Aging Syndrome

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Abstract

Aging syndrome or accelerated endothelial damage syndrome or metabolic syndrome is a chronic inflammatory process on vascular endothelium both at arterial and venous systems of the body. It terminates with an accelerated endothelial damage, an accelerated atherosclerosis, end-organ insufficiencies, early aging, and death. Male sex, sedentary life style, animal-rich diet, overweight, obesity, smoking, alcohol, white coat hypertension, hypertension, impaired fasting glucose, impaired glucose tolerance, diabetes mellitus, hypertriglyceridemia, dyslipidemia, chronic infections, chronic inflammations, chronic depression, cancers, overuse of the body, and sickle cell diseases may be the major parameters of the metabolic syndrome. Cirrhosis, chronic obstructive pulmonary disease, chronic renal disease, myocardial infarction, stroke, early aging, and death may be the main terminal end-points of the syndrome. As a conclusion, calendar ages should not be accepted as the real physiologic ages of patients with the above parameters and terminal end-points of the metabolic syndrome. On the other hand, long term underweight in the absence of any pathology such as anorexia nervosa, sudden weight loss, malignancies, chronic infections, chronic inflammations, or chronic depression may even decelerate the aging by decreasing insulin resistance, mean arterial blood pressure, and vascular endothelial damage and it may be a good property for a long lifespan.

Key words: Aging syndrome, accelerated endothelial damage syndrome, metabolic syndrome

Aging syndrome or accelerated endothelial damage syndrome or metabolic syndrome is a chronic inflammatory process on vascular endothelium both at arterial and venous systems of the body. It terminates with an accelerated endothelial damage, an accelerated atherosclerosis, end-organ insufficiencies, early aging, and death (1-2). All factors accelerating the normal aging process may mainly act on vascular endothelium and they should be accepted as components of the metabolic syndrome. If we can define parameters of the metabolic syndrome exactly, we can prevent the accelerated aging process. Sedentary life style, animal-rich diet, and excess weight may be the most common parameters of the syndrome. Overweight and obesity may cause a low grade inflammation on vascular endothelium that can be shown by slightly increased C-reactive protein levels in patients. Although main targets of the syndrome may be both the afferent and efferent vascular endothelial cells, afferent blood vessels including capillaries may be much more affected due to their much higher blood pressure. Mean arterial blood pressure may be one of the significant causes of endothelial damage and it may mostly be affected by excess weight induced changes of the body. Excess adipose tissue acts as an endocrine organ anywhere in the body and induces insulin resistance. Therefore limitation of excess weight as abdominal obesity may be meaningless in definition of the metabolic syndrome. Actually excess weight should be defined by means of body mass index. Although mean body weight is greater in males due to their tallness, body mass index is greater in females as a more valuable indicator of excess fat in the body. On the other hand, long term underweight in the absence of any pathology such as anorexia nervosa, sudden weight loss, chronic infections, chronic inflammations, malignancies, or chronic depression may decelerate aging by decreasing insulin resistance, mean arterial blood pressure, and vascular endothelial damage, and it may be a good property for a long lifespan.

Smoking and alcohol are the other frequent parameters of aging syndrome or accelerated endothelial damage syndrome or metabolic syndrome since they cause severe endothelial damage not only in the vasculature of respiratory and gastrointestinal tracts but all over the body (3-4). Smoking and alcohol have similar adverse effects on vascular endothelium with different severity in different organs (5-7). Smoking causes cirrhosis too and alcohol also causes chronic obstructive pulmonary disease. Both of them affect both arterial and venous endothelial cells of the body. Smoking causes a chronic inflammatory process in the respiratory tract, lungs, and vascular endothelium all over the body, terminating with an accelerated atherosclerosis, end-organ insufficiencies, early aging, and death. Therefore it must be included among the parameters of the metabolic syndrome. On the other hand, smoking-induced weight loss is probably related with the smoking-induced endothelial inflammation all over the body, since loss of appetite is one of the major symptoms of inflammations in the body. In another explanation, smoking-induced loss of appetite is an indicator of being ill instead of being healthy during smoking (8-10). Buerger's disease (thromboangiitis obliterans) alone is clear evidence to show the strong atherosclerotic effects of smoking since this disease has not been shown in the absence of smoking. Similarly, the alcoholic cirrhosis alone is clear evidence to show strong atherosclerotic effects of alcohol. Alcohol causes a chronic inflammatory process in the gastrointestinal tract, liver, and vascular endothelium all over the body terminating with early aging and death therefore it must also be included among parameters of the metabolic syndrome.

Male sex alone may also be a significant factor for the accelerated atherosclerotic process of the metabolic syndrome since females live longer all over the world (11). Fear to protect his family is a feature of male sex in human beings and in all animal kinds. The feature probably comes from testosterone. You cannot see some females fighting with each other for a male but you can easily see some males fighting for a female in human beings and in animal species. You can see soldiers or coalmine workers in males but not in females. Males use their physical force more in daily life. The dominant physical role of male sex is also seen during sexual activities. The overuse of body probably comes as an accelerated atherosclerosis and a shortened lifespan in males in front. The shortened survival of male sex has even been shown in the sickle cell patients although their significantly shorter mean life expectancy may be caused by the current health services (12). Smoking and alcohol consumption are also more common in males all over the world which may also indicate presence of some additional pressures in society on them. But the longer lifespan of females cannot be explained by the strong atherosclerotic effects of smoking and alcohol alone. Effects of testosterone may also be important in the shortened survival in males. So the dominant role of male sex, and smoking and alcohol put them into the accelerated atherosclerotic process whereas excess weight is the major problem in females concerning the accelerated aging process. In other words, overuse of the body in males and underuse of the body in females may accelerate the endothelial damage, atherosclerosis, early aging, and death. Avoidance of smoking, alcohol, and excess weight are essential in protection from metabolic syndrome. The term of regular exercise should be replaced with daily and essential activities in the protection of females since they actually need a lifestyle change instead of exercise. Avoidance of animal-rich diet, walking as much as possible in a day, avoidance of using elevators, eating fruit even with its peel to escape chronic constipation, drinking black tea, finding regular daily responsibilities, finding news targets to live, and forgetting to use taxis should be thelifestyle of people in risk of metabolic syndrome.

Chronic infections such as tuberculosis and bronchiectasis, chronic inflammations such as rheumatoid arthritis and sickle cell diseases, chronic depression, and cancers induce an accelerated endothelial damage, an accelerated atherosclerosis, early aging, and death therefore they should also be included among the parameters of the aging syndrome or accelerated endothelial damage syndrome or metabolic syndrome. If possible, they should be treated

effectively and indicators of the systemic inflammation including acute phase reactants should be normalized in serum since the systemic inflammatory processes damage vascular endothelial cells further.

An accelerated atherosclerotic process may be the major pathology in the metabolic syndrome and it may be the main cause of early aging and death (13). Atherosclerosis is more important than venosclerosis concerning the clinical manifestations due to the rich collaterals of venous systems in the body. Actually, vascular endothelial damage develops in all arterial and venous systems of the body. Of couse much higher blood pressure of the arterial systems is also important for the enhanced endothelial damage in the afferent vasculature. But hyperglycemia, sickle cell diseases, dyslipidemia, smoking, alcohol, and activated immune cells in chronic infections, inflammations, and cancers also damage venous endothelium in addition to the arterial one. Eventually, the syndrome terminates with end-organ insufficiencies such as cirrhosis, chronic obstructive pulmonary disease, chronic renal failure, myocardial infarction, and stroke, clinically (14). Hepatosteatosis, hepatomegaly, and left lobe hypertrophy are probably some of the significant indicators of the metabolic syndrome in the liver (15). Not only alcohol, but also smoking, overweight, obesity, hypertriglyceridemia, dyslipidemia, white coat hypertension, hypertension, and diabetes mellitus probably have cumulative effects in the development of them via an accelerated endothelial damage in the liver (16). Chronic renal disease may be one of the other indicators of the metabolic syndrome. Smoking, alcohol, animal-rich diet, excess weight, dyslipidemia, hypertension, and diabetes mellitus probably have cumulative effects in the development via accelerated endothelial damage in kidneys. These factors cause a chronic low grade inflammation on vascular endothelium terminating with an accelerated atherosclerosis. Stroke and myocardial infarction are found among the major terminal end-points of the metabolic syndrome since neurons and myocardial cells do not have the ability of regeneration. Actually these hypoxic events develop in all organs of the body but they are able to regenerate. Chronic obstructive pulmonary disease is also found among the terminal end-points of the metabolic syndrome. Not only smoking and air pollution, but also alcohol, excess weight, dyslipidemia, hypertension, and diabetes mellitus probably have cumulative effects in the development via accelerated endothelial damage in lungs.

Male sex, sedentary life style, animal-rich diet, overweight, obesity, smoking, alcohol, white coat hypertension, hypertension, impaired fasting glucose, impaired glucose tolerance, diabetes mellitus, hypertriglyceridemia, dyslipidemia, chronic infections, chronic inflammations, chronic depression, cancers, overuse of the body, and sickle cell diseases accelerate the normal aging process via an accelerated atherosclerotic process all over the body. Therefore the individuals with the above problems are actually elder than their calendar ages, physiologically. Pack-year of smoking should be added to calendar ages to calculate physiological ages of the patients. Drink-year of alcohol should be added to calendar ages of the patients to calculate their physiological ages in the syndrome. Already developed diabetes mellitus, hypertension, cirrhosis, chronic obstructive pulmonary disease, chronic renal disease, coronary heart disease, and other end-organ insufficiencies also increase the calendar ages in the syndrome.

Sickle cell diseases may be the prototypes for the terminal end-points of the syndrome (17-18). We can observe the terminal consequences of disseminated endothelial damage in early years of age in the sickle cell patients. Disseminated endothelial damage may probably be the main cause of accelerated aging in the sickle cell diseases. Although arterial involvement is prominent in the metabolic syndrome, venous involvement is also seen in the sickle cell diseases due to the hard red blood cells induced endothelial damage. Physiologic ages of patients with sickle cell diseases are much higher than their calendar ages due to the hard red blood cells induced endothelial damage all over the body. The hard red blood cells damage vascular endothelial cells especially at the capillary level since the capillary systems are the main distributors of the hard cells into the tissues (19). An accelerated metabolic syndrome-like picture is seen in the sickle cell patients in their much earlier years of age since the accelerated endothelial damage initiates just after birth in their bodies.

Metformin should be the first drug to treat the metabolic syndrome. The main action of metformin is the loss of appetite. Although metformin provides significant weight loss in most cases, approximately 30% of patients cannot continue to use it due to the loss of appetite since they like eating. Metformin should not be used in patients above the age of 70 years together with multiple diseases. It should be used in patients in those we can see the benefits of weight loss in the longterm. Up to now, we have not seen any significant side effects of metformin. Thus it is found among one of the most prescribed drugs in the world today. Since metformin decreases body weight by suppressing the appetite, it also decreases blood pressure and serum triglyceride levels. Actually, metformin should be the drug of treatment for white coat hypertension in cases of overweight or obesity. Hypertriglyceridemia and dyslipidemia should also be treated with metformin in patients with overweight or obesity. Low dose aspirin and metformin should be initiated in all patients with overweight and obesity above the age of 50 years to prevent development of irreversible end-points of metabolic syndrome such as diabetes mellitus, hypertension, stroke, and other end-organ insufficiencies.

Acarbose should be the second choice of drug for the treatment of metabolic syndrome in case of metformin intolerance or insufficiency. So acarbose can be used alone or together with metformin. Since acarbose and metformin have different actions in the body, their cumulative effects will be stronger if used together. Since acarbose decreases absorption of complex sugars in the small intestine, it will also be useful for the treatment of chronic constipation which is also frequent above the age

of 50 years due to the decreased daily activities. Acarbose is also effective on metabolic parameters including serum triglyceride levels and mean arterial blood pressure by decreasing body weight significantly. If a patient cannot tolerate acarbose, it is highly possible that the patient does not want to use any drug since the side effects of acarbose are very rare.

As a conclusion, male sex, sedentary life style, animal-rich diet, overweight, obesity, smoking, alcohol, white coat hypertension, hypertension, impaired fasting glucose, impaired glucose tolerance, diabetes mellitus, hypertriglyceridemia, dyslipidemia, chronic infections, chronic inflammations, chronic depression, cancers, overuse of the body, and sickle cell diseases may be the major components of the metabolic syndrome. Aging syndrome or accelerated endothelial damage syndrome may be other names of the syndrome. Cirrhosis, chronic obstructive pulmonary disease, chronic renal disease, myocardial infarction, stroke, early aging, and death may be the major terminal end-points of the syndrome. Finally, calendar ages should not be accepted as the real physiologic ages of patients with the above parameters and terminal end-points of the syndrome. On the other hand, long term underweight in the absence of any pathology such as anorexia nervosa, sudden weight loss, malignancy, chronic infections, chronic inflammations, or chronic depression may decelerate aging by decreasing insulin resistance, mean arterial blood pressure, and vascular endothelial damage and it may be a good property for a long lifespan.

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