



Research Article

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Effect of Yoga on Endocrine and Nervous System in Adolescent children: Assessment Using EPI parameters

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ABSTRACT

Behavioral problems are highly prevalent in adolescent children. Adolescence is characterized by several major morphological and functional / behavioral changes. Hyper activities at endocrine and nervous systems seem to be the major cause for the behavioral changes during this transition period. Yoga is found to be one of the effective methods that can influence various bio-systems and can be used in schools to establish physical and psychological well being. Assessment of endocrine and nervous system is very expensive and tedious process which is only done in a clinical setting. Electro photonic imaging (EPI) is an emerging technology that can assess energy levels of various organs and organ systems in a non-clinical setting. It is a two group (yoga group and control group) study with pre-post data collection. Yoga intervention is given in an English medium high school during academic hours. About 60 students of 8th standard participated in the study with 30 samples in each of the group. Energy levels of endocrine and nervous system is taken for both groups by scanning all the 10 fingers before and after yoga intervention. Highly specialized BioWell equipment and software was used to capture the images. EPI parameters for throat energy, thyroid gland, hypothalamus and nervous system has shown significant difference between pre-and post values of yoga group and it has shown significant reduction in the mean value of post data of yoga group whereas the mean value of same parameters in post data of control group has increased. This clearly establishes the efficacy of yoga in normalizing the effect of the endocrinal system and the resultant nervous hyper-activity. EPI is capable of differentiating energy levels of endocrine and nervous system values of yoga and control group.

Keywords: Yoga, Electro Photonic Imaging, Behavioral Problems, Adolescence.

INTRODUCTION

Wide variety of emotional and behavior problems seem to be highly prevalent in adolescent period. Changes in the endocrine and nervous system are one of the main factors which are related to adolescent behavior changes. Yoga helps to channelize the behavior and emotions towards positive direction. The effect of yoga in endocrine and nervous system is captured using EPC method and results are evaluated in this study. Onset of puberty is always associated with many changes in mental, psychological and in social life of adolescent children.

Adolescence and various behavior problems – relationship with Endocrine and Nervous System

Adolescence is more prone to emotional challenges when compared to childhood and adulthood. Adolescent children from a traditional family face less psychological and social problems when compared to children from nuclear modern family in this fast life [1]. Family environment is the root for emotional and behavioral problems in adolescent children. In India, prevalence of emotional and behavioral problems is high. Internalizing syndrome is one of main psychiatric problems in adolescence [2]. Prevalence of risk behaviors of adolescent children like smoking, alcohol, substance abuse, death toll due to motor vehicle accidents is very high [3]. Negative changes in behavior of adolescent children are presumed to be mainly because of hormones [4]. There is always a bidirectional effect that exists between hormones and emotional behavior of adolescent children [5]. Prefrontal cortex and parietal cortex of adolescent children is not completely developed until they reach the stage of adulthood [6]. So, there is increased activity of Amgdala during emotional conflicts in adolescence and reduced response of Pre frontal cortex region of the brain [7]. Adolescent children rely upon Amygdala for decision making and it is based on emotions. Adolescence is a sensitive period for brain organization and changes in hormones after puberty. It leads to differences in adult behavior [8]. Though the adolescent children may look stable during the course of development in adolescent period they tend to show major dysfunction in adulthood like criminal behaviors. There is always a risk of these behaviors being transferred to one's offspring [9]. So there is definitely a need for personality development training for adolescent children to handle the changes in adolescent stage in a positive direction.

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Efficiency of Yoga at various levels

Though multiple personality development programs are available to channelize adolescent children in proper way, many of the research studies prove the positive effect of Yoga. Yoga develops personality at various levels, i.e. Physical, mental, emotional, intellectual and spiritual. Yoga helps in reducing aggression [10]. Yoga reduces anxiety, depression and various other psychiatric problems [11]. Continuous practice of asanas, pranayama and meditation increases plasma melatonin levels [12]. Regular practice of yoga improves the feeling of well being [13]. Yoga is significantly better than physical exercise in normalizing the secretion of various hormones [14].

Electro Photonic Imaging (EPI) as diagnostic tool

There are various medical tests or questionnaires available for examining the hormone levels and development of nervous system. Now the emerging field of diagnostics is Electro photonic Imaging system. This innovative technique is used for health assessment in alternative medicine, conventional practices, psycho-physiology, psychology, and consciousness studies. It has proven its reliability and validity in capturing the energy levels of physiological organs and systems and emotional and psychological state of a person. EPI method can be used as an express-method for evaluating emotional and physical conditions of a person and effectiveness of various treatments [15]. EPI captures and differentiates subtle changes in energy levels. It can be used as bio marker for diabetes [16]. EPI Test-retest reliability of baseline values have an overall variance of 0.236 and a standard deviation of 0.387. Variance in patterns of emission and calculated diagrams is about 10% for human fingers, and 3% for materials [17].

MATERIALS AND METHODS

It is a two group study with pre-and post data collection. The study is conducted in Jnana Sagar English high school, Banashankari, Bangalore. One section of Grade 8 students which has 30 students are taken as samples for intervention group. 30 Students of other section of Grade 8 students in the same school are taken as samples for control group. Subjects included both boys and girls. Integrated Yoga Module for Anger Management developed by Dr. Alaka Mani TL is given as intervention for yoga group. Yoga intervention was given five days a week for a month's period with 40 minutes of each session. Yoga sessions were conducted during academic hours. Control group attended regular classes and no other special activity is given to them.

Data is collected for all 10 fingers using Electro Photonic Imaging equipment from both the intervention and control group before and after giving yoga intervention. Bio-Well equipment which is a revolutionary, non-intrusive way to measure energy levels using specialized camera and software system was used to capture the images. Data is retrieved from the equipment using BioWell software and exported to excel sheet in the form of numerical values. Results are analyzed and compared using IBM SPSS Statistics 20 software.

RESULTS AND DISCUSSION

Paired Sample T test is used to find significant difference between pre - and post data of normally distributed variables and Wilcoxon Signed Rank test for variables which are not normally distributed. Results for yoga group and for control group are posted in Tables below.

Table 1: Mean, Std dev, Normality ShapiroWilk value of pre and post data of yoga group, Significant difference P value between pre and post data of yoga group

Variable Name	Mean		Comparison	Standard Deviation		Normality (Shapiro Wilk Value)		P Value (Significant difference)
	Pre	Post		Pre	Post	Pre	Post	
Thyroid_gland_Energy	5.178966	4.733103	↓	.8977883	.8803575	.360	.507	.031
Cerebral_Zone_Cortex_Energy	4.520690	4.370000	↓	.7375777	.5531598	.169	.387	.416
Throat_Energy	5.626897	4.890690	↓	1.4402854	1.39806	.597	.991	.013
Mammary_Gland_Energy	5.138276	4.863103	↓	1.4716659	1.14027	.607	.471	.203
Endocrine_System_Energy	4.751724	4.522414	↓	.6510380	.6215571	.017	.187	.127
Hypothalamus_Energy	4.963448	4.618621	↓	.7668362	.6881067	.447	.433	.057
Hypophysis_Energy	4.818966	4.886897	↑	.9393172	.5208311	.209	.962	.705
Pancreas_Energy	4.576552	4.517586	↓	.8816149	.6819858	.163	.720	.776
Adrenal_Energy	4.462069	4.274483	↓	1.1249901	.9006132	.341	.576	.425
Spleen_Energy	4.196207	3.993103	↓	1.0615703	1.04792	.959	.486	.375
Nervous_system1_Energy	4.544828	4.157586	↓	.8423378	.8057457	.401	.531	.097
RightRing_Nervous_system	.278966	.239655	↓	.0485022	.0624204	.414	.000	.010
RightRing_Hypothalamus	.525862	.461034	↓	.0910854	.0885335	.524	.472	.006

Yoga group Results

Energy levels of thyroid and throat, Nervous system and hypothalamus with respect to right ring finger are showing significant difference between pre- and post data of yoga group. P value of Hypothalamus energy is 0.057 which is close to 0.05

Though variables (Energy levels of cerebral zone cortex, mammary gland, endocrine system, pancreas, hypophysis, adrenal, spleen and nervous system) do not show significant difference between pre and post data of yoga group, there is a reduction in the mean of post data of yoga group when compared with pre data of yoga group. There is slight increase in the mean of Hypophysis energy from 4.82 to 4.89.

Table 2: Mean, Std dev, Normality Shapiro Wilk value pre - and post data of Control group, Significant Difference P value between Pre – and Post data of control group

Variable Name	Mean		Comparison	Standard Deviation		Normality(Shapiro Wilk Value)		P Value
	Pre	Post		Pre	Post	Pre	Post	
Thyroid_gland_Energy	4.538966	5.389655	↑	.9598897	.9238254	.752	.529	.000
Cerebral_Zone_Cortex_Energy	4.101034	4.452759	↑	.9202342	.6756314	.559	.229	.094
Throat_Energy	4.791379	5.778276	↑	1.2874302	1.1781737	.991	.391	.000
Mammary_Gland_Energy	5.352759	5.510000	↑	1.4239555	1.0633606	.788	.354	.548
Endocrine_System_Energy	4.213448	4.810690	↑	.8084786	.6997037	.127	.570	.002
Hypothalamus_Energy	4.325517	4.912414	↑	.8398877	.6968534	.257	.541	.003
Hypophysis_Energy	4.416897	5.036207	↑	.8232302	.9011121	.458	.228	.007
Pancreas_Energy	4.145862	4.758276	↑	1.3400947	1.0648979	.819	.935	.054
Adrenal_Energy	4.034483	4.354138	↑	1.2278017	.9713559	.689	.964	.246
Spleen_Energy	3.912414	4.487586	↑	.7339699	.8949248	.442	.474	.004
Nervous_system1_Energy	3.938621	4.473103	↑	.7299448	.9111065	.156	.700	.005
RightRing_Nervous_system	.235862	.260345	↑	.0437131	.0538173	.170	.431	.051
RightRing_Hypothalamus	.459310	.498621	↑	.0811934	.0733740	.268	.897	.073

Control Group results

Energy levels of cerebral cortex, mammary gland, pancreas and adrenal gland show no significant difference between pre – and post data of the control group. Energy levels of thyroid gland, throat energy, endocrine system, hypothalamus, hypophysis, spleen and nervous system have shown significant difference between pre and post data of control group. But there is an increase in the mean value of post data of control group when compared with pre data of control group. Standard deviation has also increased in post data of control group compared with pre data of control group for many of the variables. The increase in hypophysis energy is more in control group from 4.42 to 5.04.

DISCUSSION

Hypothalamus is the seat of emotions and governs physiologic functions such as temperature regulation, thirst, hunger, sleep, mood, sex drive, and the release of other hormones within the body. This area of the brain houses the pituitary gland and other glands in the body. Yoga helps in down regulation of hypothalamic–pituitary–adrenal (HPA) axis and the sympathetic nervous system (SNS) [18]. Yoga may act at the level of the hypothalamus in reducing the cortisol [19]. So, it confirms that yoga reduces energy levels in Hypothalamus which supports the result of the variable ‘Energy level of Hypothalamus with respect to ring finger’.

Hyperthyroidism is a sympathovagal imbalanced state, characterized by both increased sympathetic and decreased vagal activity [20]. Decrease in the mean of value of energy levels of thyroid and throat confirms that yoga balances the excess sympathetic activity through thyroxin secreted by thyroid gland. In control group the increase in the mean of thyroid confirms the increased sympathetic activity in control group.

Regular practice of yoga asanas shows a significant reduction in the markers of intrinsic neuro hormonal activity [21]. In the current study, there is reduction in the mean value of energy levels of nervous system of post data of yoga group when compared to the mean value of pre data of yoga group as there it reduces in the sympathetic hyperactivity. There is an increase in the post value of control group when compared to the pre value of control group. This signifies that yoga calms down

the nervous system and reduces the energy levels in the nervous system.

Yoga nidra reduces pain by stimulating Pituitary gland [22]. Yoga stimulates the pituitary gland and relaxes by relaxation response of yoga practices [23]. So there is a slight increase in the mean of hypophysis energy in yoga group which is due to stimulation and relaxation. The increase in the mean of hypophysis energy is more in control group compared to yoga group as there is no part of relaxation or balancing of autonomic nervous system.

Optimal basal activity and responsiveness of stress system is required for healthy well being. Inadequate and excessive response of stress system impairs development and results in behavioral problems [24]. The above statement supports the results in the current study that yoga optimizes the energy levels of endocrine and nervous activity in adolescent children.

CONCLUSION

Electro Photonic Imaging is a promising equipment to find the difference between energy levels of yoga group and control group. Yoga is effective to bring the energy levels of endocrine and nervous system of high school children to optimum level.

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