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Effects of Kapalabhati on Systolic and Diastolic Blood Pressure and Heart Rate Among University Students

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The purpose of the study was to find out effects of kapalabhati on various physiological variables among physical education students of Jammu university. To achieve this purpose 16 physical education students, those who studied in Physical education department, university of Jammu were selected as subjects and Probability sampling i.e., simple random sampling method was used to choose the samples and then divided them into experiment and control group . The age of the subjects were ranged from 22 to 26 years. The total subjects were divided into two groups i.e., experimental group (n=8) and treatment group (n=8). Each group consist of eight subjects., in which Group-I (n=8) underwent Kapalbhati training for three weeks (exclude Sunday) and Group-II (n=8) acted as control group who did not participate any special training apart from the regular day to day activities.

Keywords: Kapalabhati, Physiological, Random sampling, Training, Group, activity etc.

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Introduction: - The competitive world has no space for any type of lacking either physiological or psychological and both can effectively groom with the help of yogic techniques. The improved and advance functioning of body and mind reduce the chances of failure in sports and take the sportsman level to great extent. so keeping in mind the importance and advantages of improved physiological capacities the current study is conducted to check that whether kapalabhati can improve the various physiological functioning or not. If it will be effective, then kapalabhati can used to improve numerous physiological capacities which ultimately will enable a sport person to participate more efficiently and perform effectively in the competition.

The basic need for all the sportsperson is to have efficient physiological functioning because it forms the base for the whole body to act and react properly. If the physiological functioning is not good enough then it is not possible for a normal person and a sportsperson to do any task properly. For the sports person, the physiological systems should not only function efficiently but should be more adapted and advanced than a normal individual, only then he/she will be able to perform good in sports. Various capacities and basic physiological functioning can be improved with the help of different types of training and supplements but the result of yogic techniques especially pranayama does tremendous job to bring the great change with less efforts and expenditure of money. (P.Shyam Karthik, 2014).

MEANING OF YOGA

The word yoga is derived from Sanskrit word "yuj" which means to unite. Essentially it means something that brings someone to reality. From spiritual perspective it means that process in which the jivatma and paramatma is realized by yogis. It is pure peace which leads to free a person from all sorrows, tears, misery, restlessness and agitation**.** It conveys the ideas of harnessing oneself to a discipline and at the same time of unifying the part of self, the universal flow of life and so on, according to one's religious and philosophical stance. Yoga is an art, a science and a philosophy. It touches the life of man at every level physical, mental, spiritual, social etc. The overall philosophy of yoga is about connecting body, mind and spirit.

STAGES OF YOGA

In yoga sutra, Patanjali divided raja yoga into eight steps which are mainly influenced by buddhist philosophy of yama and niyama. In these eight steps yama and niyama are the first two, followed by asana and pranayama. Then come pratyahara, dharana, dhyana and samadhi, which are the final four.

Basically these eight steps of yoga is to secure purity of body mind and soul.

1]. YAMA: Yama means social discipline, restraint or abstention. It has five moral practices

A] Non-Violence [Ahimsa] means not to hurt any creature mentally or physically through mind, speed or action.

B]. Truthfulness [Satya] is the presentation of a matter as perceived with the help of the sense organs.

C] Non stealing [Asteya] means not to covet and physically, mentally or by speech other's possessions.

D] Celibacy-Moderation in sex [Brahmacharya]. Brahmacharya does not mean life long celibacy, but moderation in sex between married couples.

E] Non-acquisitiveness [Aparigraha] means abandoning wealth and means of sensual pleasure.

2] NIYAMA: Niyama means individual discipline, physical and mental rules of conduct towards oneself. It has five practices.

A] Cleanliness [Shuchita] means internal and external purification of the body and the mind.

B] Contentment [Santosh] is a state of mind by which one lives happily and satisfied in a congenial atmosphere.

C] Austerity or Penance [Tapas] is the conquest of all desires or sensual pleasures by practicing purity in thoughts and accomplish knowledge.

D] Surrender to God [Ishvara Pramidhana] It is pure devotion to God and surrender of all actions to him.

3] ASANA: Asana means holding the body in a particular posture to bring stability to the body and poise to the mind. The practice of asana brings firmness to the body and vitality to the body and the mind.

4] PRANAYAMA:

Practise of pranayama is to stimulate, regulate and harmonize vital energy of the body. E.g., as bath is required for purifying the body, pranayama is required for purifying the mind, and internal organs.

5] PRATYAHARA [Discipline of the senses]: The extroversion of the sense's organ due to their hankering after worldly objects has to be restrained and directed inwards towards the source of all existence. This process is putting the sense under restraint.

6] DHARNA[Concentration]: It means focussing the pure mind on one's personal deity or on the individual self. The practice of Dharana helps the mind to concentrate on a particular object.

7] DHYANA [Meditation]: When one sustains and maintains the focus of attention through Dharana unbound by time and space then it becomes dhyana.

8] SMADHI [Self-realisation]: In this one's identity becomes both externally and internally immersed in meditation. Supreme happiness free from pleasure, pain or misery, is experienced. Smadhi is the climax of dhyana.

PRANAYAMA

Pranayama means control and regulation of breath. In Sanskrit "prana" means life energy or breathe and "yama" means to control. So, pranayama means the control of the vital force [prana] by concentration and regulated breathing. Prana and mind are linked with each other in such a way that fluctuation in one lead to disturb other and balance of any of one automatically balance other. According to hatha yoga controlling of prana means controlling the mind. Whereas in raja yoga it is mentioned that controlling mind means controlling prana and these are two ways to bring equilibrium in body and mind. Pranayama is very powerful yogic technique that is used to regulate the flow of energy in the body (Chirag Sunil Hakked, 2016).

Pranayama can be practice by different methods, some are slow and soft rhythm and some are fast and forceful rhythm (Senthil kumar k, 2013). Pranayama can help a practitioner to improve various physiological and psychological functioning and give a sense of silence and calmness which usually absent in most people who don't practice it. It also regulates the motion of the lungs, resulting into control of heart and vagus nerve (Ram B Singh, 2009). Pranayama should be practiced in the morning or after sunset.

Kapalabhati

Kapalabhati is last Shatkarma or cleansing technique given in hatha yoga. There are basically six cleansing technique which are used to balance tridoshas in the body i.e kapha 'mucus,' pitta 'bile' andvata 'wind.' Six cleansing technique include: dhauti, basti, neti, trataka, nauli and kapalbhati; these are known as shatkarma or the six cleansing processes.

Kapalabhati is categorized under "pranayama" as well as under Shatkarma. According to Hatha Yoga Pradeepika and Gheranda Samhita kapalabhati is a Shatkarma which is used to cleanse the body. The term kapalabhati is derived from the Sanskrit, word where Kapala means "skull" and Bhati means "to shine". It involves forceful exhalation by a strong contraction of the abdominal muscles and a passive inhalation. This pranayama is known to purifying the frontal region of the brain. Exhalation is the main part of kapalabhati. The forceful exhalation throws out the carbon-dioxide from the lungs and the deep inhalation increases the oxygen content in the blood. In hatha yoga Pradipika, kapalabhati is also known as "breathe of fire". (Mansi vaid, 2021). It is a similar practice to bhastrika pranayama except that exhalation is emphasized and inhalation is the result of forcing the air out. Kapalabhati purifies the nerves and the pranic nadis. kapalabhati help to clear mucus in the air passages, relieve congestion, reduce bloating, and improve lung capacity (hodge, 2018) Kapalabhati is an invigorating breath that can build heat in the body. It also removes excess of kapha from the body. In normal breathing, inhalation is the active process while exhalation is passive. In kapalabhati this is reversed. The abdominal muscles and the diaphragm are used to forcefully move inwards towards the diaphragm thereby throwing the air out. The inhalation is done in a passive relaxed way to fill the lungs with fresh air.

TYPES OF KAPALABHATI

There are three types of kapalbhati, according to the Gherand Samhita: vatakrama, vyutkrama, and sheetkrama. Only vatakrama is described in the Hatha Yoga Pradipika. Vata is the Sanskrit word for 'wind' or 'air.'

1.Vatakrama Kapalbhati:

It is also called as air cleansing technique and this technique involvespassive inhalationandactive exhalation. Prepare for meditation by sitting in a comfortable meditative pose, preferably siddhasana/siddhayoni asana. Close your eyes and relax while keeping your spine upright. Put your hands in jnana or chin mudra. Practice kaya sthairyam, or body steadiness. Take deep breathe and then and perform quick breaths through both nostrils, focusing on exhalation. The inhalation should be quick.

2.Vyutkrama Kapalbhati (sinus cleansing)

In this technique, you are required to**sniff**water through your**nostrils**, let it flow down to the mouth and eventually spit it out. Vyutkrama, the second kapalbhati exercise, is comparable to jala neti and is occasionally administered as part of neti. Vyutkrama is a Sanskrit word that means "expelling system." Instead of a neti lota, you'll need a bowl of warm saline water for this exercise. Lean forward, scoop the water into your palm, and inhale it into your nostrils. Allow the water to run down into your mouth, then spit it out. This is something you should do multiple times. It's critical to unwind when sucking in the water. There should be no fear. When the nose hurts during the practise, it usually signifies the water is either too salty or too saltless.

3.Sheetkrama Kapalbhati (mucus cleansing)

This is the**reverse**of Vyutkrama Kapalbhati where you take**water**through your mouth and**expel**it out through your nostrils. 'Sheet' is a word that meaning 'calm' or 'passive.' Instead of swallowing a mouthful of warm, salty water, you push it up via your nose and let it flow out with this technique. Always keep a calm demeanour. Standing rather than squatting is recommended for vyutkrama and sheetkrama. After that, either practise vatakrama kapalbhati or make sure all the water is out of your nose in the same way you did for jala neti. According to the Gherand Samhita, these techniques not only clear the sinuses of old mucus, but they also improve one's appearance and slow down the ageing process.

Objective of the Study

The study will have following objectives

01. To find the effect of kapalabhati on systolic blood pressure of physical education students of Jammu University.
01. To find the effect of kapalabhati on diastolic blood pressure of physical education students of Jammu University.
02. To find the effect of kapalabhati on the heart rate of physical education students of Jammu University.

HYPOTHESIS

On basis of objectives of the study, the following research hypothesis were formulated.

01. There is no significant difference in the systolic blood pressure of physical education students of Jammu university.
02. There is no significant difference in the diastolic blood pressure of physical education students of Jammu university
03. There is no significant difference in the heart rate of physical education students of Jammu university.

Delimitations of the study

01. This study was restricted to sixteen physical education students in Jammu university.
02. The selected subjects were only from the age group of 22 to 26 years.
03. To test the hypothesis only 16 students were selected from physical education department.
04. In this study only physiological variables was taken into consideration.
05. The experiment was done for three weeks.
06. The study was confine only to kapalabhati.
07. Student with no medical condition were taken.

Limitations of the study

01. Various other variables like psychological, social, mental, physical etc were not taken into consideration.
02. Certain factors like diet, lifestyle, heredity and atmosphere that may affect the result of the study were considered as the limitation of the study.

SIGNIFICANCE OF THE STUDY

- The research will be helpful to improve the physiological capacities of sportsperson and non-sportsperson which ultimately improve their performance.
- The study can be further

- used to organise training programmes, and camps for the sportsperson.
- The study can be helpful for remedial purpose.
- The finding of study can be used for cure and rehabilitation circulatory problems
- The study also focuses on the effectiveness of kapalabhati to bring positive changes in the physiology of the human system to attain better performance.
- The result of the study may be helpful for the trainer to design the training schedule and use kapalabhati instead of tough, time and money consuming training to get the same benefits.
- The means methods and the delimitation of the study can used for further study and implementation.

METHOD AND PROCEDURE

The method which was used for the selection of subjects, variables, collection of data are explained as under. Also, the design of the study, statistical methods and which procedure was used for the execution of the test are described below.

DESIGN OF THE STUDY

To conduct this study an experimental research design was used.

Sampling technique

Probability sampling i.e., simple random sampling method was used to choose the samples and then divided them into experiment and control group. The treatment was only for the experimental group, while control group was allowed to do their normal routine. The training was administered for the period of three weeks.

SELECTION OF SUBJECTS

The purpose of the study was to find out effects of kapalabhati on various physiological variables among physical education students of Jammu university. To achieve this purpose 16 physical education students, those who studied in Physical education department, university of Jammu were selected as subjects. The age of the subjects were ranged from 22 to 26 years. The total subjects were divided into two groups i.e., experimental group (n=8) and treatment group (n=8). Each group consist of eight subjects., in which Group-I (n=8) underwent Kapalbhati training for Three weeks (exclude Sunday) and Group-II (n=8) acted as control group who did not participate any special training apart from the regular day to day activities.

Table o.1

Detail of sample

S.NO.	Name of the group	Sample size		
1.	Treatment group	Pre-test	Treatment	Post-test
2.	Control group	08	3 Weeks yoga training	08
		08	No Treatment	08

SELECTION OF VARIABLES

Based on the relevant literature that are viewed and in accordance with the views of professional physical education personalities, the importance of variables at the high-level performance, availability of equipment, feasibility aspect of measurement the following variables were selected for the experiment of the study.

Physiological Variables

01. Heart rate

02. Systolic blood pressure

03. Diastolic blood pressure

ADMINISTRATION OF TESTS

Heart Rate

Heart rate will be taken in the resting condition of the subject. Heart rate is the no. of times heart beat in a minute and will be measured by checking pulse rate with the help of digital sphygmomanometer.

Blood Pressure

The blood pressure, both diastolic and systolic was taken using digital sphygmomanometer. The cuff of the sphygmomanometer was wrapped around the base of the Upper arm (above the elbow) of the subject and then tighten the cuff comfortably. The health expert then presses the start button on the digital sphygmomanometer and wait for cuff to inflate and then deflate after measuring the blood pressure. The values of blood pressure of both systolic and diastolic blood pressure are on the screen of machine along with pulse rate.

Photograph 3.2

Checking blood pressure

TRAINING DETAILS OF YOGIC PRACTICES

Kapalabhati (25-minutes in the morning)

Table 0.2

SCHEDULE OF TRAINING

▪ Prayer = 3 minute▪ Three round of Chanting „OM" (Aim: Concentration & Purification) =3 minute▪ Deep breathings = 2 minute▪ kapalabhati = 2-14 Minutes▪ prayer = 3 minute▪ total time 25 minutes			
Experimental Group	Kapalabhati	Rest	Control group
Day 1	10 strokes ×4	30second between each repetition	Control group did not participate in the training program.
Day 2	20 strokes ×4	30second between each repetition	
Day 3	30 strokes ×4	30second between each repetition	
Day 4	40 strokes ×4	30second between each repetition	
Day 5	50 strokes ×4	30second between each repetition	
Day 6	60 strokes ×4	30second between each repetition	
Week 2			
Day 1	70 strokes ×4	30second between each repetition	
Day 2	80 strokes ×4	30second between each repetition	
Day 3	80 strokes ×5	30second between each repetition	
Day 4	80 strokes×6	30second between each repetition	
Day 5	80 strokes×7	30second between each repetition	
Day 6	80 strokes×7	30second between each repetition	
Week 3			
Day 1	90 strokes × 7	30second between each repetition	
Day 2	90 strokes × 7	30second between each repetition	
Day 3	90 strokes × 7	30second between each repetition	
Day 4	90 strokes × 7	30second between each repetition	
Day 5	90 strokes × 7	30second between each repetition	
Day 6	90 strokes × 7	30second between each repetition	

The training was done for 3 weeks through online mode because of closure of university due to covid. Training was done for 6 days in a week. Each session was started with the prayer, then three time Chanting OM was done, deep breathings to relax the body followed by practicing kapalabhati. There was a resting period of 30 second after every set of kapalabhati. when all the sets were done some normal breaths were taken and the session was ended with prayer.

DATA COLLECTION

The yoga practice was administered for 3 weeks by the researcher himself. The subjects in the experimental and control groups were tested prior (pre-test), and after three weeks training (post-test) on **physiological variable** like heart rate, systolic blood pressure and diastolic blood pressure. After three weeks all the physiological variables that were considered in the study was statistically examined for significant difference.

STATISTICAL PROCEDURE

Data was analysed by using descriptive statistics and SPSS version 22. To compare the mean difference between the initial (pre-test) and final (post-test) scores of experimental and control groups 't' test was used with respect to experimental and control of the selected physiological variables. For testing hypothesis, level of significance was be set at 0.05 levels.

Table 0.3

Detail of data analysis

Pre-test experimental	Pre-test control
Post-test experimental	Post-test control
Post-test experimental	Pre-test experimental

ANALYSIS OF THE DATA, DISCUSSION OF FINDING AND RESULTS

In order to come at certain conclusion and to achieve the objectives of the study, a systematic treatment of data is needed which consists of three stages namely: tabulation of data, testing of the hypothesis and discussion of the results. The statistical analysis of the data consists of the data consists of the score made by the sample on various variables. The sample included 16 physical education students of University of Jammu. The age range of the sample was between 22-26 years. In processing the data mean, standard deviation, degree of freedom was computed in order to estimate the difference among the groups using 't' test are presented from the table 1 to 42. The level of significance was fixed at 0.05 levels. The hypothesis was tested and result are discussed below.

Findings

Finding of this study were made in sequence of physiological variables. In order to locate the difference between different groups the t test has been applied. For all of them separately statistical analysis was done and the result are presented in the following tables.

In order to determine the significance of difference on physiological variables between experiment and control group, t test was applied.

Table 01

Descriptive analysis of pre-test heart rate of control and treatment group.

S.no.	Physiological variable	Group	N	Mean	Standard Deviation
1.	Pre-Heart rate	Experimental	8	81.3750	5.50162
		Control	8	78.0000	2.97610

Table 01 shows descriptive analysis of physiological variable heart rate. Mean values of pre-test heart rate of experimental and control group are 81.3750 and 78.0000 respectively. Standard deviation values of pre-test heart rate of experimental is 5.50162 and control group is 2.97610.

Table 02

Significant difference between the means of Pre-test heart rate of experimental and control group.

Heart rate	Group	Mean	Mean difference	df	t-value	significance
Experimental	81.3750	3.37500	14	1.526	.149
Control	78.0000		10.774		

Not significant at 0.05 level of significance

Table 02 revealed that the significant difference of pre-test heart rate between experimental and control group was .149 which is greater than the required value at 0.05 level of significance. It shows there is no significant difference between the means of Pre-test heart rate of experimental and control group.

Table 03

Descriptive analysis of Post-test heart rate of control and treatment group.

S.no.	Physiological variable	Group	N	Mean	Standard Deviation
1.	Post-Heart rate	Experimental	8	79.7500	9.03564
		Control	8	84.8750	11.51939

Table 03 shows descriptive analysis of physiological variable heart rate. Mean values of Post-test heart rate of experimental and control group are 79.7500 and 84.8750 respectively. Standard deviation values of post-heart rate of experimental is 9.03564 and control group is 11.51939

Table 04

Significant difference between the means of post-test heart rate of experimental and control group.

Post-test heart rate	Group	Mean	Mean difference	df	t-value	significance
	Experimental	79.7500	5.12500	14	-.990	.339
	Control	84.8750		13.248		

Not significant at 0.05 level of significance

Table 04 revealed that the significant difference of post-heart rate between experimental and Control group was .339 which is more than the required value at 0.05 level of significance. It shows there is no significant difference between the means of pre-inspired reserve volume of experimental and control group.

Table 05

Significant Difference between the means of Post-heart rate and pre-heart rate of experimental group.

Heart rate	Group	Mean	StandardDeviation	Mean difference	df	t-value	significance
	Experimental Post	79.7500	5.85388	1.62500	7	-.785	.458
	Experimental Pre	81.3750					

Not significant at 0.05 level of significance

Table 05 revealed that the significant difference of post-heart rate and pre-heart rate of experimental group was .458 which is more than the required value at 0.05 level of significance. It shows there is no significant difference between the means of post-heart rate and pre-heart rate of experimental group.

Table 06

Descriptive analysis of pre-test systolic blood pressure of control and treatment group.

S.no.	Physiological variable	Group	N	Mean	Standard Deviation
1.	Pre-systolic blood pressure	Experimental	8	123.7500	17.81452
		Control	8	120.3750	12.52355

Table 06 shows descriptive analysis of physiological variable pre-systolic blood pressure. Mean values of pre-systolic blood pressure of experimental and control group are 123.7500 and 120.3750 respectively. Standard deviation values of pre-systolic blood pressure of experimental group is 17.81452 and control group is 12.52355

Table 07

Significant difference between the means of pre-test systolic blood pressure of experimental and control group.

pre-test systolic blood pressure	Group	Mean	Mean difference	df	t-value	significance
	Experimental	123.7500	3.37500	14	.438	.668
	Control	120.3750		12.561		

Not significant at 0.05level of significance.

Table 07 revealed that the significant difference of pre-systolic blood pressure between experimental and control group was .668 which is greater Than the required value at 0.05 level of significance. It shows there is no significant difference between the means of Pre-systolic blood pressure of experimental and control group**.**

Table 08

Descriptive analysis of post-test systolic blood pressure of control and treatment group.

S.no	Physiological variable	Group	N	Mean	Standard Deviation
1.	Post-systolic blood pressure	Experimental	8	119.1250	18.39594
		Control	8	117.5000	12.24745

Table 08 shows descriptive analysis of physiological variable Post-systolic blood pressure. Mean values of Post-systolic blood pressure of experimental and control group are 119.1250 and 117.5000 respectively. Standard deviation values of post-systolic blood pressure of experimental group is 18.39594 and control group is 12.24745.

Table 09

Significant difference between the means of post-test systolic blood pressure of experimental and control group.

Systolic blood pressure	Group	Mean	Mean difference	df	t-value	significance
	Experimental	19.1250	1.62500	14	.208	.838
	Control	117.5000		12.186		

Not significant at 0.05 level of significance

Table 09 `revealed that the significant difference of post-systolic blood pressure between experimental and control group was .838 which is more than the required value at 0.05 level of significance. It shows there is no significant difference between the means of pre-systolic blood pressures of experimental and control group.

Table 10

Descriptive Analysis of post-test and pre-test systolic blood pressure of experimental group.

S.no	Physiological variable	Group	N	Mean	Standard Deviation
1.	Systolic blood pressure	Experimental Post	8	119.1250	18.39594
		Experimental pre	8	123.7500	17.81452

Table 10 shows descriptive analysis of physiological variable Post-systolic blood pressure and pre-systolic blood pressure of experimental group. Mean values of post-systolic blood pressure and pre-systolic blood pressure of experimental are 119.1250 and 123.7500 respectively. And the standard deviation of post-systolic blood pressure is 18.39594 and pre-systolic blood pressure of experimental group is 17.81452.

Table 11

Significant difference between the means of post-test and pre-test systolic blood pressure of experimental group.

Systolic blood pressure	Group	Mean	StandardDeviation	Mean difference	df	t-value	Significance
	Post	119.1250	7.94512	4.62500	7	-1.646	.144
	Pre	123.7500					

Not significant at 0.05 level of significane.

Table 11 revealed that the significant difference of post- systolic blood pressure and pre-systolic blood pressure of experimental group was .144 which is greater than the required value at 0.05 level of significance. It shows there is no significant difference between the means of post- systolic blood pressure Pre- systolic blood pressure of experimental group.

Table 12

Descriptive analysis of pre-test diastolic blood pressure of control and treatment group.

S.No.	Physiological variables	Group	N	Mean	Standard Deviation
1.	Pre-Diastolic Blood pressure	Experimental	08	78.5000	5.5032
		Control	08	77.3750	3.99777

Table 12 shows descriptive analysis of physiological variable, diastolic blood pressure. Mean values of pre-diastolic blood pressure of experimental and control group are 78.5000 and 77.3750 respectively. Standard deviation values of pre-diastolic blood pressure of experimental group is 5.50325 and control group is 3.99777

Table 13

Significant difference between the means of pre-test diastolic blood pressure of experimental and control group.

Pre-test Diastolic blood pressure	Group	Mean	Mean difference	df	t-value	significance
	Experimental	78.5000	1.12500	14	.468	.647
	Control	77.3750		12.779		

Not significant at 0.05 level of significance

Table 13 revealed that the significant difference of pre-diastolic blood pressure between experimental and control group was .647 which is greater than the required value at 0.05 level of significance. It shows there is no significant difference between the means of Pre-diastolic blood pressure of experimental and control group.

Table 14

Descriptive analysis of post-test diastolic blood pressure of control and treatment group.

S.no.	Physiological variable	Group	N	Mean	Standard Deviation
1.	Post-diastolic blood pressure	Experimental	08	76.8750	8.98312
		Control	08	72.5000	6.54654

Table 14 shows descriptive analysis of physiological variable Post-diastolic blood pressure. Mean values of Post-diastolic blood pressure of experimental and control group are 76.8750 and 72.5000 respectively. Standard deviation values of post-diastolic blood pressure of experimental group is 8.98312 and control group is 6.54654.

Table 15

Significant difference between the means of Post-test diastolic blood pressure of experimental and control group

Post-test diastolic blood pressure	Group	Mean	Mean difference	df	t-value	significance
	Experimental	76.8750	4.37500	14	1.113	.284
	Control	72.5000		12.799		

Not significant at 0.05 level of significance

Table 15 revealed that the significant difference of post-diastolic blood pressure between experimental and control group was .284 which is more than the required value at 0.05 level of significance. It shows there is no significant difference between the means of pre-diastolic blood pressure of experimental and control group.

Table 16

Descriptive analysis of post-test and pre-test diastolic blood pressure of experimental group.

S.no	Physiological variable	Group	N	Mean	Standard Deviation
1.	Diastolic blood pressure	Experimental Post	8	76.8750	8.98312
		Experimental pre	8	78.5000	5.50325

Table 16 shows descriptive analysis of physiological variable Post-diastolic blood pressure and pre-diastolic blood pressure of experimental group. Mean values of post- diastolic blood pressure and pre-diastolic blood pressure of experimental group are 76.8750 and 78.5000 respectively. And the standard deviation of post and pre diastolic blood pressure of experimental group are 8.98312 and 5.50325

Table 17

Significant Difference between the means of post-test and pre-test diastolic blood pressure of experimental group.

Diastolic blood pressure	Group	Mean	StandardDeviation	Mean difference	df	t-value	Significance
	Post	76.8750	9.16418	1.62500	7	-.502	.631
	Pre	78.5000					

Not significant at 0.05 level of significance

Table 17 revealed that the significant difference of post-diastolic blood pressure and pre-diastolic blood pressure of experimental group was .631 which is more than the required value at 0.05 level of significance. It shows there is no significant difference between the means of post- diastolic blood pressure and pre-diastolic blood pressure of experimental group.

CONCLUSIONS AND RECOMMENDATIONS

The study undertaken was entitled as *"Effects of kapalabhati on systolic, Diastolic blood pressure and Heart Rate among physical education students of Jammu university".*

. It was hypothesized that

01. There is no significant effect of kapalabhati on the selected physiological variables of physical education students of Jammu university.
02. There is no improvement in the selected physiological variables of physical education students of Jammu university.
03. There is no significant difference in the systolic blood pressure of physical education students of Jammu university.
04. There is no significant difference in the diastolic blood pressure of physical education students of Jammu university.
05. There is no significant difference in the blood pressure of physical education students of Jammu university.
06. There is no significant difference in the heart rate of physical education students of Jammu university

Sample size (N=16) and total samples are divided into two groups i.e., experimental and control group which has 8 subjects each. The experimental groups were treated with selected yogic practices namely Kapalbhati, for 20 to 30 minutes, for six days per week. The experiment was administered for three weeks whereas the control groups were not given any treatment. Physiological variables test were done at pre-test and after three weeks of yogic training as the post test on the experimental groups. Simultaneously the control groups were tested.

CONCLUSIONS

The findings have been comprehensively and critically appraised to draw the following conclusions.

01. The variable namely systolic blood pressure showed insignificant experimental effect of kapalabhati.
02. The variables namely diastolic blood pressure showed insignificant experimental effect of Kapalbhati.
03. The variables namely heart rate showed insignificant experimental effect of Kapalbhati.

From the above conclusions, it may be summarized that the Kapalbhati pranayama is having significant experimental effect on some physiological variables hence validated for experimentation in Kapalbhati specifically as well as in general.

Recommendations

Based on the findings and conclusions drawn from the findings, following have been recommended.

01. Present study very clearly suggests that yogic practices are effective to be adopted by every human being in order to have normal living.
02. Through daily practice one can maintain good physiological capacities for a long period.
03. The findings as a whole concluded that the Kapalbhati is having significant experimental effect on physiological variables. Hence, should be included for professional practices and experimentations.
04. Similar type of study may be conducted in different universities of India independently.
05. Similar type of study may be conducted with more number of samples.
06. Results of the study reveal that kapalbhati is an effective measure in to improve various physiological capacities
07. Similar nature of study is recommended with other physiological variables.
08. Similar nature of the study can be carried out with other age groups and with specifically physiological disorders.
09. Same study can be more effective if diet of the subjects can be controlled.

References

Bhadoria, D. (2018, june). shodganga@INFLIBNET/Mahatma Gandhi Kashi Vidyapith/Department of Physical Education. Retrieved from shodganga. *inflibnet.ac.in: [Article] [Crossref][Google Scholar]*

Bhagat, S. S. (2015, June). Shodganga@INFLIBNET/Shivaji University/Department of Education. *Retrieved from Shodganga.inflibnet.ac.in: [Article][Crossref] [Google Scholar]*

C. Angeline. (2013). Shodganga. *inflinet.ac.in. Retrieved from Shodganga: [Article][Crossref] [Google Scholar]*

Chirag Sunil Hakked, R. B. (2016). Yogic breathing practices improve lung functions of competitive young swimmers. *Journal of Ayureveda and Integrative Medicine, 99-104 [Crossref][Google Scholar]*

DInesh T, G. G. (2013). Efeect of12 weeks of kapalabhati pranayama training on cardio-respiratory parameters in young, healthy volunteersbof Jipmer population. *International journal of medical and pharmaceutical science research and review, 53-61 [Crossref][Google Scholar]*

Hodge, A. (2018, november 16). The Power of Breathing: 4 Pranayama Techniques Worth Practicing. Retrieved from One medical. *com: [Article][Crossref][Google Scholar]*

Jain, I. (2019, september 2). The 3 stages of pranayam as per yoga sutras-. Retrieved from Total yoga. *org: [Article][Crossref][Google Scholar]*

L Nivethitha, A. M. (2017). Effects of various pranayama on cardiovascular and autonomic variables. *Ancient Science of Life, 72-77 [Crossref] [Google Scholar]*

Lal, K. (2018, February). shodganga@INFLIBNET/Banaras Hindu University/Department of physica education. Retrieved from Shodganga. *inflibnet.ac.in: [Article] [Crossref][Google Scholar]*

Malathi, M. (2018). Effect of immediate haemodynamic changes of kapalbhati on healthy volunteers. Tamil nadu: The tamil Nadu DR. *M.G.R. Medical University. Retrieved from google scholar.com [Crossref][Google Scholar]*

Mansi vaid, s. v. (2021). Kapalabhati: a physiological healer in human physiology. *Yoga-Mimamsa, 69-74 [Crossref][Google Scholar]*

Marc A. Russo, D. M. (2017). *The physiological effects of slow breathing in the healthy human. National library of medicine, 298-309 [Crossref] [Google Scholar]*

Muktibodhananda, S. (1998). Hatha Yoga Pradipika. Bihar: Yoga Publications Trust, Munger, Bihar, India. *[Crossref][Google Scholar]*

Nayak R, P. S. -D. (2015). *Kapalbhati changes cardiovascular parameters. Janaki Medical College Journal of Medical Sciences, 43-49 [Crossref] [Google Scholar]*

Nichois, H. (2021, April 14). Medicalnewstoday. com. *Retrieved from Medical News Today: [Article] [Crossref][Google Scholar]*

P. Shyam Karthik, M. a. (2014). *Effect of Pranayama and Suryanamaskar on Pulmonary Functions In Medical Students. . Journal Of Clinical and Diagnostic Research: JCDR, 4-6 [Crossref][Google Scholar]*

Senthil kumar k, j. B. (2013). Consolidate effectof vibhagha pranayama,nadishuddi pranayama, savithiri pranayama and kapalabhati pranayama on the pulmonary functionalstatus of young healthy male subjects. *International journal of medical research, 350-356 [Crossref][Google Scholar]*

Sharma, M. (2021, October 15). emedicinehealth. Retrieved from emedicinehealth. *com: [Article] [Crossref][Google Scholar]*

Singh, J. (2019). Shodganga. inflibnt. *ac.in. Retrieved from Shodganga: [Article][Crossref] [Google Scholar]*