

CONCEPT OF VYAYAMA AS A 'DRUG' - AN AYURVEDIC AND MODERN VIEW

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ABSTRACT

Ayurveda, the science of life (*Ayu*) has clearly defined the importance of *Vyayama* in life. The *Ritucarya* and *Dianacarya* chapters of classic *ayurveda* literature explain the enlightened role of *vyayama* to achieve *swasthya* which is a pathway to attain *Dhirghayu*. *Vyayama*, mentioned as a daily regimen (*Dianacarya*), its seasonal modifications (*Ritucarya*), indication and contra indication (*yogya and ayogya*), duration (*matra*), benefits (*guna* and *samyak lakhsana*), preventive and therapeutic roles in different diseases are precisely defined in *Ayurveda* literature. In Modern science different researches have been done in the field of physiological, psychological, preventive and therapeutic aspects of physical exercise.

KEYWORDS: *Vyayama*, *swasthya*, physical exercise, preventive, therapeutic.

INTRODUCTION

Swasthya and *Dhirghayu* are the foremost aim of *Ayurveda*. During this current pandemic, preservation of positive health that is being in the state of *swastha* is one of the burning challenges to medical science. Researchers have found that hypertension, obesity and diabetes are the most common underlying medical conditions in Covid-19 patients. These co morbidities are frequently cited as risk factors for severe Covid-19 outcomes. *Vyayama* (physical exercise) is one of the simple and easy 'drug' to achieve *swasthya* and it has a vital role in the current scenario. Exercise is a subcategory of physical activity which is structured, repetitive, and purposeful.^[1] The benefits of exercise not only to improve physical health, but also to enhance emotional well-being. Regular Exercise significantly reduces the high blood pressure, risk of developing heart disease, stroke, some cancers, diabetes, and obesity and may help to remove the stress, anxiety, and depression. There is lots of documentation in the *Ayurvedic* classics about *vyayama* and many works have been done in modern science also in the importance of physical exercise. This review article highlights the far-reaching health benefits of physical activity.

Ayurvedic view

The glory of *Ayurveda* lies in its concept of *swastha*. The maintenance of positive health or *swasthya* becomes need of the hour in today's world. In order to achieve *swasthya*, a vast description of *Dianacarya* and *Ritucarya* are mentioned in *Ayurveda*. *Vyayama* is one of the important preventive, curative and rehabilitative

measures mentioned in *dianacarya* and *ritucarya*. *Acharya Charaka* has explained that *vyayama* produces lightness in the body, provides ability to bear troubles, reduces aggravated *doshas* and improve the digestive power.^[2] It has been defined by *Acharya sushruta* that the activity which produces *ayasa* (tiredness) in the body is known as *Vyayama*.^[3] *Acharya Charaka* has described that the effort which produces stability and strength in the body is known as *Vyayama*.^[4] *Acharya Vagbhata* has also followed *Acharya Charaka's* view.^[5] *Vyayama* is the most helpful in prevention of psycho-somatic disorder.^[6] *Vyayama* vary according to individual body strength, age, diet pattern, season and climate.^[7]

Matra (symptom of proper Vyayama)

Symptoms of properly done *vyayama* are clearly explained as increase in respiration rate, lightness of body, sweating, feeling of some obstruction at cardiac region, *Vyayama* should be stopped after these symptoms appear.^[8]

Acharya Susruta explained as one should stop *Vyayama* at *Balardha* which means the time at which *Vayu* of *Hridayasthan* exit from mouth that is when breathlessness occur, one should stop *Vyayama*.^[9] Other symptoms of *Balardha* is sweating from axial region, forehead, tip of nose, all limb joints, and when mouth become dry. *Balardha Vyayama* means individual should practice exercise in half of own power.^[10] *Vyayama Kala* also has been described.^[11]

According to *Acharya Charaka* *Vyayama* provides lightness in body (*Laghuta*), maintains strength during

long work, exhaustion not felt early, body becomes stable, body does not express symptoms early even in adverse condition like heat, cold, thirst, and hunger (*Sthairya, Dukhasahishnuta*), pacifies *Vata Pitta Kapha dosha (Doshakshaya)* and increases digestive fire (*Agnivridhi*).^[12]

Benefits of Vyayama

Benefits of *Vyayama* according to *Acharya Sushruta* are if a person is ugly, after *Vyayama* they get beautiful look because of weight loss, proper muscles distribution compact body and proportionate figure (*Sudarshana*), enhances digestive fire, increases metabolic rate, thyroid function becomes normal, and old age does not attack early.^[13] Another benefit of *Vyayama* is loss of added fat (*Medakshaya*), so beneficial in obesity.^[14]

Through *Vyayama*, body become strengthen so compared with lion, and diseases not attack easily so disease compare with weak antelope in *Sushruta Samhita*.^[15]

Types of Vyayama

Niyudha, Bahuyudha, Adhva, Shilanirghat, Padaghat, Chankraman types of *Vyayama* describe in *Samhita Grantha*. *Niyudha* and *Bahuyudha* may be correlated with wrestling, *Adhva* and *Chankraman* means walking for long distance or simple walking *Shilanirghat* throwing or pulling stone, *Padaghat* means massage by feet.^[16]

Acharya Charaka has explained varieties of exercise for *Kaphaja Roga*. *Sleshma Prakruti Purusha* are indicated for *Padaghat* (massaging with feet), swimming, horse, elephant, chariot riding, practicing weapons, rotating weight, pulling rope, shooting arrow.^[17]

Complications

Before practice of *Vyayama* consider some factors like age of individual, strength and physical tolerance diet pattern, season, habitat (*Sadharan, Aanoop, Jangamdesha*). *Vyayama* is always beneficial for those who are physically strong and taken fatty diets (*Snigdha Ahara*).

Complication of over *Vyayama* is *Kasa, Svasha, Kshaya, Shosha, Jwara, Raktapitta, Bhrama, Klama*; may be correlated with respiratory disease, bleeding disorder, weakness, vertigo, tiredness.^[18]

Contraindication

Vyayama is contra indicated in condition of old age, for children, in pregnancy, state of depression, *Vataprakruti*, state of hunger and thirst, indulge in over sex, speak loudly, angry men, just after intake of food.^[19]

Modern View

The WHO reported that around 3.2 million deaths each year are attributable to physical inactivity.^[20] Five leading risk factors for death are high blood pressure, smoking, high blood glucose, physical inactivity and

obesity.^[21] Increasing physical activity level is the most important intervention to improve health in populations. In the literature, the term 'exercise' is frequently used to distinguish structured programs from incidental day-to-day physical activity, such as housework.^[22]

Types of exercise

Depending on the overall effect on the human body: Physical exercises can be generally grouped into two types^[23]

- **Aerobic exercise** is any physical activity that uses large muscle groups and causes the body to use more oxygen than it would while resting. Examples are exercise include cycling, swimming, brisk walking, skipping rope, rowing, hiking, playing tennis, continuous training, and long slow distance training.
- **Anaerobic exercise** which includes strength and resistance training. Strengthen muscles as well as improve bone strength, balance, and coordination. Examples of strength moves are push-ups, lunges, and bicep curls using dumbbells. Anaerobic exercise also includes weight training, functional training, eccentric training, interval training, sprinting.

According to the intensities of the exercise it can also divide to three categories, heart rate is typically used as a measure of exercise intensity.^[24]

- **Light exercise:** Does not induce sweating unless it's a hot, humid day. There is no obvious change in breathing patterns. Sleeping, writing, desk work, typing, very slow walking are the examples.
- **Moderate exercise:** It should raise your heart rate, make you breathe faster and make you feel warm enough to start to sweat after performing the activity for about 10 minutes. Breathing becomes deeper and more frequent. You can carry on a conversation but cannot sing. Bicycling, very light effort, calisthenics, home exercise, light or moderate efforts are the examples.
- **Vigorous exercise:** will make you breathe hard, increase your heart rate significantly and make you hot enough to sweat profusely after 3-5 minutes. Breathing is deep and rapid. You can only talk in short phrases. Running, jogging, jogging in place, calisthenics (e.g. pushups, sit-ups, pull ups, jumping jacks), heavy vigorous effort, rope jumping are the examples.

Health Benefits of Exercise

Exercise is performed for various reasons, including increasing growth and development, preventing aging, strengthening muscles and the cardiovascular system, honing athletic skills, weight loss or maintenance and merely enjoyment. Frequent and regular physical exercise boosts the immune system and helps prevent "diseases of affluence" such as cardiovascular, type 2 diabetes and obesity.^[25,26] It may also help prevent stress and depression, increase quality of sleep and act as a non-pharmaceutical sleep aid to treat diseases such as

insomnia, help to promote or maintain positive self-esteem, improve mental health, maintain steady digestion and treat constipation and gas, regulate fertility health, and augment an individual's sex appeal or body image, which has been found to be linked with higher levels of self esteem.^[27,28] Care providers call exercise the "miracle" or "wonder" drug—alluding to the wide variety of benefits that it can provide for many individuals.^[29,30]

Cardio respiratory fitness

There is arguably no measure more important for health than cardio respiratory fitness (CRF) (commonly measured by maximal oxygen uptake, VO_{2max}).^[31] Regular exercise makes the heart stronger and the lungs fitter, enabling the cardiovascular system to deliver more oxygen to the body with every heart beat and the pulmonary system to increase the maximum amount of oxygen that the lungs can take in. Low CRF is also well established as an independent risk factor of type 2 Diabetes and Cardiovascular disease morbidity and mortality.^[32] Similarly, It was reported that men who transitioned from having low to high CRF decreased their mortality risk by ~50% over an 8year period, whereas men who transitioned from having high to low CRF increased their mortality risk by ~50%. Exercise lowers blood pressure, slightly decreases the levels of total and low-density lipoprotein (LDL) cholesterol, and increases the level of high-density lipoprotein (HDL) cholesterol. These helpful effects decrease the risk of heart attack, stroke, and coronary artery disease. Lifelong aerobic exercise training preserves VO_{2max} into old age. However, cross-sectional data show that with lifelong aerobic exercise training, trained individuals often have the same VO_{2max} as a sedentary individual four decades younger. It is found that low estimated VO_{2max} increases mortality 4.5-fold compared to high estimated VO_{2max} .^[33] They concluded that exercise capacity is a more powerful predictor of mortality among men than other established risk factors for cardiovascular disease.

According to the American Heart Association (AHA), exercising 30 minutes a day, five days a week will improve your heart health and help reduce your risk of heart disease. You can even break it up into quick and manageable 10-minute sessions, three times a day.^[34]

Mental health

Many studies support physical activity as a noninvasive therapy for mental health improvements in cognition, depression, anxiety, neurodegenerative diseases (i.e., Alzheimer's and Parkinson's disease) and drug addiction. Various studies on mice and men have shown that cardiovascular exercise can create new brain cells (aka neurogenesis) and improve overall brain performance.^[35]

Many exercise-related improvements in cognitive function have been associated with local and systemic expression of growth factors in the hippocampus, notably; brain-derived neurotrophic factor (BDNF).^[36]

BDNF plays an important role in neuronal survival and growth, serves as a neurotransmitter modulator, and participates in neuronal plasticity, which is essential for learning and memory. Evidence available in the literature suggests that physical exercise especially aerobic exercise improves hippocampus function and increases BDNF in the serum. Studies suggest that a vigorous workout increases levels of a brain-derived protein (known as BDNF) in the body, believed to help with decision making, higher thinking, and learning.^[37] Studies found that three weeks of high-intensity cycling and five weeks of aerobic exercise improved cognitive functioning and increased levels of BDNF.

Exercise is good for relieving symptoms of depression and anxiety similar to psychotherapy. Exercise increases concentrations of nor epinephrine, a chemical that can moderate the brain's response to stress. The endorphins released during exercise create feelings of happiness and euphoria.

The following are the common psychological benefits gained through exercise.

- Improved mood
- Reduced stress as well as an improved ability to cope with stress
- Improved self-esteem
- Pride in physical accomplishments
- Increased satisfaction with oneself
- Improved body image
- Increased feelings of energy
- Improved in confidence in your physical abilities
- Decreased symptoms associated with depression

It is found that even a brief walk at low intensity can improve mood and increase energy. As little as 10 minutes of aerobic exercise can have a positive effect. Programs longer than 10 weeks work best for reducing symptoms of depression. Moderate-to-high intensity aerobic exercise can reduce anxiety sensitivity. Study suggests that 30 Minutes Exercise for 5 or more days in a week, it helps in lowering the desperation and mental stress.^[38]

Diabetes

Exercise is an important component in the management protocol of diabetes. It has a crucial role in controlling blood glucose (blood sugar) level. Higher level of glucose in Type 2 Diabetes is either due to insufficient insulin production or due to insulin resistance. In either case, exercise can reduce the glucose level by increased glucose uptake into muscles without insulin mediation. A single exercise bout increases glucose uptake by skeletal muscle, sidestepping the insulin receptor and thus insulin resistance in Type 2 Diabetes patients, exercise activates a downstream insulin-signaling pathway, facilitating GLUT4 expression translocation to the plasma membrane independent of the insulin receptor.^[39] This way regular practice of exercise can normalize the glucose level and can be considered as a very powerful

'drug' for type 2 Diabetes.

The first study, and only study to have separate study arms for diet and exercise, was in China. The pure exercise intervention group had a 46% reduction in the onset of Type 2 Diabetes, relative to the non treated group, after 6 year of the study. Diet alone reduced Type 2 Diabetes by 31% in the Chinese study.^[40] The American College of Sports Medicine and American Diabetes Association recommend that patients with type 2 diabetes participate in at least 150 minutes of moderate exercise weekly with resistance training two or three times weekly

Obesity

Obesity usually means an imbalance between energy intake and expenditure such that the excess energy is stored in fat cells. Exercise is the most important discretionary component of total daily energy expenditure, and thus has the potential to affect energy balance. Exercise increases the level of energy expenditure thus helps to burn the calories which in turn help in reduction of excess body weight. If supplemented with proper nutrition, exercise is the way to prevent obesity. A study conducted by the American College of Sports Medicine (ACSM) reveals that 150 and 250 minutes of moderate to vigorous exercise each week to lose weight^[41] that's roughly 22 to 35 minutes of exercise per day to lose weight.

Cancer

Exercise is one of the most important actions you can take to help guard against many types of cancer. Up to one-third of cancer-related deaths are due to obesity and a sedentary lifestyle. Moderate to vigorous physical activity like walking, running, cycling, swimming etc which makes sweating and increases heart beat helps in lowering the cancer risk. As per the data released by Cancer Research institute in 2020^[42], physically active shows 13-15% lower risk in bladder cancer, 12-21% lower risk of breast cancer, 19% lower risk of colon cancer, 20% lower risk of endometrial cancer (In fact the association is indirect as physical activity reduces obesity which is a strong risk factor for Endometrial cancer), 21% lower risk of esophageal adenocarcinoma, 12% lower risk of renal cancer, 23% reduced risk of kidney cancer and 19% lower risk of stomach cancer.

Exercise has many biologic effects on the body which have been associated with some specific cancers. These include^[43]

- Lowering the level of sex hormones such as estrogen and growth factors that have been associated with cancer development and progression(breast and colon)
- Preventing high blood levels of insulin which has been linked to cancer development and progression(breast ,colon)
- Reducing inflammation
- Improving immune system function

- Altering the metabolism of bile acids, decreasing exposure of the gastrointestinal tract to these suspected carcinogens(colon)
- Reducing the time it takes for food to travel through the digestive system, which decreases gastrointestinal tract exposure to possible carcinogens(colon)
- Helping to prevent obesity, which is a risk factors for many cancers

Exercise also has beneficial effects on cancer survivors. A report of American college of sports medicine concluded that moderate – intensity aerobic training and/or resistance exercise during and after cancer treatment can reduce anxiety, depressive symptoms and fatigue, beneficial for bone health and sleep quality and improve health related quality of life and physical function.^[44]

Immunity w.s.r COVID 19 pandemic

A properly functioning immune system keeps the body well and wards off infection risk. Exercise keeps the metabolic system and immunity geared up and functioning well. Exercise can cut off inflammation as well as flush out harmful toxins, bacteria and certain kind of viruses from your lungs and airways. Some studies also support that exercising boosts count of your disease-fighting antibodies and WBCs in the body and also mentions that high- intensity workouts could not just weaken the immune system, but also expose the body to more stress than usual, increase the likelihood of developing respiratory distress, complications from COVID as well as increase mortality risk.^[45] Moderate-intensity physical activity can boost your immune system, however high-intensity high volume training may suppress immune function.^[46]

Good news is that exercise appears to improve immune system response to vaccination also. Older adults with a chronic history of exercise, and those undergoing acute bouts of exercise before vaccination, produce more antibodies against strains of influenza. Several studies have seen this effect, though the clinical significance remains unclear as further research is needed. It's reasonable to assume the same exercise effect could occur with a COVID-19 vaccine.^[47]

WHO Guide lines for Exercise

As per WHO, physical activity needed for good health according to age groups^[48]

In a 24-hour day, infants (less than one year) should

- Be physically active several times a day in a variety of ways, particularly through interactive floor-based play; more is better.

In a 24-hour day, children 1-2 years of age should

- Spend at least 180 minutes in a variety of types of physical activities at any intensity, including moderate- to vigorous-intensity physical activity,

spread throughout the day; more is better;

In a 24-hour day, children 3-4 years of age should

- Spend at least 180 minutes in a variety of types of physical activities at any intensity, of which at least 60 minutes is moderate- to vigorous-intensity physical activity, spread throughout the day; more is better;

Children and adolescents aged 5-17 years

- Should do at least an average of 60 minutes per day of moderate-to-vigorous intensity, mostly aerobic, physical activity, across the week.

Adults aged 18–64 years

- Should do at least 150–300 minutes of moderate-intensity aerobic physical activity;
- Or at least 75–150 minutes of vigorous-intensity aerobic physical activity; or an equivalent combination of moderate- and vigorous-intensity activity throughout the week

Adults aged 65 years and above

- Same as for adults; and
- As part of their weekly physical activity, older adults should do varied multi component physical activity that emphasizes functional balance and strength training at moderate or greater intensity, on 3 or more days a week, to enhance functional capacity and to prevent falls.

Pregnant and postpartum women without contraindication should

- Do at least 150 minutes of moderate-intensity aerobic physical activity throughout the week
- Incorporate a variety of aerobic and muscle-strengthening activities
- Should limit the amount of time spent being sedentary.

People living with chronic conditions (hypertension, type 2 diabetes, HIV and cancer survivors)

- Should do at least 150–300 minutes of moderate-intensity aerobic physical activity;
- Or at least 75–150 minutes of vigorous-intensity aerobic physical activity; or an equivalent combination of moderate- and vigorous-intensity activity throughout the week

CONCLUSION

Based on these evidences explained in *Ayurveda* classics and Modern literature, we can conclude that exercise increases our lifespan, prevents obesity, and reduces the risk of almost every chronic disease: cardiovascular disease, diabetes and many cancers, promotes psychological well-being as well as improve quality of life. No other single behavior can do as much good for health. So exercise can be considered as a ‘miracle drug’ for health.

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