

A consensus report on the development of growth screening tool for preschool-aged children

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ABSTRACT

Introduction: The first few years of a child's life are the most crucial for appropriate growth and development. As per the latest National Family and Health Survey (2019-21), India still faces a dual burden of malnutrition with a significant number of children below the age 5 either stunted, wasted, or overweight. This necessitates periodic screening of a child's growth. Early identification can go a long way in addressing areas of concern and improving future health outcomes. **Objective:** This tool was created with the objective of screening the holistic growth of preschool children. **Methodology:** A questionnaire was developed taking into consideration four important aspects that need to be tracked to assess the holistic growth and development of a child – Body mass index (BMI), questions related to health habits, overall well-being and immunity and, age-appropriate achievement of developmental milestones. An advisory board committee was formed comprising three Paediatricians, one Developmental Paediatrician, and three Nutritionists. **Results:** Questions under each category were discussed and finalized. A consensus on the scoring pattern was reached and the tool was developed after the agreement of all the board members. The tool was named "Growth Chakra". **Conclusion:** This tool is an easy parent-friendly tool to assess growth in preschool children. This tool is not a diagnostic tool and cannot replace medical advice. The findings of this tool will help create awareness about the child's growth and help to identify the need for medical or nutritional intervention.

Key words: Preschool children, growth and development, growth screening, developmental milestones

Early childhood is an important window of opportunity to shape the trajectory of a child's holistic development while building a foundation for their future. These are the years that follow toddlerhood, before going into formal schooling [1]. There is a steady increase in height, weight, and muscle tone of preschool children. They become taller and leaner. Their legs and trunks continue to grow, and their heads are not as large in proportion to their bodies. Increments of about 2 kg (4–5 lb) in weight and 7–8 cm (2–3 in) in height are expected per year [2].

This is a time of significant progress and development in the cognitive, social, and emotional areas [3]. The brain reaches 75% of its adult weight by age 2 and 90% of its adult weight by age 5. During early childhood, children process information quickly enough to complete sequences of physical behavior like catching followed by throwing a ball [4]. From kicking and squirming, to

holding objects, crawling, and standing, the development of fine and gross motor skills starts in the early years.

The development of social skills is initially started at home at interpersonal levels through interactions with parents. This forms a fundamental part of mental health. A lack of social skills leads to feelings of loneliness, subsequent mental and behavioral problems, poor interactions with parents, teachers, and peers, and school maladjustment [5].

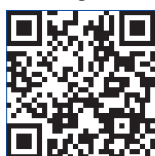
The immune system is not fully mature enough to defend itself against infections at this age. Regardless of whether it is a banana, a soft toy, a pencil, or a piece of paper, they want to put things in their mouth. There is a significant risk of exposure to pathogens during this social exploration, which could cause them to become ill [6]. With each disease episode, some of the energy that a child would usually use for growth and development is diverted to fighting infection. Infection often accompanies nutrient malabsorption, low dietary intake due to poor appetite,

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and inflammatory factors which are major contributors to poor growth.

Feeding behavior is a vital aspect as it may lead to either ends of malnutrition-undernutrition or childhood obesity. Feeding behavior of the child may be influenced by social, environmental, and emotional factors, variety of food, parental practices, etc. [7]. The use of screens during mealtime is said to be an obesogenic behavior [8]. This could be due to increased energy intake while viewing the screen or screen distracting from or obscuring feeling of fullness or satiety [9]. Picky eating behavior is also very common during these years resulting in poor nutrient-density diet, impaired cognition, poor immunity, and undernutrition eventually affecting their growth. To avoid these undesirable consequences and ensure appropriate growth trajectory, monitoring is important.

Healthy children create the future of society. Therefore, it is important to pay attention to their growth and development process. Developmental milestones show important cues about a child's developmental health. Not reaching milestones or reaching them much later than children of the same age is an indication that a child may have a developmental delay. They are a warning sign or red flag and these children may need extra support to reach their full potential. Thus, to avoid long-term disability, early detection and intervention are required.

NEED FOR A SCREENING TOOL

Tracking each child's growth and development periodically helps to have a better understanding of his or her overall growth progress and a better foundation to determine if concern is warranted [10]. Although there are various tools widely being used in India for developmental screening, not all are validated [11]. Due to time constraints at a doctor's clinic, often much importance is not given to tracking/evaluating a child's growth trajectory in addition to catering to the illness. To begin with, an easy parent-friendly tool can be used to identify children who may have growth concerns followed by referrals to specialized healthcare professionals.

There is a need for user-friendly growth and development tools specifically designed for the Indian population. Thus, a tool was created to screen the holistic growth of preschool children. This easy-to-use digital tool is intended to be a ready reckoner for mothers and caretakers as they are most aware of the child.

DEVELOPMENT OF THE TOOL

This tool takes into consideration four important aspects that need to be tracked to assess the holistic growth and development of the child. Body mass index (BMI) is the principal indicator of healthy physical growth. Standardized BMI-for-age growth charts are used to track a child's growth trajectory and evaluate health status. Apart from this, a child's daily habits, developmental milestones, and immunity status are

also indicative of their overall health status. Hence, this tool comprises questions related to the assessment of BMI, health habits, overall well-being, immunity, and age-appropriate achievement of developmental milestones.

BMI for age can help identify probable growth issues in children, such as being underweight, overweight, or obese. These issues can imply underlying health problems such as dietary insufficiency, or inadequate physical activity, which, if addressed early, can lead to better outcomes in the future. Since BMI is a standardized vital measure to assess physical growth, it was given the highest weightage in the tool. The World Health Organization BMI charts of 2–6 years were referred for BMI evaluation. The other aspects such as health habits, overall well-being, immunity, and developmental milestones were assessed using five relevant questions in each category.

QUESTIONS TO ASSESS HEALTH HABITS

1. Does your child take more than 30 min to finish their meals and need the help of TV/video/mobile to finish?
2. Does your child spend more than 2 h a day on any screen/devices?
3. Does your child have enough fruits and vegetables? (At least 1 fruit a day and 2–3 vegetables)
4. Does your child eat junk food more than twice in a week? Junk food that has a lot of sugar, refined flour, and excessive salt, like biscuits chips chocolate, fast food, cakes, cold drinks?
5. Does your child spend less than an hour daily in outdoor play?

The above questions helping in health habits assessment were taken from a health habits questionnaire for children [12].

QUESTIONS TO ASSESS WELL-BEING AND IMMUNITY

1. Does your child suffer from a cold, cough, or fever every month?
2. Does your child get tired easily, while doing regular everyday activity?
3. Does your child face difficulty in passing stool more than 3 times a week?
4. Does your child need medication for fever, cold, and cough?
5. Does your child miss school due to sickness often?

The immune status questionnaire developed by Versprille *et al.* (2019) was used to identify questions for immunity that was relatable to the Indian scenario [13,14].

The questions assessing developmental milestones were selected to evaluate age-appropriate development of fine and gross motor skills, social communication, and language skills as shown in Table 1. These were chosen from Guideline for Parents [15] and Upgraded Parenting and Child Development Guide,

Table 1: Questions to assess developmental milestones

2 years	<ol style="list-style-type: none"> 1. Can your child go up and down the stairs one step at a time without any help or assistance? 2. Can your child draw vertical and horizontal lines? 3. Does your child pull you toward things they need? 4. Can your child form 2-word meaningful sentences? E.g.: Give Toy, Where mumma 5. Can your child follow 2-step instructions? E.g.: Sit down and Eat your fruit?
3 years	<ol style="list-style-type: none"> 1. Can your child go upstairs using alternate legs without any help or assistance? 2. Can your child ride a tricycle by now? 3. Can your child draw a circle after being shown how to draw one? 4. Does your child say their first name by now? 5. Can your child form 3-word meaningful sentences? E.g.: Give me toy, Where is mumma
4 years	<ol style="list-style-type: none"> 1. Can your child go down the stairs using alternate legs without any help? 2. Can your child hop by now? 3. Can your child draw a square by now? 4. Can your child recite rhymes and tell stories by now? 5. Does your child ask for meaning of words?
5 years	<ol style="list-style-type: none"> 1. Can your child skip a rope without any help? 2. Can your child draw a triangle? 3. Does your child know how to dress and undress by now? 4. Can your child identify any four colors? 5. Can your child write some letters from their name?
6 years	<ol style="list-style-type: none"> 1. Does your child play with others in a group? 2. Does your child show concern for others? 3. Can your child draw and paint within a shape? 4. Can your child do simple addition and subtraction? 5. Can your child write some letters from their name?

Table 2: Scoring pattern

Total points	Type	Questions	Good	Can be improved	Poor
50	Body mass index	1	30	15	5
50	Well-being and immunity	1	5	3	2
		2	5	3	2
		3	5	3	2
		4	5	3	2
		5	5	3	2
50	Development	1	5	3	2
		2	5	3	2
		3	5	3	2
		4	5	3	2
		5	5	3	2
50	Health habits	1	5	3	2
		2	5	3	2
		3	5	3	2
		4	5	3	2
		5	5	3	2
200			105	60	35

shown in Table 2 below. Each item in the categories of immunity and wellbeing and health habits was scored as follows: Never = 5 points, Sometimes = 3 points, Often = 2 points. Each item in brain development was scored as Never = 2 points, Sometimes = 3 points, Often = 5 points. The sum of all the items is calculated.

AUTHENTICATION OF TOOL

An advisory board committee was formed comprising of Pediatricians (3), Developmental Pediatrician (1), and Nutritionists (3). In the advisory board meeting, the following objectives were discussed:

OBJECTIVES OF THE MEETING

- To ideate on the tool to assess the holistic growth of a child
- To validate the questions and the scoring pattern of the tool
- To create an easy-to-use, digital holistic growth screening tool.

Questions under each category - BMI, Health habits, Well-being and Immunity, and Developmental milestones were discussed and finalized. A consensus on the scoring pattern was reached and the tool was developed after the agreement of all the board members. The tool would be named as “Growth Chakra.”

CONCLUSION

The first few years of a child’s life are the most crucial for appropriate growth and development. As per the latest National Family and Health Survey (2019–21), India still faces a dual burden of malnutrition with a significant number of children below the age 5 either stunted, wasted, or overweight. This necessitates screening of a child’s growth, especially in a country like India. Many children with developmental delays or behavior concerns are not identified early until they are in school. By then, significant delays might have occurred and opportunities for treatment may have been missed. Early identification and early intervention can go a long way in addressing areas of concern and improving future health outcomes. This tool is an easy parent-friendly tool to assess growth in preschool children. This tool is not a diagnostic tool and cannot replace medical advice. The findings of this tool will help create awareness about the child’s growth and help to identify the need for medical or nutritional intervention.

AUTHORS CONTRIBUTION

All authors contributed to the content of the manuscript. All authors read and approved the final manuscript.

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Tamil Nadu Chapter [16] by the Indian Academy of Paediatrics. Each category was given equal weightage and scored as

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