ISSN PRINT 2319 1775 Online 2320 7876

 UGC CARE Listed (Group -I) Journal Volume 13, Iss 04, 2024

Intervention Study On Cognitive Development Among School Children Of Siddi Tribe

Deepa Kannur
*Assistant Professor, Department of Human Development and Childhood Studies
Lady Irwin College, University of Delhi
Email-deepakannur0472@gmail.com.

ABSTRACT

India's Siddi are a large Afro-descendant community of tribes with an estimated 150,000 members in the country, based for centuries in rural areas of Goa, Karnataka, Maharashtra, Andhra Pradesh and Gujarat. Very few Siddi families live in other parts of the country. The age of 6 to 12 years is an active and dynamic period of physical growth as well as of mental health in school children. It is well established that nutritional status is a major determinant of the health and well-being among children. The present study was conducted with objectives, to know the nutritional status and to assess the impact of intervention programme on cognitive development of school children of Siddi tribe. Random sampling technique was used to select the children in the age group of 5 years to 10 years for the study. The questionnaire and assessment methods were predominantly used to collect the data. Ravens Color Progressive Matrices and self-structured questionnaire were used to elicit the information. The results showed that severe level of stunting was observed among 5 to 7 years of age group (44.16%) compared to 8 to 9 years old children (24.5%). About 21.53% of the respondents moderately underweight in 5 to 7 years whereas 32.07% of 8- to 9-year-old belonged severe underweight category. According to cognitive development of school children, 27% had definitely above the average level of cognitive development while 26.27% of them were intellectually average and intellectually superior level of cognitive development followed by 23% children had definitely below the average level of cognitive development. Three months nutrition and activity-based intervention was given to school children. The intervention findings revealed that significant improvement of cognitive development of children and significant increase in weight status was observed in intervention group but no such improvement was observed in control group children. Hence nutritional status of the child shows positive correlation with weight, height, MUAC and BMI. This indicates cognitive development was impacting on nutritional status of the children. Hence there is a need of awareness programme on healthy and nutritious food to maintain the optimum nutritional status of the children and educational programme regarding nutrients to improve the cognitive development.

Key words: Nutrition, cognitive development, stunting

ISSN PRINT 2319 1775 Online 2320 7876

 UGC CARE Listed (Group -I) Journal Volume 13, Iss 04, 2024

Introduction

Scheduled Tribes (ST) constitute approximately 8.6% of the population of India, numbering around 10.4 crores. There are over 730 Scheduled Tribes notified under Article 342 of the Constitution of India (Ministry of Tribal Affairs, 2022). Indian society is marked by inequality, discrimination, exploitation, domination, and deprivation, often based on caste, tribe, religion, language, and region. These societal features pervade all segments of life, affecting even children. Tribals are among the most exploited and deprived sections of Indian society (Xaxa, 2011), with a total population of over 104 million people according to the 2011 census. The south Indian state of Karnataka, known for its historic, cultural, and anthropological heritage, is home to 42,48,987 tribal people, of whom 50,870 belong to the primitive group. Concentrated settlements of the Siddis are found mainly in the Western Ghats of the North Canara district and also in some part of Belgaum and Dharwad districts of Karnataka state, India. The Siddis can be identified as distinct group totally different in features from the rest of the people living in the area. The Siddis have come from different countries of East Africa and most of them were brought as slaves and few came as traders and their occupations are either agricultural labour or farming. Middle childhood is a developmental stage that typically encompasses children between the ages of 6 to 12 years. During this period, children undergo significant cognitive, emotional, and social changes as they transition from early childhood to adolescence. During middle childhood, physical growth slows down, resulting in improved motor skills. Child malnutrition, which includes under-nutrition and over-nutrition, negatively impacts cognitive development, academic performance, physical growth, and maturation (Geeta and Shivkumar, 2016). Under-nutrition causes children to have less energy and interest in learning, affecting their growth rate, body weight, and height. The overall development of a child, including cognitive development, physical growth, and nutritional intake, are interlinked. Tribal children require special attention, with at least basic education up to class seventh to ensure they are under proper care of teachers. Emphasis should be placed on cleanliness and sanitation to prevent minor diseases like skin infections, cold, and fever. Proper guidance on hygiene can significantly improve their health conditions. As the saying goes, “A healthy mind dwells in a healthy body.” The present study has been carried out with the following aim and objective.

- ✓ To know the nutritional status and
- ✓ To assess the impact of intervention programme on cognitive development of school children of Siddi tribe

Methodology

The methodology of the study involves several key components. A random sampling technique was employed to select participants, ensuring that the sample is representative of the population. The participants ranged in age from 5 years to over 9 years, with a total of 120 respondents. The research was conducted in North Karnataka. Furthermore, an intervention was implemented involving 120 participants divided into three groups: Group 1 (G1) focused on nutrition alone

ISSN PRINT 2319 1775 Online 2320 7876

 UGC CARE Listed (Group -I) Journal Volume 13, Iss 04, 2024

with 40 participants, Group 2 (G2) concentrated on activity alone with another 40 participants, and Group 3 (G3) included both nutrition and activity, also with 40 participants. This structured approach aims to assess the effects of different interventions on the targeted population.

Tools used for the study

Self-structured interview schedule was used to elicit the personal, familial, dietary pattern and cultural practices of the respondents.

Ravens Color Progressive Matrices: The study focused on assessing the cognitive development of children aged 5 to 10 years using the Ravens Color Progressive Matrices, designed for children aged 5 to 11 years. This test includes sets A and B, with an additional set Ab, to make the assessment visually stimulating. The final items in set B are black-on-white to challenge higher cognitive abilities. The test quickly provides valid cognitive function information. Scores are converted into percentiles: the 95th percentile indicates intellectual superiority, the 25th to 75th percentiles indicate above-average intelligence, below the 25th percentile suggests below-average capacity, and below the 5th percentile indicates intellectual deficiency. This method helps categorize children's cognitive abilities accurately as follows,

GRADES	INTERPRETATION
GRADE 1	"Intellectually superior", if the score lies at or able 95th percentile
GRADE 2	"Definitely above the average" in intellectual capacity, if the score lies at or above 75th percentile
GRADE 3	"Intellectually average", if the score lies at or able 25th and 75th percentile
GRADE 4	"Definitely below average intellectual capacity" if the score is lies or below 25th percentile
GRADE 5	"Intellectually defective "if the score lies at or below 5th percentile

Results and Discussion

Table 1: Personal information of children

Information about children		No	%
Gender	Male	57	47.5
	Female	63	52.5
Age (Years)	5years to 7 years	65	54.1
	8 years and 9+ years	54	45.9
Education	1st to 3rd	86	71.6
	4th and 5th	34	28.4

ISSN PRINT 2319 1775 Online 2320 7876

 UGC CARE Listed (Group -I) Journal Volume 13, Iss 04, 2024

Table 1 shows the information about the children, The demographic analysis of the children in this study reveals a relatively balanced gender distribution, with males comprising 47.5% and females 52.5%, aligning with global trends that exhibit minor gender variations in child populations due to social and environmental factors (UNICEF, 2020). This balance ensures that findings and interventions based on this data can be generalized across genders. The age distribution shows that a majority of the children were between 5 to 7 years old (54.1%), with the remaining 45.9% being 8 years and older. This represents early childhood to the beginning of preadolescence, a critical period for cognitive and social development, as indicated by developmental theories from Piaget (1972) and Vygotsky (1978). Understanding the needs and characteristics of children within these age brackets aids in tailoring educational and developmental programs effectively.

Additionally, the educational distribution highlights that a significant majority of the children were in 1st to 3rd grade (71.6%), with a smaller proportion in 4th and 5th grade (28.4%). This trend might reflect the population distribution within the sampled schools or communities, emphasizing the need for early childhood education initiatives. Research underscores the importance of early grade learning as foundational for future academic success (Heckman, 2006). The concentration of children in these lower grades suggests that robust educational frameworks and support during these initial years can have long-term positive effects on children's academic trajectories. These demographic insights, supported by relevant studies and theories, underscore the necessity for targeted early childhood educational programs to support the holistic development of children.

Table 2: Mean and Standard deviation of Anthropometric measurements based on gender

Variable	Gender	N	Mean	SD	t- value	sig
Height	Male	57	14.39	3.36	0.360	0.720
	Female	63	14.31	3.90		
Weight	Male	57	21.92	4.36	1.697	0.096
	Female	63	20.56	4.43		
MUAC	Male	57	6.44	1.02	0.546	0.568
	Female	63	6.35	0.77		
Skin fold thickness	Male	57	5.47	0.74	1.665	0.099
	Female	63	5.70	0.73		
BMI	Male	57	1.83	0.91	0.448	0.405
	Female	63	1.70	0.82		

ISSN PRINT 2319 1775 Online 2320 7876

 UGC CARE Listed (Group -I) Journal Volume 13, Iss 04, 2024

Table 2 shows the anthropometric measurements of children. According to gender, the mean value of boys' height was 14.39±3.36 while mean value of girls was 14.31±10.90 and there was no significant difference between height and gender. Weight of the boys slightly higher than girls (21.92>20.56), however there was no significant difference between gender and weight. The mean value of MUAC, skin fold thickness and BMI were almost equal and there were no significant differences in between gender with MUAC, skin fold thickness and BMI of children. The study conducted by Narayanappa et al. (2016) reported that, 27.9% of children had a BMI below the 5th percentile, indicating underweight status. Additionally, 3.3% of children were overweight with a BMI between the 85th and 95th percentiles, while 0.2% of children were classified as obese with a BMI above the 95th percentile. A significant 53.4% of the children exhibited varying degrees of protein energy malnutrition.

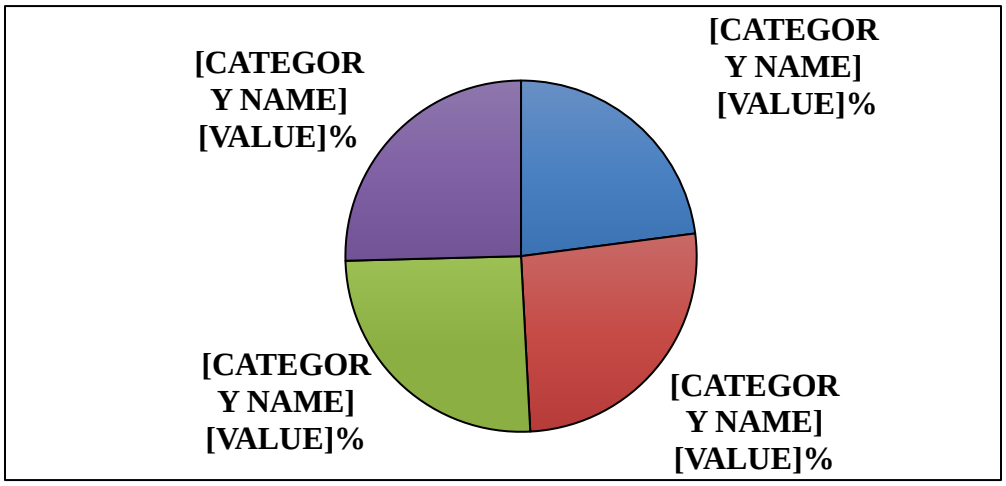

Fig. 1: Level of cognitive development of school children

Fig. 1: indicates level of cognitive development of school children, 27 percent of children had definitely above the average level of cognitive development while 26.27 percent of them had intellectually average and intellectually superior level of cognitive development followed by 23 percent of the children had definitely below the average level of cognitive development.

ISSN PRINT 2319 1775 Online 2320 7876

 UGC CARE Listed (Group -I) Journal Volume 13, Iss 04, 2024

Table 3: Comparison of cognitive development between pre and post-test within intervention groups

G1-Nutrition along (n=46)		G2-Activity alone (n=34)		G3-Both (Nutrition and activity) (n=40)	
Pre-test	Post-test	Pre-test	Post-test	Pre-test	Post-test
64.13±6.42	92.71±8.36	65.13±6.23	96.71±7.62	20.63± 3.41	12.10±2.83
5.30**		6.58**		4.55**	

Table 3 depicting the impact of three different interventions—nutrition alone (G1), activity alone (G2), and a combination of both nutrition and activity (G3)—on the cognitive and physical development of children. The results indicate substantial improvements in both G1 and G2 groups. In the G1 group, children's pre-test scores improved significantly from 64.13±6.42 to 92.71±8.36 in the post-test ($t=5.30$, $p<0.01$), demonstrating the positive impact of nutritional interventions on cognitive performance. Similarly, the G2 group showed an increase in scores from 65.13±6.23 to 96.71±7.62 ($t=6.58$, $p<0.01$), highlighting the beneficial effects of physical activity on cognitive development. Interestingly, the G3 group, which combined both nutrition and activity, experienced a different trend with pre-test scores of 20.63±3.41 decreasing to 12.10±2.83 in the post-test ($t=4.55$, $p<0.01$). These findings align with previous research emphasizing the critical role of proper nutrition and physical activity in children's cognitive and physical development. For instance, a study by Benton (2010) found that adequate nutrition significantly improves cognitive functions, including memory and problem-solving skills. Another study by Tomporowski et al. (2008) demonstrated that physical activity enhances children's executive functions and academic performance. The combination of nutrition and activity, although showing a reduction in scores in this study, may reflect the need for a balanced approach and further investigation into the interaction effects between these interventions.

Overall, these results underscore the importance of targeted interventions in improving children's health and cognitive outcomes, with nutrition and physical activity each playing a significant role. Future studies should explore the synergistic effects of combining these interventions to optimize benefits for children's development.

ISSN PRINT 2319 1775 Online 2320 7876

 UGC CARE Listed (Group -I) Journal Volume 13, Iss 04, 2024

Table 4: Comparison of cognitive development between intervention groups

G1-Nutrition along (n=46)	G2-Activity alone (n=34)	G3-Both (Nutrition and activity) (n=40)
78.17± 6.73	81.56±5.78	92.71±8.36
6.72**		

The study evaluated the cognitive development of children across three intervention groups: nutrition alone (G1), activity alone (G2), and a combination of both nutrition and activity (G3). The results showed that the G3 group, which received both nutritional and physical activity interventions, had the highest cognitive development scores, averaging 92.71±8.36. This was followed by the G2 group with an average score of 81.56±5.78, and the G1 group with an average score of 78.17±6.73. The significant t-value of 6.72 ($p<0.01$) indicates that these differences were statistically significant. The findings align with existing literature that underscores the synergistic effects of combining nutrition and physical activity on cognitive outcomes. For instance, the study by Benton (2010) highlighted the critical role of adequate nutrition in enhancing cognitive functions such as memory and problem-solving skills. Complementarily, Tomporowski et al. (2008) demonstrated that physical activity significantly improves executive functions and academic performance in children. The higher scores observed in the G3 group suggest that the combined intervention may provide a more holistic approach to cognitive development, potentially leveraging the benefits of both adequate nutrition and regular physical activity.

Additionally, a study by Hillman et al. (2008) found that children who engaged in regular physical activity showed improved brain function and cognitive performance, further supporting the observed benefits in the G2 and G3 groups. Another study by Taras (2005) reviewed the impact of diet on school performance and found that nutritional status was closely linked to academic outcomes, which was reflected in the improvements seen in the G1 group. Overall, these results reinforce the importance of integrated interventions that address both nutritional and physical activity needs to optimize cognitive development in children. Future research should continue to explore the combined effects of these interventions to develop comprehensive strategies for enhancing child development.

ISSN PRINT 2319 1775 Online 2320 7876

 UGC CARE Listed (Group -I) Journal Volume 13, Iss 04, 2024

References

- Benton, D. (2010). The influence of dietary status on the cognitive performance of children. Molecular Nutrition & Food Research, 54(4), 457-470. doi:10.1002/mnfr.200900158
- Gautam, V., (2003). Education of tribal children in India and the issue of medium of instruction: A Janshala experience. Coordinator, UN/Government Janshala Programme, Delhi, India.
- Geeta.A and Shivakumara. K (2016) "Effects of intervention programme on the attention, memory and intellectual ability among tribal children", *British Journal of Education, Society & Behavioural Science*, 17 (4), 1-9.
- Hillman, C. H., Erickson, K. I., & Kramer, A. F. (2008). Be smart, exercise your heart: Exercise effects on brain and cognition. Nature Reviews Neuroscience, 9(1), 58-65. doi:10.1038/nrn2298
- Ministry of Tribal Affairs. Year End Review 2022: Ministry of Tribal Affairs, 2022 by PIB Delhi.
- Taras, H. (2005). Nutrition and student performance at school. Journal of School Health, 75(6), 199-213. doi:10.1111/j.1746-1561.2005.00025.x
- Tomporowski, P. D., Davis, C. L., Miller, P. H., & Naglieri, J. A. (2008). Exercise and children's intelligence, cognition, and academic achievement. Educational Psychology Review, 20(2), 111-131. doi:10.1007/s10648-007-9057-0
- Xaxa, V., (2011). IHD - UNICEF Working Paper Series Children of India: Rights and Opportunities. Institute for Human Development, India.