

Research Article

## Effect of *Kapalbhati* on Blood Pressure in Naive

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### ABSTRACT

**Background and Objectives:** *Kapalbhati* is among one of the cleansing act (*shatkarma*) in yogic philosophy. It is highly recommended for those who have to do great deal of study and need a clean, clear mind. This study was conducted among medical students at Nepalgunj medical college, Nepalgunj, Nepal.

**Material and Methods:** This analytical study was conducted among 100 medical students of Nepalgunj Medical College, Nepalgunj, Nepal who gave consent and performed *Kapalbhati* correctly were included in the study. SBP and DBP were the cardiac parameters taken. Those parameters were taken before, immediately, after 1 minute, 2 minutes and 3 minutes of *Pranayama*. The data were entered in SPSS and Statistical analysis was done using version 23.

**Results:** As in usual exercises, SBP and DBP increases significantly immediately after *Kapalbhati* session when compared with the value before exercises. The basal (pre-*Kapalbhati*) mean SBP and DBP were  $125.76 \pm 7.36$  and  $82.92 \pm 5.75$  which increases up to  $143.60 \pm 11.18$  and  $90.33 \pm 7.90$  respectively immediately after exercises and fall after 3 minutes of exercises value being  $127.05 \pm 10.93$  and  $81.38 \pm 5.38$  respectively.

**Conclusion:** There is significant rise between Pre-value and post-value (immediate) of all parameters and significant fall of all parameters if compared between post-value and after 3 minute.

**Key words:** *Pranayama*, *yoga*, *Kapalbhati*, Blood Pressure.

### INTRODUCTION

Yoga is an ancient philosophical and religious tradition thought to have originated in India in 5000 BC. Now a days, modern medical

physician also recommend yoga and yogic life style in stress related disorders such as obesity, hypertension, coronary artery diseases and diabetes mellitus, which are

rooted in faulty life style and psychological stress. Yoga is the best lifestyle modification, which aims to attain the unity of mind, body and spirit through asanas (exercise), pranayama (breathing) and meditation [1, 16, 17, 20-22].

Regardless of its spiritual origins, yoga has become a popular route to physical and mental well-being [2, 3] and has been adapted for use in complementary and alternative medicine in North America and Europe [4, 16, 17, 20-22]. In Western societies, yoga is gaining increased popularity as a therapeutic method. About 14 million adult Americans (6.1% of the population) reported that yoga had been recommended to them by a physician or therapist [5]. In the United Kingdom, yoga is even promoted by National Health Service as a safe and effective approach to improve health in both the general population and diseased patients [6]. Yoga has been shown to reduce important psychological cardiovascular disease risk factors such as stress [7, 8] and depression [9].

The study done by Malhotra et al suggested that there was significant drop of heart rate after practice of *Chandra nadisuddhi pranayama* in yogic and naive group but the drop was high in yogic group as compared to naive group [10]. Kapalbhathi and its effect have not been studied well. Very few researches have been done to observe the effect of Kapalbhathi. Recently, Nayak et al (2016) reported that cardiac parameters i.e. SBP, DBP and HR increases significantly during kapalbhathi but when compared pre-kapalbhathi data with post-kapalbhathi data; increase was insignificant [11]. With this background, this study has been designed to see the acute effect and recovery time of

kapalbhathi pranayama among Naive i.e. new practitioners of yoga.

## MATERIAL AND METHODS

The study was conducted by Department of Physiology, NGMCTH, Nepalgunj, Nepal during April 2016 to October 2016. Only healthy individuals are included in the study. Total sample size was 100 (50 males & 50 females). A detailed demographic profile of the participants like height, weight, age was recorded and body mass index (BMI) was calculated. All the members of research group were actively involved in the collection of data and were cross checked by one another for any missed information. The aim and objective of the study were explained to each of them and verbal consent was taken. A baseline record of SBP (mmHg) and DBP (mmHg) were recorded before starting *pranayama*.

The participants were undergone to the supervised training of *kapalbhathi pranayama* prior to the study. They were directed to sit in an easy and steady posture either in a lotus posture i.e. *Padmasana* or a comfortable sitting posture i.e. *Sukhasana* with the head, neck and trunk erect and in a straight line and keep the body still during practice of *pranayama* in a calm and quiet room. Practice of kapalbhathi was performed in following steps as followed by Nayak et al., [11]:

- I. First sit on the padmasana and close your eyes and keep the spine straight.
- II. Now take a deep breath through both nostrils until your lungs are full with air.
- III. Now exhale through both nostrils forcefully, so your stomach will go

deep inside. As you exhale you feel some pressure in your stomach.

IV. Repeat this process for next cycle.

They performed *kapalbhati* for 3 minutes (min. 100 strokes). With maintaining padmasana position, *kapalbhati pranayamaa* was performed and BP was noted immediately after the end of *pranayamaa*. The participants were instructed to take rest. SBP and DBP were measured by digital sphygmomanometer, Kroger, Automatic upper arm blood pressure monitor (Model No- BP3AQ1-1KRO) manufactured in China. The data were entered and analysed using SPSS statistical software (version 23).

**RESULTS**

**Table 1: Demographic details of the subject**

Variables	Mean ± SD
Age (years)	19.90 ± 1.52
Weight (Kg)	58.26 ± 11.77
Height (cm)	164.71± 10.11
BMI (Kg/m <sup>2</sup> )	21.46 ± 3.92
Waist (cm)	79.89 ± 11.11
Skin Fold Thickness (cm)	2.60 ± 0.77

**Table 2: Comparison of mean of variables for Pre- and Post- *Kapalbhati***

Variables	Pre	Post (Immediate)
SBP (mm of Hg)	125.76 ± 7.36	143.60 ± 11.18*
DBP (mm of Hg)	82.92 ± 5.75	90.33 ± 7.90*

SBP: Systolic blood pressure; DBP: Diastolic blood pressure; \*, Significant at p value ≤0.05

**Table 3: Comparison of mean of variables for post- and after 3 min- *Kapalbhati***

Variables	Post (Immediate)	After 3 min
SBP	143.60± 11.18	127.05± 10.93*
DBP	90.33 ± 7.90	81.38 ± 5.38*

SBP: Systolic blood pressure; DBP: Diastolic blood pressure; \*, Significant at p value ≤0.05

**Table 4 : Comparison of blood pressures Pre-, post- and after 1, 2, and 3 minutes after *Kapalbhati***

Variable	Pre	Post	After 1 min	After 2 min	After 3 min
SBP	125.76 ± 7.36	143.60 ± 11.18	136.18 ± 11.76	130.32 ± 11.52	127.05 ± 10.93
DBP	82.92 ± 5.75	90.33 ± 7.90	86.90 ± 6.72	84.43 ± 4.91	81.38 ± 5.38

**DISCUSSION**

With increased awareness about health and increase interest in natural remedies, yogic techniques including pranayamaa are gaining importance and becoming increasingly acceptable among the scientific society [12, 16]. Patanjali, first proponent of yoga, described pranayama as the gradual unforced cessation of breathing [8, 17]. The ancient science of yoga makes use of voluntary regulation of the breathing to make respiration rhythmic and to calm the mind to reach the ultimate goal. This practice of pranayama is an art of controlling the breath [9, 15, 16, 17, 21].

Kapalbhati is a pranayamaa which is made up of two words 'kapal' in Sanskrit means forehead and 'bhati' means shining. It is a fast, rhythmic breathing using abdominal muscles. Pranayamaa has been shown to alter autonomic activity [11, 12, 16, 18]. Kapalbhati

is a traditional internal purification practice or *kriya* that tones and cleanses the respiratory system by encouraging the release of toxins and waste matter, which can help to prevent illness and allergies. It acts as a tonic for the system, refreshing and rejuvenating the body and mind. Regular practice of kapalbhati strengthens the diaphragm and abdominal muscles [13, 17, 18]. Chavhan 2013 explains importance of Kapalbhati by mentioning to affects even those diseases which are impossible to be cured by medicines like cancer, diabetes, asthma. Numerous patients have gained healthy and happy life by adopting it, in their daily life [15].

Several researches have shown the effect of various pranayama in cardiopulmonary functions [A-F]. Very few studies are focused on effect of Kapalbhati on human volunteers [11, 14, 15] among them Nayak et al. (2016) has studied the effect of Kapalbhati on cardiovascular parameters [11]. In the present study, there is significant rise between pre-value and post-value (immediately) of SBP and DBP whereas in the study done by Nayak et al (2016) there was rise in BP but the difference was insignificant [11].

Our study revealed that there is significant rise between Pre-value and post-value (immediate) of all parameters and significant fall of all parameters if compared between post-value and at the end of 3 min. The results of the study indicated that unlike most yoga breathing exercises, Kapalbhati is initially energizing rather than calming; cleansing and heating, rather than cooling which indicates that there is sympathetic stimulation during Kapalbhati Pranayama.

In this study when we compared post-value (immediate) with at the end of 3 min of kapalbhati, there is significant decrease of all parameters towards the baseline. There is even fall of DBP after 3 minutes of finishing of Kapalbhati (table 4). This shows that the effect of Kapalbhati is not similar to that of effect of simple other type of exercise. This has some different effect. This may indicates that there is activation of parasympathetic activity or a decrease in a sympathetic activity which is shown by a decrease in blood pressure towards baseline or even below that. Further study regarding the mechanism of such output needs to be done, however some researcher have made some generalised speculation about the mechanism. As this Kapalbhati involves forceful exhalation and natural inhalation, it is a form of abdomino-respiratory-autonomi exercise.

At the time of practice of *kapalbhati pranayamaa*, respiratory, abdominal and gastrointestinal receptors get stimulated. Also, afferents, centers in brain stem and cortex and various efferent nerves (vagus) get stimulated. As a result, there is synchronous increase in autonomic nervous system, pineal gland, hypothalamus and other central nervous system discharge to all parts of the body [14] responsible for significant increase in blood pressure during *kapalbhati pranayamaa* in naive.

## CONCLUSION

There is significant rise between pre-value and post-value (immediate) of all parameters and significant fall of all parameters if compared between immediate post-value and after 3 minutes value. Few studies has speculated and hypothesized some

mechanism but further study regarding the mechanism of such output needs to be done.

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## AUTHOR'S CONTRIBUTION

**SKJ-** planning of research, training of kapalbhathi pranayama, data collections and analysis; **RKG-** data collections and analysis; **KUD-** overall guidance and supervision on research work.

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