force of will and our sense of transformation. It is also known as the seat of the subconscious mind. Our sense of power and authority, self-control and discipline of the ego converge here. Imbalances in this chakra cause sapping of life force, emotional coldness, indifference, insecurity, lack of self-confidence, eating disorders, sleep disorders, blocked emotions, stomach disorders, heartburn, jaundice, indigestion, pain in the lumbar spine, nervous disorders, mellitus, diabetes, obesity and diseases of the liver, spleen and gall bladder. One can balance the energies of this chakra through meditation, mantras, mudras, asanas and pranayama.

Yogic Dietary and Lifestyle Recommendations

The quality of health depends upon many pieces that not only include the health of the bodily systems, but also include a healthy diet, exercise, and spirituality- connection to the universe.

Dietary Recommendations for Metabolic Syndrome

Diet cannot be emphasized enough. Metabolic Syndrome is a chronic condition that can potentially be reversed by adhering to healthy diet guidelines. By changing daily diet, patients can lose weight, lower their blood pressure, lower their bad cholesterol and triglyceride levels—all of which can dramatically reduce their risk of heart disease, stroke, and diabetes.

It's important to note that the Diabetes Diet recommended by the American Diabetes Association may actually worsen Metabolic Syndrome, because it emphasizes a high-carbohydrate diet that includes 6 to 11 servings of grains. A diet that is too high in carbohydrates (especially simple carbohydrates like white bread and highly processed baked goods) consistently spikes blood sugar levels and worsens the problems of insulin resistance.

Dr. Ritchie Shoemaker, author of *Lose the Weight You Hate*, says that metabolic disorders are the result of an excess intake of two key ingredients found in the typical American diet: glucose (sugar) and amylose (a simple plant starch). Amylose is rapidly converted to glucose by enzymes in the small intestine, which contributes greatly to spiked blood sugar levels. Dr. Shoemaker says that metabolic disorders can be improved—or even reversed—by following the **0-0-2-3 diet**. That means following a daily diet that contains **0** refined sugar; **0** starch (amylose) found in simple carbs; **2** servings of protein; and **3** servings each of vegetables that grow above the ground and whole fruits.

- Increase magnesium intake – New studies now show that adequate magnesium intake can reduce diabetes risk by as much as 34 percent. Adequate magnesium intake can also help manage high blood pressure. Eat foods rich in magnesium, such as pumpkin seeds, spinach, chard, sunflower seeds, and navy beans.
- Eat more low-glycemic fiber – People who have problems with blood sugar control and/or weight typically eat the wrong foods that have very low fiber content. Fiber, found in whole grains and unprocessed foods, can be very effective in stabilizing blood sugar levels. Adding high-quality fiber to diet, such as ground flax meal can improve the condition.

- Increase the amount of nutrient-dense, low-glycemic foods such as dark green, leafy vegetables, whole fruits, and sprouted nuts and seeds.
- Increase omega-3 intake – Omega-3 is found in fish oil, wild Alaskan salmon, minimal-mercury albacore tuna, sprouted nuts and seeds, and flax seed. Research has shown that omega-3 fatty acids can lower triglyceride levels, reduce plaque buildup in the arteries, and reduce heart disease risk. Those who have Metabolic Syndrome are at higher risk for developing heart disease.
- Toss out the low-fat diet – The American Diabetic Association and the American Heart Association have steadily promoted a low-fat diet to lower bad cholesterol (LDL) levels. However, that idea is overly simplistic and misleading. Not all fats are bad, and in fact, some fats are essential for good nutrition. A healthy balance of good fats is more important than eliminating all fats. Also, patients should watch out for deceptively low-fat food products that are actually high in refined sugar, artificial sweeteners, and unhealthy processed simple carbohydrates—all of which worsen Metabolic Syndrome.
- Switch from table salt to Himalayan Crystal salt – Unlike table salt, Himalayan crystal salt contains 84 minerals and trace elements, which are essential for optimal health and mineral balance. High blood pressure (which is a symptom of Metabolic Syndrome) can be caused by an imbalance of potassium, calcium, and magnesium.
- Drink room-temperature purified water throughout the day.

When managing Metabolic Syndrome, it is essential to avoid the following foods:

- All instant grains. Food products such as minute rice, cream of rice and cream of wheat can spike blood sugar levels as quickly as white, refined sugar.
- All simple or refined carbohydrates (white flour, white rice, white bread, pasta, cookies, cakes, crackers, processed snack foods, starchy vegetables that grow underground such as potatoes, beets, peanuts.)
- All foods containing refined sugar or artificial sugar-substitutes such as Aspartame, Splenda[®] etc. Artificial sweeteners may increase the risk of (or worsen) metabolic conditions such as Metabolic Syndrome, insulin resistance, and diabetes.
- Alcoholic beverages, which can rapidly spike blood sugar levels
- Limited cheese and wine

- Fungi such as mushrooms
- Pickled foods
- All fruit juices, since they lack fiber and spike blood sugar levels too rapidly
- Carbonated soft drinks that cause blood pH levels to become acidic
- Seafood, such as oysters, clams, and lobster that may contain toxic levels of mercury.
- Deep-sea fish such as tuna, mackerel, and swordfish that may contain toxic levels of mercury. One may choose minimal-mercury albacore tuna instead.
- Farm-raised fish that contain PCBs and not enough omega-3 essential fatty acids, due to their land-based diets. One may choose wild-caught salmon instead.
- Sodium nitrite found in processed foods such as hot dogs, lunch meats, and bacon
- Monosodium glutamate (MSG) found in many foods as a flavor enhancer
- Hydrogenated or partially hydrogenated oils found in many processed foods, deep-fried foods, fast foods, and junk food. Those with Metabolic Syndrome and diabetes are particularly susceptible to the negative effects of bad fats.
- Caffeine. Caffeine intake after a meal surges blood sugar levels, making blood sugar control more difficult.
- Smoking. A recent study links smoking to increased diabetes risk.

Exercise Recommendations for Metabolic Syndrome

Like diet, exercise is an essential part of the treatment plan for Metabolic Syndrome. Exercise helps control weight, helps control blood sugar levels more effectively, helps reduce high blood pressure, and strengthens the heart muscle. These are all essential in reversing Metabolic Syndrome. Effective types of exercise include yoga, brisk walking in the sun (to boost vitamin D production), biking, light aerobics, water aerobics, swimming, and strength training. The most important advice is to start. One can make small strides, and increase the exercise level as the patient gains strength and durability.

Asana, Pranayama & Meditation Recommendations for Metabolic Syndrome

Yoga can improve blood pressure and other symptoms associated with the condition known as metabolic syndrome, according to a pair of new studies.

In the first study, published in the journal *Diabetes Research and Clinical Practice*, researchers from the SP Medical College in Bikaner, India studied 101 adults with symptoms of metabolic syndrome. For three months, 55 of the participants took part in regular yogic practices, including standard postures and daily transcendental meditation. The other 56 participants were given standard care for their symptoms. At the end of the study period, the yoga group scored significantly better in measures of blood pressure, blood sugar, triglycerides and waist circumference than a group that had received its conventional treatments.

In the second study, published on-line in the journal *BioMed Central Complementary and Alternative Medicine*, researchers from the University of Karlstad, Sweden examined the psychological effects of yoga-related breathing exercises in 103 adults. The 48 adults in the control group were told to relax in an armchair for 15 minutes each day, while the other 55 participants were told to practice Sudarshan Kriya breathing exercises for an hour per day, six days a week. The exercises involved cycling between slow, normal and rapid breathing. After six weeks, the participants in the yoga group had significantly lower feelings of anxiety, depression and stress and significantly higher levels of optimism than the participants in the control group.

Yoga can be "a powerful adjunct therapy when these diseases arise," said researcher Faahri Saatiglou. "We do not emphasize this point enough in our Western health care."

Meditation may help improve endothelial function in patients with metabolic syndrome, potentially reducing cardiovascular risk, new research suggests. Presented here at the American Psychosomatic Society 69th Annual Scientific Meeting, a randomized trial in a group of African American patients with metabolic syndrome showed significant improvement in endothelial function in those randomly assigned to a year-long meditation program compared with their counterparts who underwent a program of health education alone. "We found there was a significant difference between the consciously resting meditation group and the health education group in the flow-mediated dilation, which measures endothelial function," principal investigator Kofi Kondwani, PhD, National Center for Primary Care, Morehouse School of Medicine, Atlanta, Georgia, told *Medscape Medical News*. A risk factor for coronary heart disease, the clinical manifestations of metabolic syndrome include hypertension, hyperglycemia, high triglycerides, reduced high-density lipoprotein, and abdominal obesity. A diagnosis of metabolic

syndrome is contingent on an individual having 3 or more of these risk factors.

According to the investigators, the etiology of metabolic syndrome is complex, but psychological stress appears to play a role, possibly through over-activation of stress hormones. They also note that endothelial dysfunction, which is also influenced by stress, is a major consequence of metabolic syndrome. Commenting on the study for *Medscape Medical News*, Lorenzo Cohen, PhD, a professor in the Department of Behavioral Science and director of the Integrative Medicine Program at M.D. Anderson Cancer Center in Houston, Texas, said it is well known that psychological stress has a profound effect on many biological functions. "In our work we know that stress can directly impact certain cancer-related biological systems. We believe it is very important to provide different forms of stress management to patients to help relieve the psychological stress they experience due to life-threatening illness and that one wonderful form of stress management is meditation," Dr. Cohen said in an interview.

He added that it was not surprising to him that meditation had a positive effect on endothelial function or other measures of metabolic syndrome. "We know that metabolic syndrome is related to inflammatory processes and we know that stress can increase inflammatory processes. We also know of course that meditation decreases these processes so it would make sense that it has the potential to be a useful adjunct to the treatment of this syndrome," said Dr. Cohen. Dr. Cohen noted that in recent years meditation has gained a great deal of acceptance by the medical community and patients alike and is widely accessible. Ideally, he said, it is useful to have an instructor teach patients how to meditate in order to optimize practice.

Judith Hanson Lasater—who helped design the yoga program used in a study of yoga and metabolic syndrome at the University of California at San Francisco—recommends the following poses.

Reclining Twist with a Bolster

Sit on the floor with your right hip close to the end of the bolster. Bend your knees and slide your feet to the left so the outside of your right leg rests on the floor. You can rest your left leg on the right one, or you can open the space between them. Turn to your right and put your hands on the

floor, one on either side of the bolster. Gently press your hands into the floor to lengthen the front of your body. Then bend your elbows and lower yourself onto the bolster. Place your arms comfortably on the floor. Stay for a minute and a half. Switch sides.

Elevated Legs-up-the-Wall Pose

Place the long side of a bolster parallel to a wall, leaving 6 to 10 inches between the wall and the bolster. Place a single-fold blanket on the floor at a 90-degree angle to the middle of the long side of the bolster.

Sit on one end of the bolster with the length of it behind you and one shoulder near the wall. Roll back and swing your legs up the wall. Your legs should be almost vertical, your pelvis supported by the bolster, and your shoulders and head on the floor. Cover your eyes; stay for up to 15 minutes.

Basic Relaxation

Give yourself enough floor space to spread out. Before you lie down, position a standard-fold blanket for your head and neck to rest on. Begin by sitting on the floor. Now turn to one side and lean on your elbow and forearm as you slide onto your side. Roll onto your back. (Coming into the pose in this way is easier on your back.) Roll the long edge of your blanket slightly to support the curve of the neck. Place two rolled blankets under your knees and cover yourself with a blanket. Your chin should be slightly lower than your forehead. Cover your eyes; stay for 5 to 20 minutes.

Reclining Supported Pose

Place a yoga block on the floor and prop the end of a bolster on it. Add a single-fold blanket on one end to support your head. Next, roll two blankets into one roll and place it nearby. Place two more rolled blankets on either side of the bolster to support each elbow and forearm. Sit in front of the short side of your bolster with your tailbone pressing the bolster. Bend your knees and place the large blanket roll under them. Lean back and rest your torso on the bolster and your head on the single-fold blanket. Make sure your chin is lower than your forehead. Let your legs

and feet roll out and the heels rest on the floor. Place your forearms on the blankets at your sides, palms up. Close your eyes and cover them; stay for at least 10 minutes.

Many asanas balance hormones, boost digestion, mobilize fat deposits, burn calories and activate the digestive fire. After one feels comfortable with asana practice, they go further with these suggested asanas;

Sun salutation, boat pose, half spinal twist, forward bending, inclined plane, thunderbolt , lotus, shoulderstand, plough, wind relieving, abdominal crunch, twist, locust, bow, reverse boat, plank, triangle, twisted side-angle pose, squat, and chair pose.

The Simple Pranayama Technique

Sit quietly for one minute. Breathe deeply, breathe easily. During this one minute, think that you are going to receive energy to the body and mind to become healthier, to become robust & strong. Think that you are going to throw out all the impurities of mind and the body through exhaling breath and think that you are going to have fresh and pure energy by inhaling the fresh Prana – the breath fully filled with life, strength, positivism and energy.

Once the eyes are closed and are pointing to nose, back erect, mind relaxed, start the Pranayama. It has three phases.

Slow Inhale – Take a deep breath (as deep as possible), very slowly and steadily, without hurrying up. The mind should think that you are taking the energy of God into your body.

Hold – Hold the breath for as long as comfortable. During this time, think that the Prana (energetic breath) that you have taken in is cleansing the whole body from tip of the brain to tip of leg. Imagine as though the air is moving all over the body and cleansing all the organs and mind.

Slower Exhale – Exhale slowly. Exhaling period should be longer than inhaling period. While exhaling, think that all the impurities of your body and mind that were cleansed are now let out of the body.

Repeat the same steps from 1 to 3 for three to ten times, based on your convenience.

After Pranayama, you need to sit in the same place, for at least five minutes. During which time, prayer/meditation using mudra for manipura (navel) chakra can be done.

Place your hands before your stomach, slightly below your solar plexus. Let the fingers join at the tops, all pointing away from you. Cross the thumbs and straighten the fingers. Concentrate on the navel chakra located on the spine, slightly above the level of the navel. This mudra balances the fire element in the abdominal region and activates the digestive system.

Conclusion

The metabolic syndrome constitutes a major challenge for public health professionals in the field of preventive medicine since most of the adults seem to be affected by the syndrome. Lifestyle changes could have a profound influence on the syndrome and its development. Yoga therapy is one of the preventive methods of the metabolic syndrome. Yoga therapy is proven to help relieve the symptoms of metabolic syndrome. It is a total health system for patients with metabolic syndrome. Yoga therapy may reduce the consequences of the metabolic syndrome which are the important risk factors for cardiovascular disease, premature death and diabetes.