

## **EFFICACY OF KAPALBHATI ON CARDIOVASCULAR SYSTEM**

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### **ABSTRACT:**

World has seen enough ups and downs during Covid-19 period. Thousands of people were losing their lives everyday as we were not capable enough to fight with the virus. Situation was getting worse and worse every day. Advisory released by the Ministry of AYUSH advised everyone to stick with some ayurvedic treatment such as gargling with turmeric mix lukewarm water, use of cinnamon & bay leaf in their routine diet to improve immunity. In the same Ministry of AYUSH also advised to perform some yoga-based practice like asana, pranayama, meditation specially KAPALBHATI as a shield to protect oneself from the covid-19. Physiologically, Kapalbhathi works as a broomstick to cleanse the respiratory system. Hence it proved very helpful to prevent and recover us from the clutches of the virus. In general, it is very good practice to strengthen our respiratory system and boost up its mechanism. Studies suggest that it has a positive impact on respiratory rate, respiratory rhythm, lung volume, breath holding capacity, cardiac-output, tidal volume, strength of lungs & heart muscles. The purpose of this article is to explore and present a comprehensive review of the literature based on Kapalbhathi and its physiological impact on our human body, especially on cardio-vascular system.

**KEYWORDS:** Shatkarma, Vatkrama, Vyutkrama, Sheetkrama, Cleansing, Cardio-Vascular.

**INTRODUCTION:** Yoga has been a practice from the ages that combines body, mind, and soul. It is a divine journey for achieving harmony, peace, balance, and the most important union between these three. Yogic theories suggest that it is mandatory to cleanse your body internally & externally first to start your journey.

From yogic perspective, cleansing practice is generally a set of practices that pushes practitioners forward in their way. According to the famous yogic text ‘Gheranda Samhita’, there are six different types of cleansing practices. Collectively, it is termed as Shatkarma where Shata means six, Karma stands for practices. Dhauti, Basti, Neti, Nauli, Trataka & Kapalbhathi are six cleansing techniques mentioned in Gheranda Samhita. Dhauti means to wash, Dhauti itself has different types and techniques and all those practices are focused on cleanliness of our digestive system. Basti is cleansing practices based on our lower abdominal organs such as rectum, anus, and large intestine. Neti is known as E.N.T. cleanser. Nauli work as a whirlpool to give massage to our all-abdominal muscles as well as surrounding glands and organs associated with the digestive system so that they can work in proper and better manner. Trataka is a gazing practice which helps to get our eyes clean and strengthen respective eye muscles. Kapalbhathi is the last practice in the series which emphasizes the respiratory system both internally and externally. In this research paper we will discuss all three types of kapalbhathi i.e. vatakrama kapalbhathi, vyutkrama kapalbhathi & sheetkrama kapalbhathi and its effectiveness on our cardiovascular system.

### **Review of literature:**

Being one of the traditional practices, kapalbhathi has been tried and tested by various people for medical and traditional purposes. Lots of the experiments and research work has been done before for the same. Gore in (1984) studied and found drastic change in tidal volume while practicing kapalbhathi; it was 150-200 ml in comparison to normal breathing that ranges between 450-500 ml per breath. Gore discussed that kapalbhathi also stimulates the nerves of the abdominal (Navel)region. In 2008 Kennedy and others studied the effects of unilateral forced nostril breathing on the heart and found that there is a unique unilateral effect on sympathetic stimulation of the heart after the practice of Kapalbhathi & others. Kuna and others in 1991 studied “*Kapalbhathi: Yogic cleansing exercise, cardiovascular and respiratory changes*” and found nine beats per minute increase in heart rate after Kapalbhathi.

### **Research Questions:**

- What other types of physical benefits one can get from practicing kapalbhathi?
- What are the other techniques to perform kapalbhathi practices?
- Is there any relation of kapalbhathi with Tridosha i.e., vata, pita & kapha?

### **Research Objectives:**

- Identify the effect of Kapalbhathi on some physiological activities like heart rate, respiratory rate pulse rate etc.
- To identify the connection between kapalbhathi and the sympathetic nervous system.
- To discuss the benefit of practicing kapalbhathi in respiratory disorders like asthma & sinusitis.

**Research Methodology:** Present research is based on secondary data. All the facts and theories given in this research work are adopted by using review method. Various research papers, & articles, different journals, various authentic websites like PubMed, research gate and google scholar has been used as a source of secondary data for this research work.

## **INTRODUCTION:**

As mentioned earlier, Kapalbhathi is the last of the six shatkarma. Kapalbhathi is also termed as '**BHALBHATI**' in Gheranda Samhita. **Kapal** and **Bhala** both are Hindi translations of '**forehead**' or '**Cranium**'. Cranium is a combination of eight bones of our head. So collectively, Kapalbhathi or Bhalbhathi is a cleansing practice of the human forehead. In general, we also know kapalbhathi as a **FRONTAL BRAIN CLEANSING PRACTICE**.

In spirituality, **Bhati** means light, shine, perception, knowledge etc. Hence kapalbhathi refers to a practice which strengthens or solidifies our brain physiologically and awakens those latent and inactive centers which are very much responsible for perception. Kapalbhathi somehow looks like a pranayama named as Bhastrika, but both are having lots of differences in terms of technique, usages, and benefits. Gheranda Samhita states there are three types of Kapalbhathi – Vatakrama, Vyutkrama and Sheetkrama kapalbhathi discussed below.

## **VATAKRAMA KAPALBHATI:**

It is one of the common versions of kapalbhathi that people know about. Vata normally stands for Vayu i.e., 'Air'. So, the basic tool that is going to be used in this practice for cleansing is Vayu i.e., '**Air**'. This practice looks very much similar to Bhastrika Pranayama but there are differences between these two. There are different types of techniques mentioned in the yogic text to perform kapalbhathi but we will discuss one of the traditional methods given by Maharishi Gheranda, author of Gheranda Samhita. To practice vatakrama kapalbhathi one needs to sit at any meditative posture like Sukhasana (simple cross leg posture), Ardha-Padmasana (Half lotus posture) or Padmasana (Lotus posture) with concentration on their breath.

As practitioner has to go for an alternate nostril breathing, the practitioner has to apply some hasta mudra (Hand gesture). For that right thumb and right ring finger plays an important role. Practitioner needs to close the right nostril by using the right thumb to allow inhalation through the left one and breathe fully as possible but comfortably. Then, by pulling or contracting abdominal muscle one has to breathe out forcefully through the right one by closing the left nostril, using the right ring finger. Same process will be followed by blocking the left nostril by the right ring finger and breathing through the right nostril and again one must exhale forcefully through the left nostril by closing the right nostrils with the right thumb. So not only the breath but the thumb and ring finger of the right hand also works alternately. This will consider one frequency or round of vatakrama kapalbhathi.

Author of Hatha Pradipika, Swami Svatmaram has also discussed how one should perform vatakrama kapalbhathi. He has mentioned that practitioners have to breathe from both nostrils. Breath should be felt as if it is entering in the abdomen not in the chest. After consuming the proper amount of breath, the practitioner has to exhale forcefully through both nostrils.

### **VYUTKRAMA KAPALBHATHI:**

Vyutkrama Kapalbhathi is also known as **sinus cleansing**. In general, or in mathematics Vyutkrama means reverse or opposite. How is this practice differing from the previous one? So, the major difference between these two is the tool one is using for the cleansing in these practices. In vyutkrama & sheetkrama practice, practitioners will use water instead of air for cleansing.

In this practice, practitioners need a bowl of lukewarm saline water. One should take some of the water in their palm. Practitioners need to lean a bit forward, place the water filled palm near the nostrils and then try to sniff the water through the nostrils. Let the saline water flow through the nostril down into the mouth and then have to spit it out from the mouth. Because we are pulling water from the nostrils not from the mouth, that is why it is termed as Vyutkrama.

### **SHEETKRAMA KAPALBHATHI:**

Practice of Sheetkrama Kapalbhathi is opposite of vyutkrama kapalbhathi. ‘Sheet’ word stands for **coolness** or **cooling effect**. In this practice, practitioners must lean forward and take a mouthful of lukewarm saline water but instead of drinking or gulping it, practitioners need to push it up toward the palate so that water flows out through the nostrils. Practitioners must make sure that one has to apply a

bandha (lock) at the throat by joining chin to the chest i.e., Jalandar Bandha (Throat Lock), so that water doesn't enter into our food pipe or windpipe.

It is very important to know about the prerequisites and contraindications linked with these practices such as whether practices should perform in standing or sitting manner? Is everyone capable of practicing these practices? What type of other practices are required or useful before practicing kapalbhathi? What is the best preferred time, month, or season for attempting kapalbhathi? What to do if water entered our ears, brain cavities or other parts instead of the required part? What type of food behavior should one follow while performing these practices? What type of practices is required after the completion of the practice? Does one need guidance from any yoga teacher or can one do it on their own? These practices are made for the betterment of practitioners but according to famous poet and historian Thomas B. Macaulay half knowledge is always worse than ignorance, these practices can lead to some major or minor problems if one does not know about these traditional yogic techniques properly.

## **INTRODUCTION OF CARDIOVASCULAR SYSTEM:**

Cardiovascular word is a combination of two different words Cardio & Vascular. **Cardio** originated from the Greek word '**Kardia**' that means '**Heart**' whereas **vascular** comes from the word '**vascularis**', i.e. of or pertaining to **vessels** or **tubes**. So, the heart and channels of blood vessels present in our body collectively make up the cardiovascular system. Heart is a muscular organ, having the size of a human fist. Our heart delivers oxygen, nutrients, hormones & removes carbon dioxide, waste products throughout this complex network of blood vessels. Besides it, this mechanism is also important for regulating our body temperature, blood clotting and protection against disease and infection as blood continuously runs within these vessels. Thus, the blood circulatory system is one of the most important systems of our human body.

Respiratory rate is the number of the breaths taken per minute. Studies suggest that a respiratory rate of a normal human being took 12-18 breathe per minute & approximately 22000 per day. Definitely it is one of the main vital signs of the human body to be alive. The speed, pattern & depth of our breath shows how well our body is behaving. Coordination between the respiratory system and cardiovascular system decides how efficiently gaseous exchange takes place between our cells. Every time when we breathe oxygen enters in our nose through nostrils and then passes through different organs and cavities such as pharynx, larynx, windpipe, bronchi etc and ultimately reaches the lungs. This oxygen first moves to the blood then to heart and ultimately pushes out by heart to deliver

oxygenated blood (oxygen mixed blood) to every single cell and tissue of the human body through a network of vessels. In proportion through these vessels, carbon dioxide reaches at our nostrils and then comes out from our body and this is how the functioning of our respiratory system and cardiovascular system depends on each other.

### **IMPORTANCE OF KAPALBHATI:**

As we have discussed earlier the number of the breath taken by a normal healthy being in one day, it is quite obvious to understand the busyness of the respiratory system. Respiratory system relies on the cardiovascular system to deliver oxygen it gathers. For the proper functioning of our body the right amount of oxygen should reach every cell of the body at the right time but some physiological, psychological factors or any imbalance in our body can lead our cardiovascular system to work differently.

According to Ayurveda, the human body is made up of tridosha i.e., Vata (Air), Pitta (Bile) and Kapha (Phlegm). Each cell of the body is made up of tridosha. All physiological and biological functions of our body are regulated by these tridosha. Balance of vata, pitta and kapha is a sign of a healthy state. Thus, it is very important for the extensive well-being and health of an individual. Ayurveda believes that the human body consists of thousands of nadis. Word 'Nadi' originated from the word 'Nada' that means **'to flow'** or **'energy channels'**. Our body uses these networks of nadis as a supply chain network. It is very important that these channels should be clean and clear so that the necessity of every single cell should be reached at the right quantity and right time. Kapalbhati works as a cleansing agent or we can say works like a broomstick to make these paths clear for smooth transportation. Anatomy says that the respiratory system has mucus glands that continuously produce mucus for lubrication and for safety purposes but excessive production and accumulation of mucus at any part of the system can be responsible for higher respiration rate, higher heart rate, difficulty in breathing and some other respiratory related issues. This is why it is mandatory to keep these passages clear and open so that the transition of oxygen and carbon dioxide takes place properly. Kapalbhati is one of the most effective techniques to do so. Study suggests that not only it clears the passage but also boosts the circulatory system to reach oxygen, nutrients etc., to the foremost cells present in the body.

### **EFFECT OF KAPALBHATI ON CARDIOVASCULAR SYSTEM:**

A team of researchers found out after their study, that regular practice of kapalbhati for two months initially led to energizing our body and expelling carbon

dioxide. It also produces heat in the body that means it activates the sympathetic nervous system during the practice. It also helps to convert deoxygenated blood to oxygenated blood. In 2022, Varun Malhotra, Department of Physiology, AIIMS, Bhopal and others found in his study that kapalbhati increases gamma wave activation post practices that are a good sign of very high concentration level. It also helps to improve mood as well as reduces abdominal fat. It further helps to increase the functioning of the heart, strengthens heart & lungs muscles, improves blood circulation, clear nasal passages, removes accumulated mucus, dirt or dust particles, pollutants from the respiratory system. In 2016, Baljinder Singh Bal found significant differences in Vital Capacity (VC), Tidal Volume (VT), Expiratory Reserve Volume (ERV), and Inspiratory Capacity (IC) in university going girls. Ranil Jayawardhana (Department of physiology, Faculty of medicine, University of Colombo, Sri Lanka) and others found in his study that kapalbhati is very effective and beneficial for asthmatic patients. It is also seen in multiple researches that regular practice of kapalbhati strengthens abdominal muscles, reduces abdominal fat, massages muscles as well as organs of cardiovascular and digestive system, thus helps in proper excretion and many more. Some other research suggests that this practice is very beneficial in polycystic ovarian syndrome and Attention Deficit Hyperactive Disorder and sleep related disorders. In 2016, Reshma Ansari Department of Basic Medical Sciences, Cyberjaya University College of Medical Sciences, Selangor, Malaysia stated that kapalbhati would help to address infertility in PCOS women.

It was seen that just because of this practice water enters the nose through nostrils and it touches and activates those areas, basically nerves present in nasal passage which generally do not meet water. According to yogic text, this region has immense importance in spirituality because one of the mudras (gestures) that a practitioner wants to attempt or to succeed in to attain higher spiritual aspect belongs to this particular region; Khechari Mudra. According to yoga spirituality Khechari Mudra is one the keys known for the activation of Bindu chakra (Crown Chakra). So, this nasopharyngeal region is claimed to have a higher position in spirituality, and can be reached out by using this vyutkrama kapalbhati very easily. Physiologically, warm saline water helps to clear mucus, dust or dirt particles, phlegm from nasal passages & pharyngeal region so that gaseous exchange can be done smoothly. Definitely if, it happens in the above-described way, it will definitely improve the work efficiency of the cardiovascular system.

Effect of sheetkrama kapalbhati is very much similar to vyutkrama kapalbhati as we have discussed earlier that in these two, we use the same tool for the cleansing i.e., water. Gheranda Muni has mentioned that this practice had an impact on our

skin, specifically face. Face starts to glow as impurities are no more there in the nasal passage and in the cranial cavities. In 2009, Yun-Hu Wang and others found that normal saline nasal irrigation improves Pediatric Rhinoconjunctivitis and decreases acute sinusitis symptoms. In 2019, S. Meera and others found that progression and occurrence of upper respiratory tract infections can be greatly reduced by the practice of jal neti. Researches support its efficacy in managing sinusitis, allergic conditions and improving vision. Proper circulation of oxygenated blood, nutrients filled food will nourish every single cell of the region as the region doesn't have any impurities in it and now become pure, clean and healthy.

### **CONCLUSION:**

After the above discussion about the different types of kapalbhati, procedures & benefits, it is obvious to say how important these practices are for the effective functioning of the cardiovascular system & longevity of human beings. All the research mentioned here in this paper proves that theories given by the famous yogis in yogic scripture centuries ago, have significance at present as well. This ancient and pious yogic practice has the essence of physiological & psychological benefits in it.

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