



Effect of Pranayama on children health leading to mental health

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Abstract

There is a constant rise of anxiety and stress concerns among children and as evidenced, many countries practiced yoga therapies to reduce the stress and anxiety. The study aims to advance the understanding of Pranayama- a method derived in Yoga on children's health specifically measured in physical health and mental health. For this, the data collected from fifty-five girls studying in residential school of renowned university

campus. The intervention provided was blood report and measurement of their respiratory abilities in week one and then Pranayama was practiced for 8 weeks with measurement taken on same variables. ANOVA was performed to test the pranayama effect with the help of SPSS 20.0 for analysing the data. The results showed that Pranayama improved the health conditions of the children. The resultant implications for the school administrators and government are presented hereafter.

Keywords: Yoga, Pranayama, Child, Mental health, Blood report, Respiratory system

1. Introduction

Today, students are under tremendous pressure to increase their academic performance, which is usually measured from their cumulative grade point average (CGPA). Such parameters have been in utmost attention paid by all concerned as it decides the career paths for the children (Parajuli, Pradhan, & Bapat, 2022). As a result, children studying in schools needs to achieve the expected level, which raise anxiety and stress among them. The school students face stress and anxiety which is physical as well as psychological (Anusuya, Mohanty, & Saoji, 2021).

Therefore, practicing yoga everyday can bring the psychological and physical benefits to the school children. According to Hagen & Nayar (2014), yoga is a “mind-body intervention that applies movement, breathing, and relaxation to nurture holistic well-being in children” (Shanker & Pradhan, 2022, p. 1). In fact, Pranayam has been the most practiced breathing meditation which has been growing field of research (Hepburn & McMahon, 2017). Pranayama helps to improve wellbeing of an individual i.e., “physical”, “psychological” and “spiritual” (Chopra, 2006). Many studies supported that pranayama reduces anxiety and stress among children and adolescents (Khalsa et al., 2012; James-Palmer et al., 2020).

Children, due to their “appropriateness” and “socially right” behaviour balance with their parents, always hide their distress and urge to make their parents tension-free. Therefore, they grounded with constructivist approach, actively participate in their development process, which can be aligned with yoga that offers right balance to their body, feelings and mental health (Hagen & Nayar, 2014). Further, Anusuya et al. (2021) investigated the effect of yoga-based interventions on cognitive and psychological wellbeing of children.

Therefore, the purpose of the study is to investigate the effect of pranayama on children’s physical health and wellbeing. Moreover, an intensive literature search demonstrated rare evidence that studied the effect of various pranayama on physical wellbeing of the children. Interestingly, most of the studies have concluded their results based on any gender and no specific attempts were made to understand the female student’s perspective except few instances such as Parajuli, Pradhan, & Bapat (2022). Based on above discussion, following hypotheses were

formulated: *female children undergoing pranayama intervention would exhibit an improvement in their physical health than the control group female children.*

2. Materials and methods

2.1 Participants

Fifty female students studying in the ninth standard at a female school in Gujarat, India were assessed for the study. The age was sued to include the female student in the experimental or control group as the inclusion criteria. The age range of 15-16 years was used to recruit the participants, who were well convergent with English. Students with any disability or practicing yoga, meditation regularly were excluded from the study. The female students were selected with the help of convenience sampling, with the consent from students and principal of the schools. Participants were randomly assigned in experimental (n=26) and control group (n=28).

2.2. Design and setting

In this study, experimental design was administered with post-test control-group method. The experimental group participants were received an intervention program for 8 weeks' time, while control group participants were not received any intervention. Participants were oriented about the study, purpose and hence their informed consent was received. They were also informed about the place where the pranayama was performed each day for the period. Upon completion of the intervention duration, their blood samples were taken, along with their respiratory abilities were recorded for both the groups using Peak flow meter (measured in mm).

2.3 Intervention

The experimental group who has received intervention underwent for 30-minute pranayama training for six days a week for two months. We used pranayama trainer who has formal education in yoga. Table 1 displays the pranayama practices. The total duration for the intervention that includes scientifically designed training program capturing “Bhramari”, “Nadi shodhan pranayama”, and “Kapal Bhati” was pre-decided to last for 3-minutes, while “Sheetli pranayama”, and “Bhastrika pranayama” was pre-decided to last for 2 minutes, excluding resting time.

Table 1: Experimental intervention of pranayama

Pranayama Practice	Repetition	Duration (minutes)	Intervention
Bhramari	9	3	With your eyes closed, take a straight seat in a quiet, well-ventilated corner. Maintain a gentle smile on your face. Keep your eyes shut for a while. Pay attention to the stillness and the bodily feelings.

			<p>Grasp your ears with your index fingers such a way that cartilage form. Inhale deeply, then lightly press the cartilage as you exhale. You can make a loud bee-like humming sound while pressing the cartilage in and out with your fingertips, or you can leave it pressed. Although you can also produce a low-pitched sound, producing a high-pitched sound will yield greater results (Art of Living, 2024).</p> <p>Repeat for said duration.</p>
Nadi Shodhan Pranayama (Surya anulomvilom)	9	3	<p>Maintain an upright spine and relaxed shoulders while sitting comfortably. Maintain a soft smile on your face. With your hands facing up or in the Chin Mudra (the tips of your thumb and index finger lightly touching), place your left hand on your left knee. Position the thumb on the right nostril, the ring and little fingers on the left, and the tip of the index and middle fingers on the right hand in the space between the eyebrows. To open or close the left nostril, we shall utilize the ring and little fingers, and for the right nostril, the thumb.</p> <p>Breathe out slowly through your left nostril while applying pressure with your thumb to your right nostril. After taking a breath through the left nostril, softly press it with your little and ring fingers. Breathe out of the right nostril while removing the right thumb from it. Inhale via your right nostril and exhale through your left. This concludes your first round of Nadi Shodhan pranayama. Continue breathing in and out through different noses.</p> <p>(Art of Living, 2024).</p>
Kapal Bhati	3	3	<p>Sit with your back straight and in comfort. With your palms facing up, place your hands on your knees. Draw in a deep breath. Draw your navel back toward your spine as you release the breath. As much as is comfortable for you, do it. You may feel the muscles in your abdomen contract by keeping your right hand on</p>

			your stomach. Breathing naturally enters your lungs as your belly and navel relax. To complete one round of Kapal Bhati, take twenty of these breaths. When the round is over, close your eyes, unwind, and pay attention to your body's feelings. (Art of Living, 2024).
Shitali Pranayama	2	2	As you sit comfortably on a chair or cushion, be sure your spine is in a neutral position. To center yourself, take a few deep breaths. Then, take a breath through the tongue's tunnel while curling and slightly stretching it. Focus on the sensation of coolness that permeates your lips, throat, and upper body. Close your mouth, let go of the tongue, and exhale through your nose. (Art of Living, 2024).
Bhastrika Pranayama	2	2	Sit in the cross-legged posture of sukhasana or vajrasana. clenches your hands into a fist and brings your arms close to your shoulders. Take a deep breath, lift your hands to the sky, and spread your fists. Close your fists, pull your arms down to your shoulders, and exhale a little strongly. Take twenty breaths and repeat. Palms resting on your thighs, relax. Inhale a couple times normally.

2.4 Data and assessment

At the end of 2-month pranayama training, the students were asked to take a deep breath. They were told to place the Peak Flow Meter in their mouth between the teeth and close lips around the mouthpiece. After that, students were asked to blow ensuring the tongue will not halt the air flow and their readings were recorded. The data recorded of the children when they were in standing position. The Peak Expiratory Flow Rate (PEFR) was measured in litter per minute. Two times readings were taken and the highest among two was recorded. The same procedure was carried out for control group children who have not received any pranayama training for 2 months. After that, the students of both experimental group and control groups were requested to give their blood samples were taken and sent to laboratory in the university.

3. Analysis of data

Total fifty-four sample data were processed in SPSS 20.0. The mean age of all the children was 14.1 ± 1.56 years (range 13-16 years). The mean height was 127.2 ± 13.9 cm (range 119-154 cm). The mean weight of the sample

was 31 ± 7.57 kg (range 27-39 kg). the average PEFR was $279,67 \pm 20.242$ L/m. The haemoglobin data reported the mean value of 11.13 ± 1.074 value. The control group respondents were coded as “1” and experimental group respondents were coded as “2”. Analysis of Variance (ANOVA) was performed to test the effect of pranayama on PEFR. Table 1 shows the results of ANOVA for PEFR.

Table 1: PEFR statistics for pranayama

Effect	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	9846.008	1	9846.008	43.133	0.000*
Within Groups	11869.992	52	228.269		
Total	21716.000	53			

Note: * $p < 0.05$ level; PEFR= Peak Expiratory Flow Rate

The results show that pranayama creates a significant effect on PEFR ($F=43.133$; $p < 0.05$). The mean PEFR among children who received pranayama training ($M=292.68$ L/m) was higher as compared to those children who have not received the training ($M=265.65$ L/m)

Further, to test the effect of pranayama on children blood condition, four parameters were recorded from their blood reports such as haemoglobin, RBC (red blood cell), white blood cell (WBC), and platelets counts. All these four variables were measured in ratio data and considered as dependent measures in this study. Therefore, multiple analysis of variance (MANOVA) was conducted (Hair et al., 2010; Finch & French, 2013). to test the simultaneous effect of pranayama on these four blood measures.

Table 2: Multivariate results for blood

Statistic	Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
Pillai's trace	0.712	30.315 ^a	4.000	49.000	0.000	0.712
Wilks' lambda	0.288	30.315 ^a	4.000	49.000	0.000*	0.712
Hotelling's trace	2.475	30.315 ^a	4.000	49.000	0.000	0.712
Roy's largest root	2.475	30.315 ^a	4.000	49.000	0.000	0.712

Note: ^aExact statistic

The multivariate results were shown in table 2. The effect of pranayama on four dependent measures was found significant (Wilks Lambda = 0.288; $p < 0.05$). The strength of the effect was 71.2 percent, represented with eta squared value. This shows that the change in pranayama will create an effect up to 71.2% in blood quality conditions.

4. Discussion and implications

This study attempted to address the positive effects of pranayama on children's psychological wellbeing, through experimental design. Pranayama helps children to breathe healthy and due to proper level of oxygen supplement in the body, their physical growth and development would be scientific. Apart, breathing management at the younger age helps children as a preventive strategy, when they become adult and experience the challenges of the world.

This study experimented the combination of various pranayama techniques in the form of training program (with a rotation and repetition designed scientifically) and derived the results using blood reports of children. Therefore, practicing pranayama can act as an instrumental to developing physical vigor, active concentration, emotional resilience and make them joyous. This will also improve physical wellbeing of children. This helps school management to offer pranayama-based activity program, which will help improve posture and agility of child. The study also advocates the role of government in laying down the structure where the children got exposed to the pranayama techniques, as many dropouts or some children not affording the school will never get the exposure.

5. Limitations and future scope

However, the study has following limitations, along with its significance: first, the study used post-test data and not any longitudinal data, and thus it is difficult to comment upon its long-term effect of physical wellbeing. Second, the study used only female children, residing in campus accommodation and therefore all gender group may differ on the results. And finally, the sample size used in this study was only fifty-four, which was low. The future study may take larger samples to improve the generalisability of the findings.

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