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## Effect of biofeedback assisted training methods on electro dermal response of males and females

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### Abstract

The present study was being carried out to see the effect of 35 minutes, 6 weeks biofeedback assisted training on electrodermal response of males and females in the age group of 11 to 15 years. 128 students both boys (N=64) and girls (N=64) were divided randomly into 4 groups with 32 subjects in each of the 4 groups namely: Yoga Nidra, Biofeedback, Yog nidra and Biofeedback combined and control group. The three experimental groups other than the control group were given intervention with or without biofeedback. Statistical technique of paired samples t-test using SPSS version 20 was being used. The results showed significant differences in both males and females before and after the intervention of yog nidra with biofeedback. Yog nidra and biofeedback plus yoga nidra combined groups for both males and females showed significant differences in electrodermal response. Most prominent increase after the 6 weeks of intervention on electrodermal response was observed for the Biofeedback and Yoga nidra group combined among males ( $468.00 \pm 93.02$ ) followed by among females ( $423.25 \pm 112.26$ ) Control and biofeedback groups for both the males and females did not show statistically significant differences after 6 weeks.

**Keywords:** Yog Nidra, Biofeedback, paired samples t-test, Gender

### Introduction

Life has become stressful for our young generation due to self imposed academic demands, population, pollution and demands for parents and peer pressure in school. Family ties has also been playing an important role on psychology of young children besides technological advances like social media, too much information, addictions to apps so on and so forth. Anxiety has been shown to have a negative effect on our health with a large number of children who are unaware that their symptoms may have solutions (Lail & Schroedar, 1990) [2]. Traditionally psychologists have been using standard protocols on general issues like counseling, behavior related aspects, peer group influences, learning disorders through paper pencil tests, interviews, group and individual counseling sessions sometimes involving parents and giving some recommendations to both the child and the parents to follow. Unfortunately, the array of interventions shown to be effective experimentally is very limited. Realizing such gaps, the present study was being undertaken to see the effectiveness of biofeedback assisted yogic training methods as interventional variable and to analyze how effective it would be to alleviate anxiety, stress, tension etc. among children.

Though behavior is biologically related, it is logical to combine biological functions with behavior to elicit change (Hynd & Willis 1988; Pliszka, Hatch, Borchering, & Rogness, 1993; Whitten, D' Amato, & Chittooran, 1992) [1, 4, 6]. The present study can be seen as significant in view of its practicality in school settings where behavior and psychological problems are abound.

Biofeedback may be described as the process of providing information about an ongoing physical response in the body. This knowledge then, is used to change the bodily response and thus increase self control and decrease the anxiety symptoms (Orton & Noonberg, 1980) [3].

The procedure provides information to the subject about bodily reactions (i.e., anxiety produced responses) such as heart rate, electro-dermal response etc. in an amplified form. By learning to first identify and then control the anxiety reactions in the body, symptoms such as elevated respiration arte, heart rate or test anxiety can be alleviated.

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**2. Methodology**

For the purpose of the study 64 male and 64 female school students (N=128) in the age group of 11 to 15 years (32-Yoga nidra, 32-Biofeedback, 32-Biofeedback and yog nidra combined and 32 in the control group) were selected randomly from Delhi schools. The pre and post-intervention electro-dermal response (in kilo-ohms) was measured for all the groups. The results were calculated and analyzed using SPSS 20 version.

Yoga Nidra intervention (Swami SS. *Yoga Nidra*. 6th edition. Yoga Publications Trust: Ganga Darshan Munger Bihar India; 1998) [5] as developed by Swami Satyananda Saraswati, School of Yoga, Munger, Bihar, India was being implemented by the trained instructor. The protocol consisted of 35 min per day, five days a week intervention for six weeks to the experimental groups only.

**2. Results and discussion**

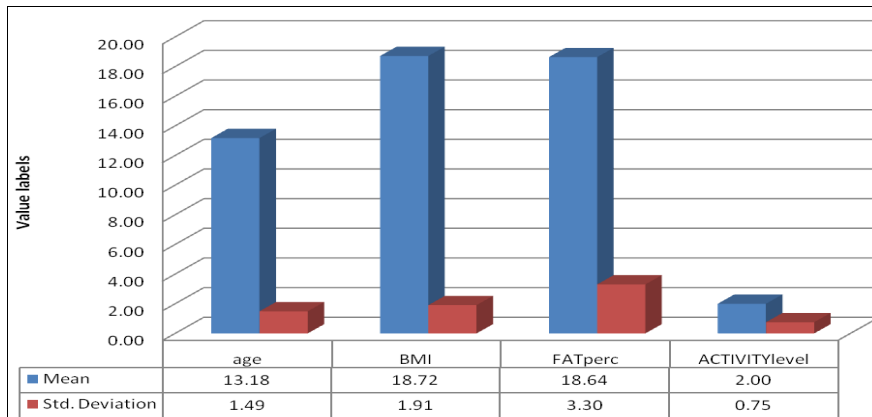
**Table 1:** Test of normality for the data

Variable	Gender	Kolmogorov-Smirnov <sup>a</sup>			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
Pre intervention electrodermal response	Male	.085	64	.200*	.975	64	.217 (NS)
	Female	.089	64	.200*	.970	64	.117 (NS)
Post-intervention electrodermal response	Male	.197	64	.000	.855	64	.000
	Female	.255	64	.000	.805	64	.000

\*. This is a lower bound of the true significance.  
a. Lilliefors Significance Correction

Shapiro–Wilk’s column shows that the overall pre-intervention GSR values for both males and females were not significant at .05 level of confidence therefore the data was normally distributed which is a favorable condition for us to

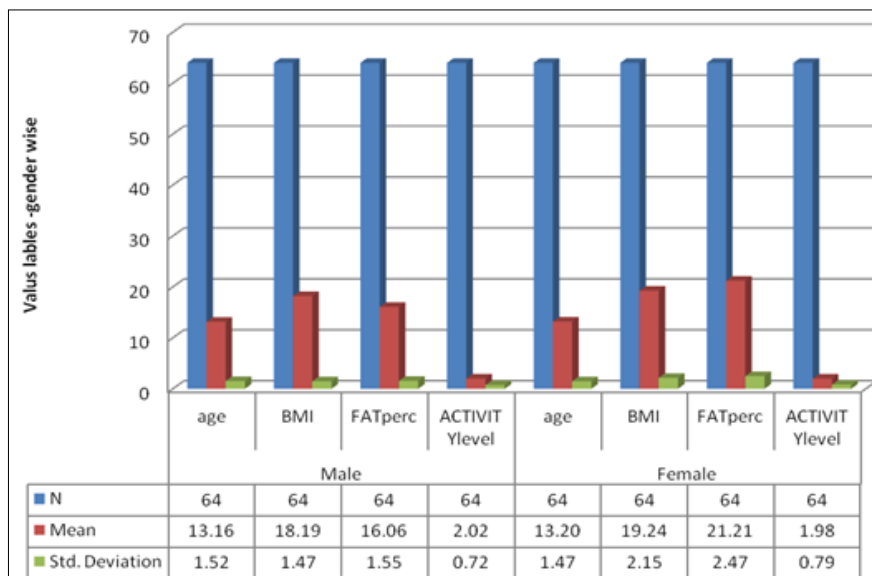
move further. Post-intervention the values were significantly different as shown because of the differences in response to the interventions being incorporated to the experimental groups.



**Chart 1:** Combined demographic mean and standard deviations of age, body mass index, fat percentage and activity level-overall for both genders.

Chart-1 shows the demographic variables of all the students combined. Mean age was 13.28 ± 1.49, mean BMI was 18.72

± 1.91, fat percentage 18.64 ± 3.30 and activity level 2.00 ± 0.75.



**Chart 2:** Gender wise demographic mean and standard deviations of age body mass index, fat percentage and activity level.

Chart-2 shows the gender wise demographic variables. For males the Mean age was  $13.26 \pm 1.52$ , mean BMI was  $18.19 \pm 1.47$ , fat percentage  $16.06 \pm 1.55$  and activity level  $2.02 \pm 0.72$ .

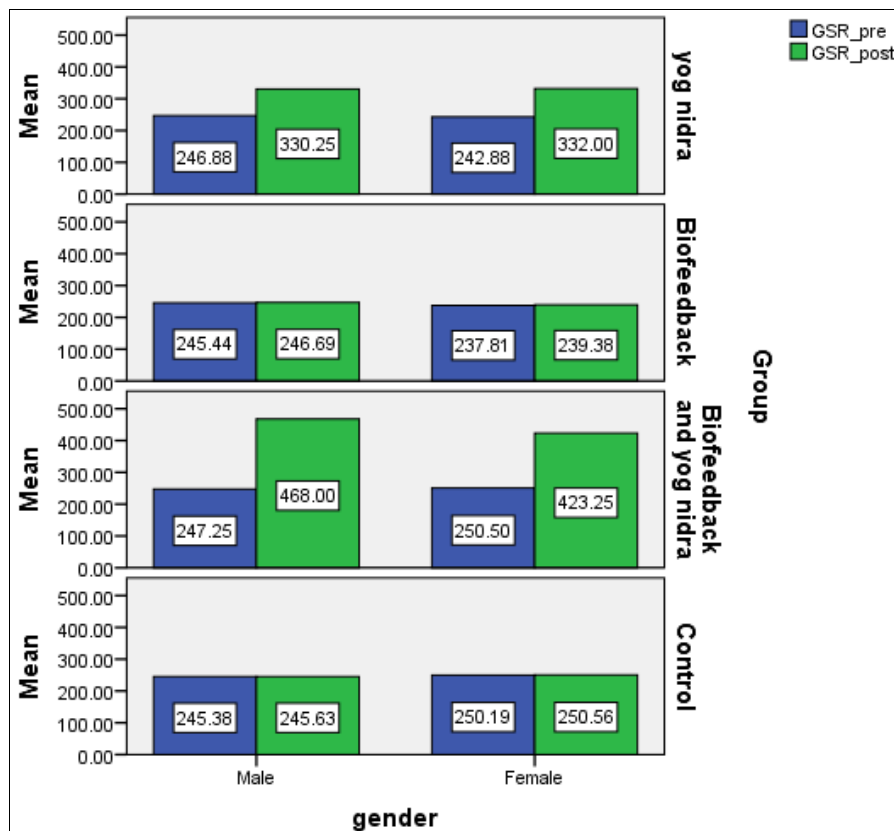
For females the Mean age was  $13.20 \pm 1.47$ , mean BMI was  $19.24 \pm 2.15$ , fat percentage  $21.21 \pm 2.47$  and activity level  $1.98 \pm 0.79$ .

**Table 2:** Pre and post intervention group wise mean and standard deviation of electrodermal response (GSR) measured in kilo-ohms

Gender			N	Mean	Std. Deviation
Male	yog nidra	GSR_pre	16	246.88	26.61
		GSR_post	16	330.25	52.35
	Biofeedback	GSR_pre	16	245.44	19.75
		GSR_post	16	246.69	19.42
	Biofeedback and yog nidra	GSR_pre	16	247.25	25.44
		GSR_post	16	468.00	93.02
	Control	GSR_pre	16	245.38	32.82
		GSR_post	16	245.63	32.97
Female	yog nidra	GSR_pre	16	242.88	18.20
		GSR_post	16	332.00	82.07
	Biofeedback	GSR_pre	16	237.81	22.30
		GSR_post	16	239.38	22.12
	Biofeedback and yog nidra	GSR_pre	16	250.50	20.84
		GSR_post	16	423.25	112.26
	Control	GSR_pre	16	250.19	20.43
		GSR_post	16	250.56	20.08

Table-2 shows the Pre and post intervention group wise mean and standard deviation of electrodermal response (GSR) for males and females. In males, post –intervention GSR for biofeedback and yoga nidra group was found to be better ( $468.00 \pm 93.02$ ) as compared to other 3 groups. Similar trend

was seen in females, post –intervention GSR for biofeedback and yoga nidra group was found to be better ( $423.25 \pm 112.26$ ) as compared to other 3 groups. Male biofeedback and yoga nidra group showed better GSR in comparison to female biofeedback and yoga nidra group.



**Chart 3:** Pre and post-intervention Electrodermal response values for the males and females group wise.

Chart-3 shows visibly clear pre and post-intervention electrodermal response values for the males and females group wise. Control group for males and females showing

almost same level and same with the solely biofeedback group.

**Table 3:** Paired samples t-test showing differences at .05 level of confidence.

Gender			Paired Differences		df	Sig. (2-tailed)
			Mean	Std. Deviation		
Male	yog nidra	GSR_pre - GSR_post	-83.38	54.09	15	.000
	Biofeedback	GSR_pre - GSR_post	-1.25	2.96	15	.111 (NS)
	Biofeedback and yog nidra	GSR_pre - GSR_post	-220.75	91.99	15	.000
	Control	GSR_pre - GSR_post	-0.25	1.34	15	.468 (NS)
Female	yog nidra	GSR_pre - GSR_post	-89.13	78.37	15	.000
	Biofeedback	GSR_pre - GSR_post	-1.56	3.86	15	.127 (NS)
	Biofeedback and yog nidra	GSR_pre - GSR_post	-172.75	99.41	15	.000
	Control	GSR_pre - GSR_post	-0.38	1.36	15	.287 (NS)

**From the results as shown in table-3, we can say that:**

- There was a significant average difference between pre and post electrodermal values of male yoga nidra group ( $t_{15} = 83.38$ ,  $p < 0.000$ )
- There was a significant average difference between pre and post electrodermal values of male biofeedback and yoga nidra group ( $t_{15} = 220.75$ ,  $p < 0.000$ )
- There was a significant average difference between pre and post electrodermal values of female yoga nidra group ( $t_{15} = 89.13$ ,  $p < 0.000$ )
- There was a significant average difference between pre and post electrodermal values of male biofeedback and yoga nidra combination group ( $t_{15} = 172.75$ ,  $p < 0.000$ )
- The control and only biofeedback groups for both males and females showed no significant differences on pre and post electrodermal values.

**3. Conclusion**

Males were able to relax more than females in the yoga nidra and biofeedback group combined, the only yog nidra groups showed second best improved electrodermal values. The control and only biofeedback groups for both males and females did not show statistically significant differences on electrodermal response. This shows that mainly the relaxation effect was being brought out as result of interventions given to males and females in the yog nidra and biofeedback plus yog nidra groups.

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