IJFANS INTERNATIONAL JOURNAL OF FOOD AND NUTRITIONAL SCIENCES
ISSN PRINT 2319 1775 Online 2320 7876
Research Paper , UGC CARE Listed (Group -I) Journal Volume 12, Iss 01, 2023

Observation Of Genderwise Nostril Dominance Role As Assessed By Electrophotonic Imaging Parameters In Meditators

Guru Deo[1*], Srinivasan, Thaiyar M[2]

[1*]Assistant Professor (Yoga Therapy), Department of Yoga Therapy, Morarji Desai National Institute of Yoga, 68 Ashoka Road, New Delhi-110001, INDIA, E-mail: gurudeoyoga15@gmail.com /+918088489025

[2]Professor, Division of Yoga & Physical Sciences, S-VYASA Yoga University, Jigani, Bangalore, Karnataka- 560105, INDIA

***Corresponding Author:** Guru Deo

*Assistant Professor (Yoga Therapy), Department of Yoga Therapy, Morarji Desai National Institute of Yoga, 68 Ashoka Road, New Delhi-110001, INDIA, E-mail: gurudeoyoga15@gmail.com /+918088489025

Abstract

Breath plays central role at the psychophysiological level due to its relationship between mind and body. The essential role of breath is employed in the practice of Anapanasati meditation technique. Current **s**tudy aims to observe the nostril dominance in male and female meditators as reflected in electrophotonic imaging parameters.

Methods: A total 432 subjects (264 male and 168 females - mean age 34.36±6.83) were part the current study of two meditation places. Long Term Meditators (LTM) had more experience of meditation than 60 months (mean of months 111±47.20, hours per day 1.71 ± 1.20). Short Term Meditators (STM) had experienced meditation from six months to less than 60 months (mean of months 37.17±19.44, hours per day 2.14 ± 4.99). Cross-sectional design was used in the study. Data were collected from two sites using Electrophotonic Imaging (EPI).

Result: Overall results in this study show that long-term and short-term male and female practitioners had right hemispheric activation as compared to left during the time of assessment. There was no uniform trend of nostril dominance in results towards either direction in both LTM and STM groups. Observation of nostril was contributory in understanding trends in subtle energy changes in meditators.

Conclusion: Long-term male meditators showed right hemispheric dominance at the psychophysiological level at the time of assessment. Physiologically and psychophysiologically long and short term female meditators exhibited fluctuating trends in both directions-right and left hemispheric dominance as reflected in the electrophotonic imaging parameters.

Keywords: Anapanasati, Meditation, Nostril, Electrophotonic Imaging, Breathing, Gender.

Introduction

Directive of attention through breathing plays a significant role in the meditation traditions. The breathing techniques are devised to induce rhythmical breath flow. In this pattern alternating inhalation and exhalation through the left and right nostrils are practiced. Studies have shown that regular practice of breathing techniques enhances parasympathetic dominance, reduces sympathetic dominance, improves cardiovascular and respiratory actions, decreases tension, anxiety and strain on the body and improves overall health.[1–4]

Anapanasati meditation is the part of Vipassana meditation described in Buddhist tradition. This technique widely known as focused attention meditation is largely studied in scientific domain.

ISSN PRINT 2319 1775 Online 2320 7876
 UGC CARE Listed (Group -I) Journal Volume 12, Iss 01, 2023

Practitioners of this technique are advised to concentrate on respiration of breath. During the practice if distraction takes place by external stimulant, attention is brought again on the object of meditation. [5] This technique if practiced for a longer duration, brings an unforced attentive stage of *chitta*.

In the current area, very few studies are carried out to explore gender-related changes on the states of mind due to nostril dominance in meditators. A survey carried out in the United States indicates women participate more than men (23.8% women and 14.4% men) in alternative therapies including meditation.[6] Many studies report that women obtain more improvement in mental and physical parameters in comparison to men due to practice of meditation. Gender differences are and often observed where emotional functioning, cognitive and precognitive abilities are correlated.[7–9] It is shown in Qigong meditation application where females exprssed greater reduction in craving and anxiety than males.[10] Females repossess the presence of others proficiently and have better face acknowledgement throughout than males.[11,12] It is observed that females have more subjective and adaptive coordination towards spiritual orientation than males.[13]

Moreover, there are interesting findings regarding the dominance of nostril (unilateral nostril breathing). Literature shows the nasal cycle is connected to hemispheric activation, including cognitive performances. Dominance of breathing has a different influence over spatial and verbal performances in both male and female.[14] In unilateral forced nasal breathing (UFNB) study, it was found that right UFNB enhances cognition of the left hemisphere of the brain and left UFNB increases right hemispheric cognitive performances [15,16] and this effect is known and discussed in the Yogic literature. Recently unilateral forced nostril breathing is used for treating aphasia exploring the potential values of its effect on the improvement of this condition.[17]
The study is to find gender-oriented differences of nostril dominance in mediators through electrophotonic imaging parameters. Another objective of the study is to observe possible shifts in nostril dominance due to meditation in shorter and longer duration of practitioners.

Application of Electrophotonic Imaging (EPI)
Electrophotonic Imaging (EPI) also stands for Gas Discharge Visualization (GDV) - is being used to assess human bioelectromagnetic field. It is used as a pre-diagnostic tool regarding physiological and psychophysiological state in human being.[18] During assessment, electrons are extracted through tip of the finger when it is placed on a dielectric surface.[19] In measurement, low electrical current with high voltage and high frequency is functional to the fingertip for less than a millisecond. After that response is visible in a shining form around the finger and captured by Couple Charge Device.[20] The received image is called GDV gram. In the process of recording electrons and photons are mined from the surface of the upper layer of skin due to application of electromagnetic field.[21] The captured images of glow can be grossified and produced again in many different area of subtle energy . All 10 images taken from the fingers of both hands provide total information about the expected health condition of an individual. If image is fluctuating in its sector, it exhibits an unevenness in the repective organ inside the body.[22] The flow of electron emission in the human body becomes imbalance during different psychophysiological conditions. The image materialization varies due to the person's psycho-emotional state. The image is distributed into different sectors and analyzed as per acupuncture meridian theory[23] There are two ways of assessment: with and without the filtercoat which shows physiological and psycho-physiological pattern of the human body respectively [20] A filter is a specifically made of plastic sheet which is positioned during measurement. In EPI measurements, variation in measured values is between 4.1 and 6.6 % [20] whereas in a metallic object this range is 8 to 10%.[24] This appliance is noninvasive in its usage, gives fast assessments and has strong reliability.[20,25,26] EPI had been used to measure different types of clinical aspects of health like heart related disorders, autism, cancer, hyperglyacemia, games, healing and meditation..[25–33]

ISSN PRINT 2319 1775 Online 2320 7876
 UGC CARE Listed (Group -I) Journal Volume 12, Iss 01, 2023

EPI parameters

Three EPI parameters are considered for this study. They are Activation Coefficient, Integral Area and Integral Entropy.

Activation Coefficient (AC) is the measurement of level of stress in an adult with normal range of 2 to 4.

Integral Area (IA) is the measurement of general health index with the range -0.6 to +1 for healthy people.

Integral Entropy (IE) is an evaluation of disorderliness in human energy field along with normal range 1 to 2 in healthy person.

Methods

A total four hundred and eighty subjects were included from Pyramid Valley International, Bangalore and The Pyramid Spiritual Trust, Kailaspuri, Hyderabad, India, including two hundred and sixty four males and one hundred and sixty eighty females (mean age of 34.36±6.83years). A Total of 432 subjects were included in the analysis after excluding 50 subjects (23 males and 27 females). The exclusion criteria were applicable on four factors that were wrong finger images, only without filter measurement, health issues with extreme values in the images. All people were categorized into two groups Long-Term Meditators (LTM) more than 60 months (mean months of practice 111±47.20, hours per day 1.71 ± 1.20), Short-Term Meditators (STM) from 6 months to less than 60 months (mean months of practice 37.17±19.44, hours per day 2.14 ± 4.99). There were one hundred and eighty-four subjects in LTM group (mean age- 35.28±6.49 in years) consisting of one hundred sixteen male and sixty-eight females, two hundred and forty eighty STM (mean age 33.69±7.00) consisting of one hundred and forty eighty males and hundred females were taken for comparisons. Written informed consent were taken from all subjects. The study got approval from the Institutional Ethical Committee of the university. The cross-sectional research design was used in the study. Data were collected from the two sites using Electrophotonic Imaging (EPI).

The people who were fine health wise with 24 to 45 years of both genders were part of this study. To be taken into study either in LTM or STM group, subjects required to have at least 6 months meditation practice. Subjects having missing fingers or cut in fingers, smoked or taken alcohol on the day of test, having any known illness or on medication were not taken in the study.Self-reported health status, age, and already meditation experience details were taken to assign in either of the groups. During measurements, nostril dominance was noted to ensure which nostril was active. Experimenter checked manually at the time of test by placing a finger close to nose and enquiring subject to exhale while closing the mouth.

Data Acquisition and Analysis

Electrophotonic Imaging instrument also known as Gas Discharge Visualization made by "Kirlionics Technologies International," Saint-Petersburg, Russia [GDV camera Pro with analog video camera, model number: FTDI.13.6001.110310] was used to collect data. Raw data from EPI program was transferred to excel for analysis. R statistical packages (R version 3.0.1 2013) by R Foundation for Statistical Computing Platform were used to process data for statistical analysis[34] Parametric Independent t- test was performed within group where a level of $P<0.05$, was set for statistical significant level. To interpret variability during analysis atmospheric temperature and humidity, also measured by using a hygrometer (Equinox, EQ 310 CTH). Mean temperature 26.63±3.47 C and humidity were 52.18% during data collection time at several intervals. This was done to check atmospheric effect and variability of electrophotonic emission in human subjects.[20]

Results

ISSN PRINT 2319 1775 Online 2320 7876
Research Paper , UGC CARE Listed (Group -I) Journal Volume 12, Iss 01, 2023

Gender related observation of Nostril Dominance and Comparison of EPI Parameters' Values within LTM Group

Observation was made for determining which nostril was dominant to understand hemispheric activation in experienced meditators during the time of measurement. Table-1 shows males of LTM group, RN (Right Nostril) dominance values of AC were higher in comparison to LN (Left Nostril) dominance in them but result was not significant.

At the physiological level, values of Integral Area with filter left side (IAWL) and Integral Area with filter right side (IAWR) were found lower in RN dominance males as compared to LN. The mean values of Integral Entropy with filter left side (IEWL) were more and Integral Entropy with filter right side (IEWR) mean values were less in RN dominance males as compared to LN. At the psychophysiological level, the mean values of Integral Area no filter left side (IANL), Integral Area no filter right side (IANR) and Integral Entropy no filter left side IENL were lesser in RN dominance males in comparison to LN. Significantly higher values **(*p*=0.04)** of Integral Entropy no filter left side (IENR) were found in RN in comparison to LN dominance. In females, lower mean values of AC were found in RN dominance as compared to LN.

Table-1 Gender related Nostril Dominance values of EPI parameters in LTM group

Type of Measurement	Variable	Male (LTM)		*p-value*	Female (LTM)		*p-value*
		RN mean±sd	LN mean±sd		RN mean±sd	LN mean±sd	
Physiological (With Filter)	AC	2.83±0.86	2.77±0.91	0.71	2.68±1.08	2.98±0.99	0.25
	IAWL	0.48±0.13	0.49±0.11	0.70	0.39±0.13	0.43±0.13	0.20
	IAWR	0.49±0.13	0.51±0.11	0.30	0.40±0.11	0.45±0.12	0.09
	IEWL	1.93±0.14	1.92±0.15	0.72	1.94±0.14	1.87±0.15	0.07
	IEWR	1.92±0.16	1.96±0.14	0.18	1.93±0.15	1.94±0.14	0.74
Psycho-physiological (Without Filter)	IANL	0.15±0.21	0.18±0.20	0.48	0.08±0.24	0.09±0.20	0.97
	IANR	0.16±0.18	0.18±0.18	0.56	0.11±0.23	0.09±0.25	0.69
	IENL	1.84±0.18	1.85±0.22	0.88	1.86±0.19	1.89±0.16	0.45
	IENR	1.88±0.14	1.82±0.18	0.04*	1.88±0.20	1.95±0.16	0.12

*$P<0.05$, RN=Right Nostril, LN=Left Nostril, LTM=long-term meditators, STM=short-term meditators, AC= activation coefficient, IAWL= integral area with filter left, IAWR=integral area with filter right, IEWL=integral entropy with filter left, IEWR=integral entropy with filter right. IANL= integral area no filter left, IANR=integral area no filter right, IENL=integral entropy no filter left, IENR=integral entropy no filter right.

At psychophysiological level, mean values of IANL, IENL and IENR were lower in RN dominance females than LN. Higher values were observed in IANR in RN dominance females in comparison to LN dominance females. The above discussed results in LTM group including males and females, effect of nostril dominance were not found statistically significant except IENR in males.

ISSN PRINT 2319 1775 Online 2320 7876
 UGC CARE Listed (Group -I) Journal Volume 12, Iss 01, 2023

Gender related Observation of Nostril Dominance and Comparison of EPI Parameters in STM Group

Table-2 Gender related Nostril Dominance values of EPI Parameters in STM Group

Type of measurements	Variable	Male (STM)		*p-value*	Female (STM)		*p-value*
		RN mean±sd	LN mean±sd		RN mean±sd	LN mean±sd	
Physiological (with filter)	AC	2.94±1.07	2.89±0.82	0.71	2.84±0.77	2.77±0.72	0.65
	IAWL	0.50±0.14	0.49±0.13	0.66	0.45±0.12	0.44±0.13	0.83
	IAWR	0.51±0.13	0.52±0.12	0.69	0.46±0.13	0.46±0.12	0.83
	IEWL	1.86±0.26	1.95±0.13	**0.005***	1.93±0.16	1.93±0.13	0.93
	IEWR	1.90±0.22	1.93±0.17	0.25	1.93±0.15	1.86±0.17	0.07
Psycho-Physiological (without filter)	IANL	0.17±0.26	0.17±0.19	0.85	0.13±0.20	0.12±0.13	0.86
	IANR	0.15±0.25	0.17±0.21	0.65	0.14±0.21	0.13±0.15	0.86
	IENL	1.84±0.19	1.87±0.18	0.38	1.86±0.17	1.85±0.13	0.82
	IENR	1.84±0.18	1.84±0.19	0.85	1.89±0.17	1.93±0.14	0.29

*p<0.01, RN=Right Nostril, LN=Left Nostril, LTM=long term meditators, STM=short term meditators AC= activation coefficient, IAWL= integral area with filter left, IAWR=integral area with filter right, IEWL=integral entropy with filter left, IEWR=integral entropy with filter right. IANL= integral area no filter left, IANR=integral area no filter right, IENL=integral entropy no filter left, IENR=integral entropy no filter right.

Study focused to register the trend and characteristics of nostril dominance in STM group gender wise. Table-2 shows higher mean values of AC in males with RN dominance as compared to LN dominance but not significant. Mean values of IEWL were found lesser in RN dominance than LN and result was statistically higher significant **(p=0.005).** No differences were found in the mean values of IANL and IENR (refer to Table -1) with LN dominance compared to RN in males.

In females, mean values of AC were found higher in RN compared to LN dominance. At physiological level in females higher values of IAWL were found in RN dominance than LN. No differences were found in the mean values of IAWR and IEWL. Mean values of IAWL and IEWR at physiological level and values of IANL, IANR and IENL at psychophysiological level were higher in RN dominance than LN.

Discussion

The aim of the current study was to explore gender-related observation of nostril dominance in meditators. Here attempts were also made to explore the nostril dominance due to meditation in context of brain hemispheric activation on electrophotonic imaging parameters. A recent study reported lower values of activation coefficient indicating less stress in female meditators.[10,20] Higher consistency in females reported previously which indicates better synchronization between the brain hemispheres..[9] Quadrato Motor Training (QTM) a type of moving meditation increased theta and alpha, reveal heightened attention and enriched moderation, found in female compared to male.[35] In Qigong meditation, findings show females reduced both anxiety and withdrawal symptoms significantly more than males..[10] A recent study reported cumulative effect of long and short term meditation based on gender wise classification [36]. Here the focus is to explore gender wise nostril dominance and its possible relationship to brain during meditation.

Analysis of Nostril Dominance within LTM Group

The first study focused to see the trend of nostril dominance and its contributory characteristics, during EPI measurement in meditators. It is well documented that regulated breathing practices play a vital role to decrease sympathetic dominance, stress and improves overall health. [1,2,37] Humans naturally breathe through nostril right or left nostril and this dominance changes once in about one

and a half hours. The role of right nostril dominance is more relevant in activation of left hemispheric brain functions.[38,39]

In these experiments, it was found that values of AC, IEWL, and IENR were higher in RN dominance as compared to LN dominance in LTM males. This result shows left brain hemisphere was more active in males during measurement. In LTM females also, higher values of IEWL and IANR were noted in RN dominance as compared to LN. Thus, the results show left hemispheric activation in females too. Lower mean values of IAWL, IAWR, IEWR, IANL, IANR and IENL were observed in RN dominance male in comparison to LN dominance. There was overall dominance pattern of LN dominance in most of the parameters in LTM males which indicates more activation of right hemispheric brain than left.

Lower mean values of AC, IAWL, IAWR, IEWR, IANL, IENL and IENR were found in RN dominance females in LTM as compared to LN. These results show even females had more right hemispheric brain activation during measurement. It is reported that during RN dominance verbal performance was better whereas during LN dominance spatial performance. But in the same study during deep observation researchers found that during LN dominance spatial performance was slightly better than that of RN dominance.[40] Previous findings documented that in unilateral nostril breathing male and female performance of the hemisphere was different from each other. Male performed better during RN dominance on the spatial task and better in verbal performance during left nostril dominance. Study reported that in the case of LN dominance females performed better on the spatial task but unilateral breathing had no influence on their verbal performance.[14] Studies have reported that 15 minutes left nostril breathing reduced heart rate and 8 weeks of daily 15 minutes left nostril breathing significantly lowered systolic blood pressure.[41,42]

In IAWL and IAWR, values were higher in LN dominance as expected in meditators. It indicates change from sympathetic dominance to parasympathetic in LTM males. This change resulted in improvement of overall health and restored functional reserve of energy.[20,43] Higher mean values of IENR were significant where RN dominance has shown left hemispheric activation. These results also show compensatory phases are taking place in the system in LTM males.[22] AC parameter showed differently in genders where females had right hemispheric activation and males left. It is also observed in this study that different parameters of EPI exhibit a diverse trend of results based on dominance of right and left hemispheric activation in genders. The overall findings of nostril dominance, LN dominance was more in both genders at the time of measurement. Study has shown that free nostril breathing in human subject is linked relatively to performance on spatial and verbal task.[14–16,44] No uniform trend of nostril dominance was found in both males and females at the both physiologically and psychophysiologically in LTM group.

Analysis of Nostril Dominance within STM Group

In Table-2, results are presented to find out any uniform trend in STM group based on gender. It was expected that nostril dominance could play a contributory role in the outcome variable for this study. The mean values of AC and IAWL in RN dominance were higher in STM males as compared to LN. This is an indication of left hemispheric activation and possible involvement in thinking process. Lower mean values of IAWR, IEWL, IEWR, IANR and IENL were observed in RN dominance of males in comparison to LN dominance. In these variables, right hemispheric activation was found, which is in the line of expectation in the study. Mediation if practiced for a longer duration of time, gives the pattern of parasympathetic dominance.[43] Right hemisphere is supposed to play vital role in parasympathetic nervous system activity than the left hemisphere.[39,45] In current study observation shows meditators are with right hemispheric activation which involves parasympathetic activities.

Higher mean values of AC, IAWL, IEWR, IANL, IANR and IENL were found in RN dominance females as compared to LN dominance females. Results show due to RN dominance, there was left hemispheric brain activation and more involvement of mental activity. Several earlier studies suggest relative changes in EEG pattern and physiological changes occur with nasal cycle.[14] Lower mean values of IENR were found in RN dominance females in comparison to LN. In this observation males and females are exhibiting different trend over all. In female STM group, over-all left hemispheric activation is observed. In male, STM group, over all right hemispheric activation is found. Result observed here, show that the two genders may be practicing the same kind of meditation and still their brain activation pattern could be different.[5] IEWL values were significantly lower in RN dominance in males as compared to LN dominance. Depending on nostril dominance, STM group females have more stress than males. In LTM group, females had right hemispheric activation, intuitive involvement and parasympathetic dominance in comparison to males.[46] In study as per analysis based on nostril dominance, LTM group males were probably engaged in mental activities during meditation. But in STM group, males show right brain activation based on nostril dominance.

Conclusion

Long-term male meditators showed right hemispheric dominance at the psychophysiological level at the time of assessment. It could be due to longer period of meditation practice. At the physiological and psychophysiological levels, long and short term female meditators exhibited fluctuating trends in both directions-right and left hemispheric dominance on the electrophotonic parameters. Short-term male meditators displayed right hemispheric dominance at the physiological level.

Acknowledgements

The facilities and help provided for the study by management, Pyramid Valley International, Bengaluru and The Pyramid Spiritual Trust, Kailaspuri, Hyderabad, India, are gratefully acknowledged.

References

1. Bhargava R, Gogate MG MJ. Autonomic responses to breath holding and its variations following pranayama. Indian J Physiol Pharmacol 1988;42:257–64.
2. Telles S, Nagarathna R NH. Breathing through a particular nostril can alter metabolism and autonomic activities. Indian J Physiol Pharmacol 1994;38:133–7.
3. Mohan M, Saravanane C, Surange SG TD, AS C. Effect of yoga type breathing on heart rate and cardiac axis of normal subjects. Indian J Physiol Pharmacol 1986;30:334–40.
4. Adam Burke, Sean Marconett. The Role of Breath in Yogic Traditions:Alternate Nostril Breathing. Biofeedback 2008;36(2):67–9.
5. Lee TMC, Leung M-K, Hou W-K, Tang JCY, Yin J, So K-F, et al. Distinct neural activity associated with focused-attention meditation and loving-kindness meditation. PLoS One 2012;7(8):e40054.
6. Barnes PM, Bloom B, Nahin RL. Complementary and alternative medicine use among adults and children: United States, 2007. Natl Health Stat Report 2008;(12):1–23.
7. Brody LR. Gender differences in emotional development: A review of theories and research. J Pers Soc Psychol 1985;53(2):102-149.
8. González-Garrido A a., Gómez-Velázquez FR, Sequeira H, Ramos-Loyo J, López-Franco AL. Gender Differences in Visuospatial Working Memory —Does Emotion Matter? Int J Psychol Stud 2013;5(1):11–21.
9. Ramos-Loyo J, Sanchez-Loyo LM. Gender differences in EEG coherent activity before and after training navigation skills in virtual environments. Hum Physiol 2011;37(6):700–7.
10. Chen KW, Comerford A, Shinnick P, Ziedonis DM. Introducing qigong meditation into residential addiction treatment: a pilot study where gender makes a difference. J Altern Complement Med 2010;16(8):875–82.

11. Hall J a, Schmid Mast M. Are women always more interpersonally sensitive than men? Impact of goals and content domain. Personal Soc Psychol Bull 2008;34(1):144–55.
12. Marciniak R, Sheardova K, Cermáková P, Hudeček D, Sumec R, Hort J. Effect of meditation on cognitive functions in context of aging and neurodegenerative diseases. Front Behav Neurosci 2014;8(17):1–23.
13. Miller, Alan S, Stark. R. Gender and Religiousness: Can Socialization Explanations Be Saved? 1. Am J Sociol 1076 2002;107(6):1399–423.
14. Block R, Arnott DP, Quigley B, Lynch WC. Unilateral nostril breathing influences lateralized cognitive performance. Brain Cogn 1989;9(2):181–90.
15. Jella, Susan A. and DSS-K. The effects of unilateral forced nostril breathing on cognitive performance. Int J Neurosci 1993;73(1–2):61–8.
16. Shannahoff-Khalsa, David S., Michael R. Boyle and MEB. The effects of unilateral forced nostril breathing on cognition. Int J Neurosci 1991;57(3–4):239–49.
17. Marshall R, Laures Gore J, DuBay M, Williams T, Bryant D. Unilateral forced nostril breathing and aphasiaexploring unilateral forcednostril breathing as an adjunct to aphasia treatment: a case series. J Altern Complement Med 2015;21(2):91–9.
18. Korotkov KG. Measuring Energy Fields: Current Research. USA: Backbone Publishing Co. Fair Lawn; 2004.
19. Korotkov KG, Williams B, Wisneski LA. Assessing biophysical energy transfer mechanisms in living systems: the basis of life processes. J Altern Complement Med 2004;10(1):49–57.
20. Korotkov K., DeVito D, Arem K, K M, Williams B, Wisneski L. Energy Fields Electrophotonic Analysis In Human And Nature. Sain-Petersburg: Amazon.com Publishing; 2011.
21. Cohly HHP, Kostyuk N, Cole P, Meghanathan N, Isokpehi RD. Gas discharge visualization: An imaging and modeling tool for medical biometrics. Int J Biomed Imaging 2011;2011(1):1–7.
22. Korotkov KG. Human Energy Field: Study with GDV Bioelectrography. Fair Lawn, NJ: Backbone Publishing Co; 2002.
23. Korotkov K. The Principles of GDV Analysis. Marco Piet. Embourg, Belgium: Amazon.com Publishing; 2009.
24. Konstantin K, Oleg C, Elena G, Oleg S, Anna K, Elena L, et al. Non-local consciousness influence to physical sensors: experimental data. Philosophy Study. Philos Study 2011;1(4):295–304.
25. Korotkov KG, Williams B, Wisneski LA. Assessing biophysical energy transfer mechanisms in living systems: the basis of life processes. J Altern Complement Med. J Altern Complement Med 2004;10(1):49–57.
26. Korotkov KG, Matravers P, Orlov D, Williams B. Application of electrophoton capture (EPC) analysis based on gas discharge visualization (GDV) technique in medicine: a systematic review. J Altern Complement Med 2010;16(1):13–25.
27. Chapter II: Review of the Literature. Acta Radiol [Old Ser 1960;53:7–18.
28. Sharma B HA. Gas Discharge Visualization Gas Discharge Visualization Characteristics of an Indian Diabetes Population. Voice Res 2014;2(4):28–33.
29. Luiza I, Wróbel C, Szadkowska I, Masajtis J GJ. Images of corona discharges in patients with cardiovascular diseases as a preliminary analysis for research of the influence of textiles on images of corona discharges in textiles ' users. AUTEX Res J 2010;10(March):26–30.
30. Kostyuk N, Rajnarayanan R V, Isokpehi RD CH. Autism from a biometric perspective. Int J Env Res Public Heal 2010;7(5):1984–95.
31. Korotkov K, Shelkov O, Shevtsov A, Mohov D, Paoletti S, Mirosnichenko D, et al. Stress Reduction with Osteopathy Assessed with GDV Electrophotonic Imaging : 2012;18(3):251–7.
32. Korotkov K, Bundzen P V, Bronnikov VM, Lognikova LU. Non-local Consciousness Influence to Physical Sensors : Experimental Data. 2011;1(4):295–304.
33. Guru Deo, Itagi RK, Srinivasan TM, Kushwah KK. Effect of Anapanasati Meditation Technique through Electrophotonic Imaging (EPI) Parameters: A Pilot Study. Int J Yoga 2015;8(2):117–21.

34. R Development Core team. A language and environment for statistical computing [Internet]. [Internet]. 2014;Available from: http://www.r-project.org/
35. Ben-Soussan TD, Berkovich-Ohana A, Glicksohn J, Goldstein A. A suspended act: Increased reflectivity and gender-dependent electrophysiological change following Quadrato Motor Training. Front Psychol 2014;3(5):55.
36. Deo G, Kumar IR, Srinivasan TM, Kushwah KK. Cumulative effect of short-term and long-term meditation practice in men and women on psychophysiological parameters of electrophotonic imaging: a cross-sectional study. J Complement Integr Med [Internet] 2015;Available from: http://www.degruyter.com/view/j/jcim.ahead-of-print/jcim-2015-0050/jcim-2015-0050.xml
37. Mohan M, Saravanane C, Surange SG TD, Chakrabarthy AS. Effect of yoga type breathing on heart rate and cardiac axis of normal subjects. Indian J Physiol Pharmacol 1986;30:334-40.
38. Meyer S.; Strittmatter M.; Fischer C., Georg T. S, B. Lateralization in autonomic dysfunction in ischemic stroke involving the insular cortex. Neuroreport 2004;15(2):357–61.
39. Barron S.A., Rogovski Z. HJ. Autonomic consequences of cerebral hemisphere infarction. Stroke 1994;25(1):113–6.
40. Klein, R., Pilon, D., Prosser, S .• & Shannahoff-Khalsa D. Nasal airflow asymmetries and human performance. Biol Psychol 1986;23(2):127–37.
41. Jain N., Srivastava R.D. SA. The effects of right and left nostril breathing on cardiorespiratory and autonomic parameters. Indian J Physiol Pharmacol 2005;49(4):469–74.
42. Shannahoff-Khalsa D.S. KB. The effects of unilateral forced nostril breathing on the heart. Int J Neurosci 1993;73(1–2):47-6-.
43. Sukhsohale ND, Mrunal SP. Effect of short-term and long-term Brahmakumaris Raja Yoga meditation on physiological variables. Indian J Physiol Pharmacol 2012;56(4):288–392.
44. Shannahoff-Khalsa, David S., Michael R. Boyle and MEB. The effects of unilateral forced nostril breathing on cognition. Int J Neurosci 1991;57(3–4):239-249.
45. Shannahoff-Khalsa DS. Selective unilateral autonomic activation: Implications for psychiatry. CNS Spectr 2007;12(8):625–34.
46. Madhyastha S, Latha KS, Kamath A. Stress and coping among final year medical students. AP J Psychol Med 2014;15(1):74–80.