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# Yoga-teaching protocol adapted for children with visual impairment

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## ABSTRACT

**Context:** Childhood visual deficiency impairs children's neuro-psychomotor development, considerably affecting physical, mental, social, and emotional health. Yoga's multifaceted approach may help children with visual impairment (VI) to cope with their challenges.

**Aim:** This study aimed to develop a special protocol for teaching yoga to children with VI, and to evaluate their preferred method of learning.

**Methods:** The study was carried out at Ramana Maharishi Academy for the Blind, Bengaluru, South India. Forty-one students volunteered to learn yoga practices, and classes were held weekly 5 days, 1 hr per session for 16 weeks. The study introduced a new method using a sequence of five teaching steps: verbal instructions, tactile modeling, step-by-step teaching, learning in a group, and physical guidance. A questionnaire concerning the preferred steps of learning was then given to each student, and verbal answers were obtained.

**Results:** A total of 33 (out of 41), aged  $11.97 \pm 1.94$ , 15 girls and 18 boys responded. Twenty-six (78.79%) chose physical guidance as their most favored learning mode.

**Conclusions:** Specially designed protocol may pave the way to impart yoga in an exciting and comfortable way to children with VI. More studies are needed to further investigate the effectiveness of this new yoga protocol in similar settings.

**Key words:** Health; physical activity; practice; teaching method; visual impairment.

## INTRODUCTION

Childhood visual impairment (VI) is of global concern with an estimated 19 million children aged below 15 years.<sup>[1]</sup> VI is defined as a functional limitation of the eye(s)<sup>[2]</sup> affecting the ability to independently execute essential daily activities, job-related tasks or leisure activities, or move securely through the surroundings.<sup>[3]</sup> Since much of children's learning is visual, VI adversely impacts early development.

Children with VI are less physically active,<sup>[4,5]</sup> less physically fit,<sup>[6]</sup> and have poor locomotive functions and


object control skills,<sup>[7]</sup> impaired balance,<sup>[8]</sup> lower quality of life,<sup>[9]</sup> higher anxiety levels,<sup>[10]</sup> and greater physiological arousal<sup>[11]</sup> than their sighted peers. In this light, early vision loss adversely affects physical, mental, social and psychological health, and quality of life in children with VI.<sup>[12]</sup> Thus, they require more support to fulfill all aspects of their lives.

To tackle these issues, activities such as balance exercises,<sup>[13]</sup> aerobics,<sup>[14]</sup> ice skating,<sup>[15]</sup> gymnastics skills,<sup>[16]</sup> goal ball game,<sup>[17]</sup> and rope jumping as exercise training<sup>[18]</sup>

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have been specially adapted for children with VI. Today, yoga is well accepted as a physical activity, as beneficial or better than exercises at improving the levels of fitness<sup>[19]</sup> and health outcomes.<sup>[20]</sup>

Extensive research has investigated the wide-ranging effects of yoga on body, mind, and psyche in children. Previous studies have reported that regular yoga practice enhances the functioning of various bodily organs and organ systems.<sup>[21,22]</sup> Yoga's positive effects on physical health include co-ordination,<sup>[23]</sup> muscle strength,<sup>[19,24,25]</sup> balance,<sup>[26]</sup> cardio-pulmonary fitness,<sup>[25,27]</sup> and overall physical fitness.<sup>[23]</sup> Mentally, it improves memory,<sup>[28]</sup> concentration, and attention,<sup>[29]</sup> whereas psycho-physiologically it diminishes cortisol level,<sup>[30]</sup> anxiety, and stress.<sup>[31]</sup> In normal children, it improves quality of life<sup>[32]</sup> and self-esteem.<sup>[23]</sup>

Overall, yoga constitutes an ethical, physical, mental, and emotional discipline, forming the basis of a way of life. It promises to fulfill the special needs of children with VI, but only few studies have been conducted on yoga on such populations. These showed positive effects on physiological arousal,<sup>[11]</sup> proprioception,<sup>[33]</sup> minimum muscular fitness,<sup>[34]</sup> and balance.<sup>[35]</sup> Surprisingly, despite yoga's promise, it has not been added to the regular curriculum for those with VI.

This study had two objectives; development of a suitable protocol and to determine preferred mode of learning yoga from a survey of students' reports.

### Protocol development

The learning capacity of children with VI varies according to age, socioeconomic status, and previous exposure to the outside world. Children's fundamental issues; inability to perceive space, fear of falling, and difficulty in locating direction of sounds motivated us to modify normal yoga teaching protocols to tackle their problems.

Various instructional strategies have been used for teaching physical exercises to children with VI, including verbal instruction, tactile teaching, and physical guidance.<sup>[36-38]</sup> The yoga training protocol was developed based on 4 years' experience of imparting yoga to children with VI, with input from yoga experts, physical trainers, and experience from a previous study.<sup>[33]</sup>

Initially, yoga training focused on verbal instructions. While this described the concepts of practice, it failed to help it integrate intellectually or to be applied practically. Most yoga practices are named for elements of nature or animals: Sun, butterfly, fish, camel, etc., which fail to communicate concrete conceptions to the children.

Preliminary stages of practice must focus on concrete experiences with direct meaning for the children. Such limitations of verbal instruction make tactile models necessary to illustrate concepts of practice sufficiently and accurately. Observing each child's limitations and ability to gain ideas about each practice from a tactile model was also important. Some children found both steps difficult, so each practice was further divided into sub-steps to better guide their body positions. Trainers' key roles were to observe children' interest and grasping capacity, and to adapt training techniques as required.

The following five-step method was adapted to teach the yoga practices effectively.

### Step 1: Verbal guidance

Verbal communication is a prime medium for children with VI and unable to make eye contact, or perceive facial expressions or gestures. Descriptions explain actions required to perform practical tasks. Verbal guidance is most effective when composed in simple, precise language.<sup>[39]</sup> Clear, concise, and complete descriptions of each yoga practice were given. In addition, to avoid possible adverse effects, each yoga posture's limitations and contraindications were explained.

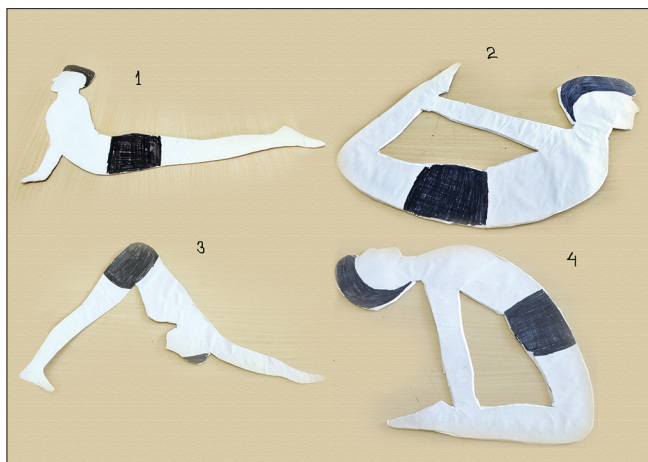
For students with VI, verbal description alone could not give them sufficient concrete conceptions of each practice, and failed to inculcate practical competence. Further steps were needed to create strong enough mental images to learn each practice. These limitations led to Step 2.

### Step 2: Tactile modeling

Children with VI greatly rely on the sense of touch as an additional mode of learning. For many, touch is the chief mode of communication. Arora and Kour<sup>[40]</sup> showed that to identify objects of different textures, children with VI use tactile discrimination more than the senses of taste and hearing. To promote communication, textured materials such as sandpaper or board are commonly used. Regardless of the type of material, tactile models must make sense to children with VI.

For better understanding and to create interest, thick paper cut out models of each asana were prepared and distributed among participants. Each child was encouraged to touch and feel the model until they thought they really understood the body position. Figure 1 shows the paper cut out models of different yoga postures. Touching such cut out models greatly enhanced the student's ability to understand precisely what is required to correctly position every part of their body in each yoga posture.





**Figure 1:** Paper cut out models of postures named, 1Bhujangasana, 2Dhanurasana, 3 Parvatasana (part of Surya namaskar), 4 Ustrasana

This required sensitivity and sufficient time to comprehend the tactile information. Such models of yoga postures are challenging to prepare. Note that tactile models are useful only when a child recognizes what they represent. Furthermore, use of touch cues for each separate practice should be consistent so that no confusion is introduced.

While physical postures can be taught using models, moving practices such as loosening exercises cannot be taught. Similarly, breathing and relaxation practices do not require tactile input.

### Step 3: Step-by-step teaching

Proficiency comes not by verbal instruction but by practice. Step-by-step instruction constitutes a strategic teaching method that divides each practice into sub-steps to understand, memorize, and perform it comfortably. It is more effective in verbal guidance, and helps students gain proficiency, though overall instruction may require a longer time period. In addition, extra time is needed to reinstruct when sub-steps are forgotten.

Teaching *Bhujanga* (cobra) asana, an important posture for all spinal problems<sup>[41]</sup> offers an example. Steps are as follows:

- 1<sup>st</sup> step: Lie down in prone posture and place the palms besides the chest.
- 2<sup>nd</sup> step: Inhale and raise the upper part of the body including head, neck, shoulders, chest, and upper part of the abdomen, above the navel.
- 3<sup>rd</sup> step: Maintain the final position with normal breathing.
- 4<sup>th</sup> step: Exhale and come back to the starting position.

### Step 4: Learning in a group

Practices become easier to learn when participants can touch and feel an instructor or peer-performing the

movements. Students were divided into groups of four or five of the same gender, standing in a circle with a demonstrator student at the center. As the demonstrator performed the posture according to the yoga instructor's directions, members of the group touched and felt the body and limb positions. This method was highly effective in helping the children to learn postures. Although similar to tactile modeling, students experienced the required positions more directly.

Some may feel uncomfortable being touched, so this step should be used carefully. Students need to understand clearly what they are trying to learn. Limitations such as aversion to physical touch or tendencies to back away or wince noted in studies of sighted children<sup>[42]</sup> were not encountered.

### Step 5: Physical assistance with verbal guidance

Physical assistance is an important, effective teaching technique to improve the performance of children with VI. When other modes of teaching fail to provide clear conception of a practice, this strategy becomes appropriate to teach a skill. Instructions are given in students' local language to accomplish each posture after they have successfully acquired its essence. When all the students could follow instructions for each asana, the yoga instructor corrected their postures guiding their limbs to better positions individually. Since children with VI may hesitate to explore, and may misunderstand or misinterpret touch, this step may help them become comfortable with a practice.

## METHODS

### Participants

In the first half of the study, 41 children with VI (26 male, 15 female) aged  $11.90 \pm 2.09$  enrolled from a residential school for the blind, "Ramana Maharishi Academy for the Blind," Bengaluru, South India, and underwent 16 weeks of yoga training. Thirty-three of these students responded for this second part of the study concerning their preferred learning method.

### Inclusion criteria

Individuals who had (a) VI since birth; (b) aged 9–16 years; (c) visual acuity  $<20/200$  and field of vision limited to 200 (legally blind)<sup>[43]</sup> (d) no earlier exposure to yoga, and (e) agreed to give informed consent were included in the study.

### Exclusion criteria

Participants with (a) other physical or mental challenge (b) multiple impairments, (c) any injury restricting the

practice of yoga, or (d) any chronic medical disorders were excluded from the study.

### Ethical approval

This study was carried out in compliance with the Helsinki Declaration and was approved by SVYASA's Institutional Ethics Committee. Written consent was obtained from children, school authorities, and participants' parent/guardian.

### Intervention

Yoga classes of 60 min duration were conducted 5 days/week for 16 weeks by the first author, a trained yoga instructor with specific teaching experience of children with VI. Two more trained yoga instructors were also employed to guide the children. For the convenience of learning, the entire group of 41 children was subdivided into four groups with 10 or 11 in each group. Classes were conducted separately for each group in different sessions.

Practices were selected to promote all-round development, including breathing exercises (5 min) to normalize breath rate; loosening practices (10 min) to stretch and relax muscles; asanas, maintaining various postures (20 min) to release physical and mental tensions by relaxing and revitalizing the body; pranayama, voluntary regulation of breathing (10 min) to lower levels of stress and anxiety, relaxation practices (15 min) to relax the whole psycho-physiological system, and develop body-mind awareness. Details of the yoga practices are listed in Table 1.

Asanas (physical postures) were taught using all the five steps described above. Breathing and loosening practices could not use the second, "tactile model" step as they are not static postures. During relaxation practice, Step 1, "verbal instruction" was sufficient as no physical movements are involved. In addition, various songs (e.g., patriotic) and krida yoga (yogic games) were used to develop emotional control, spatial awareness, alertness, concentration, and memory.

### Assessments

For this second half of the study, 33 students were responded individually concerning their preferred learning method, i.e., which strategy they preferred. Each student stated to the interviewer their particular order of preference for the five steps.

### Analysis

Data were compiled using Excel and analyzed using SPSS 20.0 software (IBM Corporation, NY, USA).

**Table 1: List of the practices**

Duration (total 60 min)	Types of practices	Name of the practices
5	Breathing practices	Hands in and out breathing Ankle stretch breathing Sasankasana breathing Tiger breathing
10	Loosening practices	Jogging and jumping Mukha dhouti Forward and backward bending Twisting Surya namaskar (12 rounds)
20	Yoga asanas Standing asanas	Ardhakati chakrasana Ardha chakrasana Padahasthasana Trikonasana Parivrta trikonasana
	Sitting asanas	Vajrasana Paschimottanasana Ustrasana Vakrasana
	Prone asanas	Bhujangasana Salabhasana Dhanurasana Makarasana
	Supine asanas	Sarvangasana Halasana Matsyasana
10	Pranayama	Kapalabhati Vibhagiya pranayama Nadisuddhi pranayama Bhramari pranayama
15	Relaxation/meditation (alternate days)	Instant, quick, and deep relaxation technique/ nadaanusandhana, A + U + M chanting (each 9 rounds)

### RESULTS

A total of 41 participants were interviewed, 33 (aged 11.97 ± 1.94, 18 male and 15 female) responded for their order of preference for the five steps of learning yoga. Eight failed to provide satisfactory data, mostly because they could not name the order of preference. About 27 were totally blind and six had only light perception.

Table 2 shows that student's first preferred method of learning was physical guidance by the instructor (Step 5) and 26 of 33 students (78.79%) responded in support of this. As their second preference, 17 (51.51%) participants voted Step 2; while the third preference was Step 4, 16 (48.48%) students supported for this; the fourth preference was Step 1, preferred by 15 (45.45%) students and Step 3 was student's least preferred step, 20 (60.61%) students have opted this as their fifth choice.

### DISCUSSION

This study aimed to develop an acceptable yoga-teaching protocol for children with VI, focusing primarily on their

**Table 2: Students’ preferred instructional strategies**

Order of Preferences	Name of the steps				
	Verbal guidance*	Tactile modelling*	Step by step teaching*	Learning in a group*	Physical assistance*
1 <sup>st</sup>	0	3 (9.09)	3 (9.09)	1 (3.03)	26 (78.79) <sup>a</sup>
2 <sup>nd</sup>	8 (24.24)	17 (51.51) <sup>b</sup>	1 (3.03)	6 (18.18)	1 (3.03)
3 <sup>rd</sup>	3 (9.09)	7 (21.21)	3 (9.09)	16 (48.48) <sup>c</sup>	4 (12.12)
4 <sup>th</sup>	15 (45.45) <sup>d</sup>	4 (12.12)	6 (18.18)	8 (24.24)	0
5 <sup>th</sup>	7 (21.21)	2 (6.06)	20 (60.61) <sup>e</sup>	2 (6.06)	2 (6.06)

Most to least preferred steps=<sup>a</sup>First, <sup>b</sup>Second, <sup>c</sup>Third, <sup>d</sup>Fourth, <sup>e</sup>Fifth. \* =Number of students (Percentage)

needs and challenges. This part determined students’ preferred method of learning. Findings revealed that of the five teaching techniques, “physical assistance with verbal guidance” was most favored by the children, with “tactile modeling with verbal guidance” as the 2<sup>nd</sup> choice. “Learning in a group,” “verbal guidance,” and “step-by-step teaching” were, respectively, their third, fourth, and fifth preferences.

These findings are consistent with previous studies showing that physical guidance is a successful teaching method for acquiring skills in students with VI.<sup>[44,45]</sup> Another study found physical guidance to be the preferred instructional strategy for learning to swim.<sup>[36]</sup> In contrast, another study suggested that those children with VI who happen to be hesitant to physical touch may prefer tactile modeling as a mode of teaching.<sup>[37]</sup> Our observation was that students were initially protective, but after they became familiar with the instructors, they preferred individual guidance to tactile model. This may be because physical assistance clarifies movements required in each practice by physically aligning participants’ body part,<sup>[46]</sup> may provide kinesthetic cues to transmit clear ideas about the posture.

Like physical guidance, tactile modeling is also effective, and has been found the preferred mode of teaching for some children with VI.<sup>[37]</sup> Here, “tactile modeling” was the second choice possibly because it was only used for few of the practices.

“Learning in a group” was the students’ third favored method, but was close to the second possible method because the sense of touch is used in both. Although “verbal guidance” is essential as the fundamental technique for transmitting mental images,<sup>[47]</sup> it was only fourth choice. Possibly because students were the first-time yoga practitioners, verbal guidance could not provide a clear conception of each practice. This is supported by Kohler,<sup>[48]</sup> who explains that the auditory sense is not the only compensatory sense used by those with VI when acquiring much needed practical skills.

**Observations**

Each step has its own uniqueness and importance for teaching yoga efficiently. Once moves are clearly

understood, they can be taught using only verbal cues for each movement. A second important observation was of no adverse effects during the study period.

Most students found adjustment to the new routine difficult, while for some comprehension, it was limited. A few were nervous and afraid of falling. Some could not recognize the direction of the instructor’s voice, and faced the opposite direction, but within a week, all started taking more interest and were more positive about learning yogic practices. With certain practices, they never felt comfortable; these were balancing asanas, dynamic practices, and ones where the body needs to be lifted from the ground.

**Limitations**

The findings are limited by a small sample size. Hence, the present trial could not detect the preferred mode of learning gender wise.

**Suggestions**

- Patience is the prime need for a yoga instructor, especially when dealing with children who require more time and energy to communicate each practice
- Awareness of what motivates children and how to use such motivation as an effective strategy is the foremost need to conduct a class successfully
- Students become enthusiastic when given positive feedback with phrases such as great job, nice performance, and absolutely right. These are more effective when given individually
- Other useful principles such as encourage active learning; use intrinsically motivating/rewarding stimuli; recognize feedback as students give it; respect their feelings both verbally and nonverbally; select stimuli of interest to the children; and motivate their active participation
- VI is often accompanied by other physical and psychological disabilities. Each child has unique requirements. Adjust schedules for the children taking into account factors such as severity of need and tolerance for intervention, etc
- Instructors should be aware of each student’s problems, and yoga practice should be arranged so that it can be maximally effective for each one

- Children are often hesitant to explore because of fear of the unknown. Girls are more self-protective toward strangers than boys. Trainer's responsibility is to make both practice and the atmosphere easy to accept
- Students with VI can execute gross motor skills similar to peers with sight, given time, and opportunity. They need to learn and retain necessary motor skills to be able to be physically active throughout their lives.

## IMPLICATIONS AND CONCLUSIONS

Children with VI are now being integrated into mainstream physical education. This study implemented a yoga-teaching method adapted for children with VI in a residential school setting, and determined preferences for different steps of learning, confirming acceptability of the new approach. It hopes to inspire more instructors to become involved in teaching children with VI yoga, the advantages of which have been reported elsewhere.<sup>[34]</sup> The steps described above will help yoga instructors do so more effectively and enjoyably. Tactile modeling and correcting student postures with verbal instructions particularly help students' understanding and ability to practice independently. Parents and teachers alike can encourage the children to engage in such physical activity to improve fitness, reduce stress, and help cope with their many needs and challenges. Further studies using this protocol may encourage adoption of yoga as a part of their regular activities and incorporation into their curriculum.

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## Conflicts of interest

There are no conflicts of interest.

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