A STUDY ON THE EFFECT OF SELECTED YOGIC KRIYAS AND PRANAYAMAS ON SELECTED AUTONOMIC FUNCTIONS (A NONINVASIVE STUDY)

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CERTIFICATE

The abstract of the thesis *A Study on the Effect of Selected Yogic Kriyas and Pranayamas on Selected Autonomic Functions (A Noninvasive Study)* is forwarded to the University of Delhi for evaluation.

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Abstract

The objectives of the conducted study were (i) to find out the effect of anulom vilom on the autonomic functions of sedentary females age ranging 35 years to 45 years (ii) to find out the effect of kapalbhati on the autonomic functions of sedentary females age ranging 35 years to 45 years (iii) to find out the effect of bhramari on the autonomic functions of sedentary females age ranging 35 years to 45 years (iv) to find out the effect of agnisar on the autonomic functions of sedentary females age ranging 35 years to 45 years. The study was delimited to the following yogic kriyas and pranayamas (1) anulom vilom (2) kapalbhati (3) bhramari and (4) agnisar. The study was further delimited to the sedentary females age ranging from 35 years to 45 years.

Keeping in view the purposes of the study, a large number of sedentary females (n=244) were randomly selected from Prajapita Brahma Kumaris Ishwariya Vishwa Vidyalaya, Shiv Darshan Gyan Mandir, Jaitpur Ext., New Delhi-110044. The age of the sedentary females ranged from 35 years to 45 years. There were four experimental protocols namely anulom vilom, kapalbhati, bhramari and agnisar. For each experimental protocol one experimental and one control group were assigned. The corresponding experimental and control groups were homogeneous / matched groups in regard to age, resting heart rate, systolic blood pressure and diastolic blood pressure. Hence, there were four experimental groups and four control groups. The number of samples at pre test in the experimental groups were [anulom vilom (n1)= 35, kapalbhati (n2)=35, bhramari (n3)=35, agnisar (n4)=35] consisting of 140 samples. The number of samples at pre test in control groups were [anulom vilom (n1)= 26, kapalbhati (n2)=26, bhramari (n3)=26, agnisar (n4)=26] consisting of 104 samples. The number of samples at post test in experimental groups were [anulom vilom (n1)= 30, kapalbhati (n2)=30, bhramari (n3)=32, agnisar (n4)=30] consisting of 122 samples. The number of samples at post test in control groups were [anulom vilom (n1) = 23, kapalbhati (n2)=23, bhramari (n3)=26, agnisar (n4)=25] consisting of 97 samples. The experimental groups were treated with selected yogic practices namely anulom vilom, kapalbhati, bhramari and agnisar (tailored programme), independently to independent
group for 20 to 30 minutes, for six days per week, at least two days per week was the minimum eligibility attendance though each participants were motivated to have maximum number of attendance. The experimental treatments or training were administered for six weeks, whereas the control groups were not given any treatment or training. Autonomic functions test were done at pre test and after six weeks of yogic training as the post test on the experimental group. Simultaneously the control groups were tested. The selected twenty two variables were resting heart rate (bpm), systolic blood pressure (mmHg), diastolic blood pressure (mmHg), deep breathing test score (change in heart rate), expiratory inspiratory ratio, valsalva manoeuvre ratio, hand grip test score (mmHg), cold pressure test score (mmHg), lying to standing test score (mmHg), 30:15 ratio, NN50 count (f), PNN50 count (%), SDSD(ms), RMSSD(ms), SDANN(ms), LF(normalised unit), HF(normalised unit), LF/HF Ratio, LF-AP (ms²), HF-AP(ms²), total power -AP (ms²) and SDNN (ms). To meet the purposes of the study mean, standard deviation and t test were used as statistics and the drawn hypotheses were tested at 0.05 level of significance.

The major findings were as following:

1. Resting heart rate (bpm) for all the experimental groups and control groups having insignificant difference between the pre test and post test.

2. Systolic blood pressure (mmHg) for all the experimental groups and control groups having insignificant difference between the pre test and post test.

3. Diastolic blood pressure (mmHg) registered significant difference in regard to kapalbhati experimental group as well as agnisar experimental group, whereas insignificant difference between the pre test and post test were recorded for rest of the comparisons.

4. Deep breathing test score (change in heart rate) documented significant difference in regard to anulom vilom experimental group, bhramari experimental group and agnisar experimental group, whereas insignificant difference between the pre test and post test were recorded for rest of the comparisons.
5. Expiratory inspiratory ratio registered significant difference in regard to anulom vilom experimental group as well as bhramari experimental group, whereas insignificant difference between the pre test and post test were recorded for rest of the comparisons.

6. Valsalva manoeuvre ratio documented significant difference in regard to kapalbhati experimental group as well as agnisar experimental group, whereas insignificant difference between the pre test and post test were recorded for rest of the comparisons.

7. Hand grip test score (mmHg) documented significant difference in regard to kapalbhati experimental group, whereas insignificant difference between the pre test and post test were recorded for rest of the comparisons.

8. Cold pressure test score (mmHg) registered insignificant difference between the pre test and post test for all the experimental groups and control groups.

9. Lying to standing test score (mmHg) documented significant difference in regard to anulom vilom experimental group, kapalbhati experimental group as well as agnisar experimental group, whereas insignificant difference between the pre test and post test were recorded for rest of the comparisons.

10. 30:15 ratio registered significant difference in regard to bhramari experimental group, whereas insignificant difference between the pre test and post test were recorded for rest of the comparisons.

11. NN50 count (f) documented significant difference in anulom vilom experimental group, whereas insignificant difference between the pre test and post test were recorded for rest of the comparisons.

12. pNN50 count (%) registered significant difference in regard to anulom vilom experimental group and agnisar experimental group, whereas insignificant difference between the pre test and post were recorded for rest of the comparisons.

13. SDSD (ms) documented insignificant difference between the pre test and post test for all the experimental groups and control groups.

14. RMSSD (ms) registered insignificant difference between the pre test and post test for all the experimental groups and control groups.
15. SDANN (ms) documented significant difference in regard to bhramari experimental group, whereas insignificant difference between the pre test and post test were recorded for rest of the comparisons.

16. LF (normalized unit) registered significant difference in kapalbhati experimental group as well as agnisar experimental group, whereas insignificant difference between the pre test and post test were recorded for rest of the comparisons.

17. HF (normalized unit) documented significant difference in regard to kapalbhati experimental group and agnisar experimental group, whereas insignificant difference between the pre test and post test were recorded for rest of the comparisons.

18. LF/HF Ratio registered significant difference in regard to kapalbhati experimental group and agnisar experimental group, whereas insignificant difference between the pre test and post test were recorded for rest of the comparisons.

19. LF- AP (ms²) documented insignificant difference between the pre test and post test for all the experimental groups and control groups.

20. HF- AP (ms²) registered insignificant difference between the pre test and post test for all the experimental groups and control groups.

21. TP- AP (ms²) documented insignificant difference between the pre test and post test for all the experimental groups and control groups.

22. SDNN (ms) registered insignificant difference between the pre test and post test for all the experimental groups and control groups.

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

1. The variables namely deep breathing test score (change in heart rate), expiratory inspiratory ratio, cold pressure test score (mmHg), lying to standing test score (mmHg), NN50 count (f), pNN50 count (%) and LF/HF ratio, a total of seven variable out of twenty two variables documented significant experimental effect of anulom vilom pranayama.
2. The variables namely diastolic blood pressure (mmHg), valsalva manoeuvre ratio, hand grip test score (mmHg), lying to standing test score (mmHg), LF (normalised unit), HF (normalised unit) and LF/HF ratio, a total of seven variable out of twenty two variables documented significant experimental effect of kapalbhati kriya.

3. The variables namely deep breathing test score (change in heart rate), expiratory inspiratory ratio, 30:15 ratio and SDANN (ms), a total of four variables out of twenty two variables documented significant experimental effect of bhramari pranayama.

4. The variables namely diastolic blood pressure (mmHg), deep breathing test score(change in heart rate), expiratory inspiratory ratio, valsalva manoeuvre ratio, lying to standing test score (mmHg), NN50 Count (f), pNN50 Count (%), LF(normalised unit), HF (normalised unit) and LF/HF ratio, a total of ten variable out of twenty two variables documented significant experimental effect of agnisar kriya.

5. The highest number of autonomic (sympathetic and parasympathetic) variables found to be significant variables to study the experimental or training effect in agnisar kriya followed by anulom vilom pranayama, kapalbhati kriya and bhramari pranayama.

6. In anulom vilom pranayama, among the seven significant autonomic (sympathetic and parasympathetic) variable three were activity variables and four were reactivity variables.

7. In kapalbhati kriya, among the seven significant autonomic (sympathetic and parasympathetic) variables three were activity variables and four were reactivity variables.

8. In bhramari pranayama, among the four significant autonomic (sympathetic and parasympathetic) variables one was activity variable and three were reactivity variables.

9. In agnisar kriya, among the ten significant autonomic (sympathetic and parasympathetic) variables five were activity variables and five were reactivity variables.
10. It is concluded that autonomic (sympathetic and parasympathetic) reactivity variables found to be superior variables to study the experimental or treatment effect of yogic pranayamas and kriyas.

11. The variables namely lying to standing test score (mmHg) and LF/HF Ratio were common autonomic (sympathetic and parasympathetic) variables demonstrated significant experimental effect in the three selected kriyas and pranayamas namely anulom vilom pranayama, kapalbhati kriya and agnisar kriya.

12. The variables namely deep breathing test score (change in heart rate) and expiratory inspiratory ratio were common autonomic (sympathetic and parasympathetic) variables demonstrated significant experimental effect in the three selected kriyas and pranayamas namely anulom vilom pranayama, bhramari pranayama and agnisar kriya.

13. The variables namely diastolic blood pressure (mmHg), valsalva manoeuvre ratio, LF (normalised unit) and HF (normalised unit) were common autonomic (sympathetic and parasympathetic) variables demonstrated significant experimental effect in the two selected kriyas namely kapalbhati kriya and agnisar kriya.

14. The variables namely NN50 count (f) and pNN50 (%) count were common autonomic (sympathetic and parasympathetic) variables demonstrated significant experimental effect in the two selected kriyas and pranayamas namely anulom vilom pranayama and agnisar kriya.

15. The variable namely hand grip test score (mmHg) was the only unique autonomic variable demonstrated significant experimental effect of kapalbhati kriya.

16. The variable namely SDANN (ms) was the only unique autonomic variable demonstrated significant experimental effect of Bhramari Pranayama.

17. From the above conclusions, it may be summarized that the selected kriyas and pranayamas having significant experimental effect on autonomic (sympathetic and parasympathetic) variables, therefore the selected autonomic (sympathetic and parasympathetic) variables are good dependent variables hence, validated for experimentation in yogic kriyas and pranayamas specifically as well as in general.