ISSN: 2322 - 0902 (P)
ISSN: 2322 - 0910 (O)

International Journal of Ayurveda and Pharma Research

Review Article

ROLE OF VYAYAMA IN PREVENTION OF LIFE STYLE DISODERS - A REVIEW

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Article info

Article History:

Received: 29-07-2022

Revised: 14-08-2022

Accepted: 25-08-2022

KEYWORDS:

Vyayama, Balaardha lakshana, benefits of *Vyayama*, prevention.

ABSTRACT

Physical inactivity is a primary cause of most chronic diseases. Because nowadays we are leading a sedentary life style which in turn leads to causation of many life style diseases as well which will going to disturbs our immunity system. *Swasthavritta* mainly deals prevention rather curing the diseases and also which suggests the *Dinacharya, Rutrucharya, Trayopatasthambha*, and *Vihara* etc. *Vyayama* also eliminates all toxin of the body& increases digestive fire, physical and mental strength, also which enhances the overall well-being. So *Vyayama* is an important preventive, curative and rehabilitative measure. *Ayurveda* Science describes several types of code and conducts of *Vyayama* for promotion of health and also prevention of diseases. The main aim of this work is review of *Vyayama* according to different *Ayurveda Acharya's* and to know the preventive aspect of *Vyayama* in different diseases.

INTRODUCTION

Prevention is better than cure. In India the disease profile is changing day by day and rapidly. The WHO has identified India as one of the nations that is going to have most of the lifestyle disorders in the near future. According to WHO lack of physical activity contributes to approximately 17% heart diseases and diabetes 12% of falls in the elderly, and 10% of breast cancer and colon cancer. And overall physical inactivity causes 9% of premature mortality worldwide.[1] people who are insufficiently physically active have an increased risk of all causes mortality compared to those who engage in at least 30 minutes of moderate intensity physical actively on most day of the week.[2]

According to classics it is stated that no creature in this universe is immortal, it is impossible to prevent the death, but it is possible to prevent disease, so one should try for that which are preventable. [3]A wise person should perform such actions which are good for his body / health as the officer in charge of the city and charioteer, in charge of the chariot protect city and chariot respectively.[4]

Access this article online	
Quick Response Code	
	https://doi.org/10.47070/ijapr.v10i8.2493

For further maintenance of health, one should take care of his body by neglecting all other things because if body is not healthy then nothing is existing.[5] This paper, aimed at studying and analysing the mechanisms, physiological positive effects of physical activity, indications contraindications, etc. are described in *Ayurveda.*

Ayurveda has not only described the beneficial effects of *Vyayama* but also has documented the harmful effects of excessive physical activity and the detrimental effects of *Vyayama* in certain health conditions where it is contraindicated. Exercise is so beneficial for health that it should be considered as a drug. As for any other drug, dosing of physical exercise is very important, otherwise, unfavourable side effects may occur.[6]

Review of *Vyayama*

Definition of *Vyayama*

The activity which produces tiredness in the body is known as *Vyayama*.[7]

The bodily movement which is meant for producing firmness and strength is known as physical exercise or *Vyayama*.[8] Activities which produces tiredness to the body are known as *Vyayama.* Lightness of the body, which increases capacity to work, good appetite, reduction of body fat and parts of the body becoming strong and firm are the good benefits of exercise.[9]

Classification of *Vyayama*

While explaining the *Hemanta rutucarya*, *Sushruta* quotes

- *Niyuddha*-Fighting, *Bahuyuddha*-Fighting with arms
- *Adhva* -walking for long distance
- *Silanirghatana*-Throwing / pulling the stone[10]
- *Cankarmana*, *Bharaharana*
- Even *Vagbhata acharya* explained various types of exercises in *Hemanta rutu*

Wrestling with skilled persons to half of his strength and *Padaghata* (foot massage) etc. regularly.[11]

- *Sarasisu plavana* (Swimming in a lake/pool), riding on *Haya/turaga* (Horse), *Gaja* and *Ratha* (Carriage/ chariot), *Sastra karma*, *Tulabramana* (Rotating weights), *Gunakarkana* (Pulling ropes), *Dhanurakarsana* (Shooting arrows) are forms of *Vyayama* explained in *Ayurveda*.

Maatra* of *Vyayama

Persons who wants to attain long and healthy and wealthy life should do physical exercise daily up to half of their capacity in all the seasons, it would prove injurious.[12]

Acarya caraka has explained *Matravat vyayama lakshana*

Signs of proper *Vyayama*

1. Sweating - *Swedaagamah*
2. Increased respiratory rate - *Shvaasavridhhi*
3. Increased heart rate - *Hridayoparodhachha*
4. Feeling of lightness in body- *Gaatranam laghavam,*
5. Dryness of mouth - *Mukhasosha*
6. Exertion- *Ayaasa*[13]

Balardha laksana* of *Vyayama* acc to different *Acharya's

Sushruta	***Charaka***	***Vagbhata***	***Yogaratnakra***
Gatranamlaghvam	*Swedaagamah*	*Balavaan*	*Svedopagamana* in *lalaata*
Hridayoparodha	*Shvaasavridhhi*	*Snighdha bhojana*	*Sevedopagamana* in *Naasa*
Swedaagamah	*Hridayoparodhachha*	In *Hemantha, Sisira* and *Vasanta rutu*[17]	*Svedopagamana* in *Gaatra sandhishu*
Shvaasavridhhi	*Gaatranam laghavam*		*Svedopagamana* in *Kaksha*[18]
Vaya, Bala	*Mukhasosha*		
Sharira prakriti	*Ayaasa*[16]		
Desha, Kala, Ashan[14-15]			

***Maatra of Vyayama* based on *Rutu's*–** The person who is healthy and strong, taking *Snigdha ahara* should perform the regular exercise of the following grade as per the *Rutu.*[19]

1. *Alpavyayama*– in *Grishma*, *Varsha*.

2. *Balardha*– in *Sharat*, *Hemantha*, *Shishira* and *Vasanta* season.

3. *Ativyayama*- excess exercises should not adopt in any seasons.

Different grade of *Vyayama* is advised in different seasons because the *Sharira bala* does not remain same all through the year, it differs with the seasons. *Sharira bala* is *Sreshtha* in *Hemantha*, *Shishira*, *Madhyama* in *Sharath*, *Vasanta* and *Alpa in Grishma*, Varsha season[20]

***Vyayama Kala* [21]**

Suitable time for *Vyayama*

- *Pratyusa*– *Hemanta*-4-6 am
- *Purvanna* – *Vasanta*–6-9 am
- *Aparanna* – *Pravith*-5-7 pm

Ultimately these can be considered as appropriate time for *Vyayama* and these are the *kaala* where the person will be in empty stomach or food consumed will be digested. So *Vyayama* should perform in empty stomach.

Contraindicated time

- *Madhyanha* – Afternoon- 12:00 Pm
- *Madyaratri* –Mid Night-12:00 Am

Are not suitable time for exercise and even *Vyayama* is contraindicated soon after food intake.

***Vyayama* Based on Rutu (Season)**

Strong healthy individual should indulge in regular exercise up to *Ardha sakti* in *Vasanta*, *Hemanta* and in *Sisira rutu*.

In other *rutu* that is in *Varsa*, *Sharad* and *Grisma rutu* person should exercise half of their capacity *Ardha sakti.* [21]

In *Aatapa kala* (*Grisma* = summer season), *Vyayama* is contraindicated.

Contraindicated seasons according to *Acarya caraka Grishma rutu, Varsa rutu* [22]

Benefits of *Vyayama*

Who indulging themselves in regular exercise helps to digest the food easily even it is incompatible food. [23]

Promotive Benefits

Acarya Caraka [24]

- *Laghavam*-lightness of the body
- *Sthirata*-brings stability and firmness
- *Karma samarthya*-capacity to do work
- *Dubkha sahishnuta* -Capacity to withstand pain and discomfort
- *Dosa kshaya* -Pacifies the *Kapha dosha*
- *Agni vruddhi* -Incraeses the digestive capacity
- *Sariropacaya*-Proper nourishment, *Gatranam suvibhakto* –Proper and well-structured body
- *Srama, Klama, Pipasa, Sita, Ushna, Sahishnuta*
- Postpones the senile period.[25]

Preventive Benefits: [26-27]

- Helps to reduce the body weight- *Sthaulya apakarspam*
- Helps to reduce the deposited fat- *Meda kshaya*
- Helps to digest the *Viruddha* and *Avipakva anna*

Mode of action of *Vyayama* on body

- Develops musculature by improving circulation to all body parts.
- Exercise also gives massaging effect over the vital organs like liver, pancreas, spleen; stomach which may secrete the digestive juices and enzymes by this it increases the digestive capacity.
- Increases the carbohydrate metabolism (Glycolysis)
- Lipolysis of accumulated adipose tissue, (Gluconeogenesis)
- Perspiration takes out the accumulated toxins from the body.
- Makes body to feel light & active.
- Increases oxygen supply to remote tissue.
- Increases basal metabolic rate.[28]

Physiological effects of *Vyayama*

Regular exercise has a lot of scientifically proven health benefits; it has prophylactic and therapeutic values also *Sushrutha* has advised that physical activity is the best measure to reduce obesity *(Sthaulya),* and the persons who exercise daily are not afflicted by diseases. For mitigation of all the three *Dosha Vata, Pitta, Kapha Vyayama* is always best. The role of exercise and physical activity in health and disease has been appreciated by various researchers and now the physiology of exercise has been included as a separate chapter in Modern physiology.

Recognising the beneficial effects of physical activity American College of Sports Medicine (ACSM) has recommended moderate degree physical activity in daily routine and has given guidelines for it. ACSM and the American Heart Association in year 2007, have also reported that routine of daily physical activity (PA) stimulates a number of beneficial physiologic changes in the body and can be highly effective for prevention and treatment of many of most prevalent and pernicious chronic diseases, including coronary heart disease (CHD), hypertension, heart failure, obesity, depression, and diabetes mellitus.[29]

Indications for *Vyayama*

It is indicated in disorders produced due to *Vriddhi of Kapha dosha* and increased *Meda* like in *Medoroga*, *Prameha*.

Acharya Charaka and *Sushrutha* both has advised *Vyayama* in the form of various physical activities like wrestling, sports riding, and brisk walking in the prevention and management of Diabetes and *Urusthambha* [30-31]

Sushruta has advised journey on foot of hundred *Yojana* in management of greatly increased diabetes for poor patient [32]

Contraindications for *Vyayama* [33, 34-35]

Person who indulge in following activities are contraindicated for *Vyayama karma*

- *Ativyavaya*, *Bharagrahana*
- *Adhva*,
- *Bala*
- *Vrddha*
- *Bahu bhasaka*
- *Pravata sevana*
- *Atiksudhita trşita*
- *Bhojanante & Ajeerna*
- In *Vata Pitta vyadhi* in *Svasa*, *Kasa*, *Ksata*, *Bhrama Vyayama* is contraindicated

Excessive indulgence in exercise may give rise to complications like tiredness, emaciation of rasa *Raktadi dhatu, Klama, Trishna, Rakta pitta, Pratamaka svasa*, *Kasa, Jvara, Vamana, Arocaka* etc.*[36-38]*

Vyayama causes increase in *Vatadosha* so it not indicated in conditions in which *Vatadosha* is found increased like in old age, weight loss, and after some *Panchakrama* procedures like *Vata dosha, Virechana karma*.[39] Physical activity is contraindicated in acute inflammatory state of disease like *Vatarakta, Visarpa,* Intake of *Madya* (wine) after physical exertion may give rise to different diseases.[40]

Poisoned person should not perform exercise. [41]

***Vyayama* as Preventive Measure**

1. Primary prevention

Vyayama which prevents the risk factors & onset of diseases like obesity, cancer, hyperlipidemia, diabetes, cardiovascular diseases.

Physical exercise was correlated with a lower methylation frequency of two tumour suppressor genes. CACNA2D3 & L3MBTL which can cause gastric cancer & breast cancer, brain tumours, haematological malignancies respectively on hyper methylation.

Individual who exercise more minutes in a week has lower levels of DNA methylation.[42]

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.

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 up take 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.

Exercise increases the level of energy expenditure thus helps to burn the calories which in turn help in reduction of excessive body weight. If supplemented with proper nutrition, exercise is the best 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 that's roughly 22 to 35 minutes of exercise per day to lose weight.

Vyayama has been described as important part of the treatment of obesity. Studies have concluded that exercise training is helpful for weight reduction and lowering the CRP level. Aerobic fitness and exercise programs such as walking, jogging, and aerobics have been encouraged as a means to reduce total cholesterol, low-density lipoprotein cholesterol (LDL-C) and triglycerides while elevating the "good" high-density lipoprotein cholesterol (HDL-C), Few studies are suggestive that resistance training may also. Increases lipid and lipoprotein profiles. Decrease in total cholesterol and LDL-C have been reported in both male and female, while women also showed a significant decrease in triglycerides, from resistance training. Decrease in weight was observed after isotonic exercise.[43]

According to the American Heart Association (AHA), exercising 30 minutes a day, five days a week will improve heart health and help reduce risk of heart disease. You can even break it up into quick and manageable 10-minute sessions, three times a day.[44]

As per the data released by Cancer Research institute in 2020, physically active shows the 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 oesophageal adenocarcinoma,12% lower risk of renal cancer, 23% reduced risk of kidney cancer and 19% lower risk of stomach cancer.[45]

2. Secondary prevention

Vyayama can prevent the complications of diseases like lipidemia, Hypertension, Diabetes, Insomnia.

Exercise lowers the 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. [46]

Recent study reveals that exercise is the most recommended alternative option given in the condition of Insomnia rather than sleeping pills. [47]

The first study, and the 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 6year of the study. Diet alone reduced Type 2 Diabetes by 31% in the Chinese study. 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 [48]

3. Tertiary prevention

Recurrent and regular exercise has also been shown to prevent or to recover major illnesses such as insomnia and depression, musculoskeletal, neurological diseases. Exercise is also have role in improving the brain function.[49]

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. [50]

Recurrent and regular exercise has also been shown to prevent or to recover major illnesses such as insomnia and depression. Exercise is also found to improve brain function.[51]

Exercises have been shown to be Neuro protective in many neurodegenerative and neuromuscular diseases. Frequent exercise may reverse alcohol induced brain damage. Physical & aerobic exercise helps in increasing the blood and oxygen flow to the brain helps in increasing growth factors that helps in neurogenesis and promote the synaptic plasticity possibly by improving short- and long-term memory. It increases Neuro-chemicals in the

brain that helps in cognition, such as dopamine glutamate, nor-epinephrine & serotonin.

Particularly aerobic exercise is used as treatment for Depression [52]

The following are the common psychological benefits gained through exercise. Improved mood, Reduced stress as well as an improved ability to reduce the 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 of depression.[53]

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 leave and physical function.[54]

In *Ayurveda* also our *Acharya* quoted that *Dhi, Dhairya, Atamaadi vignana* these are the measures by which we can give *Satvaavajaya Chikitsa* to those who are suffering from mental disorders to overcome from their illness and to give mental support.[55]

In musculoskeletal disorders like chronic arthritis, joint stiffness, muscular contractures, cervical spondylitis, post surgeries, etc. exercise can be considered as main rehabilitative treatment and for the promotion of health.

Also in neurological disorders like epilepsy, cerebral palsy, poliomyelitis, acute spinal cord injury, post surgeries, etc. in those conditions exercise will allow to experience less stiffness as well as re-functioning of affected system.

CONCLUSION

- *Ayurveda* given a realistic description related to preventive, promotive and therapeutic significance of *Vyayama.*
- *Charaka* and *Sushruta Samhita* strongly supported that *Vyayama* is essential for a person to maintain normal health and also prescribed it for prevention and curative purpose also in rehabilitation.
- So we conclude that physical exercises increase our lifespan and maintenance of normal health by preventing many lifestyle diseases and it reduces the risk of every chronic diseases.
- *Vyayama* promotes psychological well-being as well as improves quality of life. No other single attitude can do as much good for health. So exercise can be considered as drugless therapy for health.
- Further researches can be conduct in high-lightening the *Ayurvedic* literatures about *Vyayama* in a scientific way so that it can be acceptable by general population and they will adopt it as a daily routine.

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Cite this article as:
Priyanka Shastri, Chandrashekaraddi S. Karamudi, Prabhu C. Nagalapur. Role of Vyayama in Prevention of Life Style Disorders - A Review. International Journal of Ayurveda and Pharma Research. 2022;10(8):83-89.
https://doi.org/10.47070/ijapr.v10i8.2493
Source of support: Nil, Conflict of interest: None Declared

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