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(RESEARCH ARTICLE)

A cross-sectional study addressing the cognitive development of two-year-old children

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Abstract

Background: Cognitive skills of children advance throughout all stages of development, progressing from simple, concrete representations to complex, abstract beliefs and attitudes. These early years of cognitive development plays an important role in their mental and emotional health across the lifespan. This study aimed to assess the cognitive development of two-year-old children.

Method: This cross-sectional study was conducted at Bangabandhu Sheikh Mujib Medical University among 318 conveniently selected mothers having two-year-old children. Socio-demographic information of the participant and the evaluation of the cognitive development of their two-year-old child was done by using a pretested, interviewer-administered, semi-structured questionnaire, modified according to cultural context for better adaptability from Parent Report of Children's Abilities-Revised (Child's play) and Ages & Stages Questionnaires: Social-Emotional, Second Edition through a face-to-face interview.

Results: The mean age of the mothers was 26.29 years. Among the two-year aged children of the respondents, 53.1% were male & 46.9% were female. Most children (83.3%) belong to first or second birth order. The study found that among the two-year aged children of the respondents, 10.7% had severely delayed cognitive development, 6.6% were moderately delayed, and mild delayed cognitive development was found among 14.2%. Most (61%) of the children's cognitive development was at the standard level, and 7.5% showed above-average development.

Conclusion: About one-third of children included in this study were found to have mild to severe cognitive developmental delay, which calls for further assessment at the national level for a better understanding of children's cognitive development and the need for intervention.

Keywords: Cognitive development; PARCA-R; ASQ:SE-2; Two-year-old children; Bangladesh

1. Introduction

Cognitive ability is the process whereby a person can think, reason, understand, recall information, solve problems, and learn, which starts in the first year of life through the formation of sensory and perceptual systems that regulate language and socio-emotional behavior (1).

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Delay in this development of cognitive ability is linked to psychosocial and behavioral problems in children, and an estimated 30% of cognitively delayed children had mental health disorders, roughly three times the risk of typical youngsters (2). It has been demonstrated that childhood cognitive ability predicts crucial outcomes such as academic accomplishments, occupational successes, and social adjustments (3).

An estimated of over 200 million children worldwide were not realizing their cognitive developmental potential, most of whom lived in South Asia and Sub-Saharan Africa and were likely to perform unsatisfactorily in school, earn less, high fertility, and offer poor care for their children, thus perpetuating poverty (4). A drop of about 20% in adulthood income was linked to this unfulfilled potential, which has far-reaching effects on national development (1). In low- and middle-income nations, there were an estimated around 55 million children under the age of five who had significant cognitive delays; 60% of whom could be reduced if three separate Sustainable Development Goals (SDGs) were met: every mother had a secondary education, every household had access to better water and sanitation, and every child had an acceptable level of home encouragement (5). The social and economic prosperity of the nations can be boosted, and the cycle of poverty can be broken by investing in the children's cognitive development (6).

In Bangladesh, according to the population and housing census 2022, there were 9.44% under five children among 165 million population (7). SDGs referring to no poverty (Goal 1), zero hunger (Goal 2), good health and well-being (Goal 3), and quality education (Goal 4) for all children by 2030 may be challenging to accomplish without realizing the full potential of children having cognitive delay (8).

However, little research has been done, and limited data are available addressing the cognitive delay of two-year-old children in Bangladesh. This study was conducted to address the problem, which might offer a base to call for action from parents and stakeholders.

2. Material and methods

2.1. Study design and population

This was a cross-sectional study to assess the cognitive development status of two-year-old children. The data were collected from 318 mothers with two-year-old (aged 24 months to 35 months) child who were not already diagnosed with cognitive delay. The mothers were taken from the inpatient and outpatient department of Bangabandhu Sheikh Mujib Medical University from December 2021 to January 2022.

2.2. Data Collection

Data was collected using a pretested, interviewer-administered, modified questionnaire according to cultural context for better adaptability from Parent Report of Children's Abilities-Revised (PARCA-R) - Child's play and Ages & Stages Questionnaires: Social-Emotional, Second Edition (ASQ: SE-2) for evaluation of cognitive development status along with socio-demographic information of the children and their parents. Before the beginning of the interview, the purpose of the study was explained in detail to each eligible respondent, and written informed consent was taken, ensuring the privacy and confidentiality.

2.3. Ethical Consideration

This study was conducted after getting approval from the Institutional Review Board, National Institute of Preventive and Social Medicine (Reference No. NIPSOM/IRB/2021/18, Date 13/12/2021). Written informed consent was taken after a proper explanation of the purpose, procedure and use of the study. The participants had the freedom to refuse to participate or withdraw at any point from the study. Confidentiality and privacy were maintained, giving maximum priority.

2.4. Statistical Analysis

Variables were descriptively expressed by frequency and percentage. For the variable of the age of the mother in years, the closest integer value was used. The classification of the level of education of the participants and their husbands was; no institutional education, completion of primary education (5 years of institutional education), completion of secondary education (10 years of institutional education), completion of higher secondary education (12 years of institutional education), completion of graduate education and above (>16 years of institutional education). Respondent's socio-economic status was identified by a single count of ten household items consisting of electricity, flush toilet, land phone, cellphone, television, radio/transistor/FM radio, refrigerator, car, bicycle/scooter/motorcycle, and washing machine. The total score was counted by adding all the items each having 1 point, resulting in a total score

ranging from 0-10. Finally, the score was categorized into three groups: Low status-(0-4), Medium status-(5-7), and High status-(8-10). The cognitive development of the child was calculated by PARCA-R and ASQ: SE-2 modified questionnaire consisting of 34 questions, the total score of which was 34 (Yes=1, No/Don't know=0) and classified into six groups; 0 – 13:Severe delay, 14 – 18:Moderate delay, 19 – 23:Mild delay, 24 – 30:Standard, 31 – 33:Above average, 34:Very above average (9,10). Data analysis was done using Statistical Package for the Social Sciences version 23 for Windows.

3. Results

The participants were enthusiastic and after proper explanation about the study data was collected from 318 participants. The response rate was 100% and there was no missing data.

Table 1 Socio-demographic information of the participants (N=318)

Variables		
Age (in years)		
	Mean±SD	**27.8±18.6 years**
	Frequency	**%**
Religious view		
Muslim	308	96.9
Hindu	10	3.1
Marital status		
Married	312	98.1
Widowed/separated/Divorced	4	1.2
Don't want to mention	2	0.6
Socio-economic status		
Low	64	20.1
Middle	222	69.8
High	32	10.1
Education		
No institutional education	26	8.2
Primary	93	29.2
Secondary	68	21.4
Higher secondary	61	19.2
Graduation & above	70	22.0
Husband's education		
No institutional education	37	11.6
Primary	51	16.0
Secondary	55	17.3
Higher secondary	78	24.5
Graduation & above	97	30.5
Occupation		
Service	54	17.0

Business	6	1.9
Housework	252	79.2
Day laborer	6	1.9
Husband's Occupation		
Service	223	70.1
Business	51	16.0
Unemployed	11	3.5
Day laborer	33	10.4
Sex at birth of the child (24 -35 months age)		
Male	169	53.1
Female	149	46.9
Birth order of the child (24-35 months age)		
1st or 2nd birth order	265	83.3
3rd or more birth order	53	16.7

Table 1 shows that among the participants, the mean age was 26.3 years, with a standard deviation of ±4.8 years. Most of them (96.9%) were Muslim. The majority (98.1%) of the participants were married. More than two-thirds (69.8%) of the participant belonged to middle socio-economic status. The highest proportion (29.2%) of participants had a primary level of education. The highest proportion (30.5%) of the participants mentioned that their husbands had completed education up to graduation and above level. The majority (79.2%) of the participant were housewives. Among the participant's husbands, most (70%) were service holders. Of the two-year-old child of the participants, more were male (53.1%) than female (46.9%). Most (83.3%) of the two-year-old child of the participant belonged to the first or second birth order.

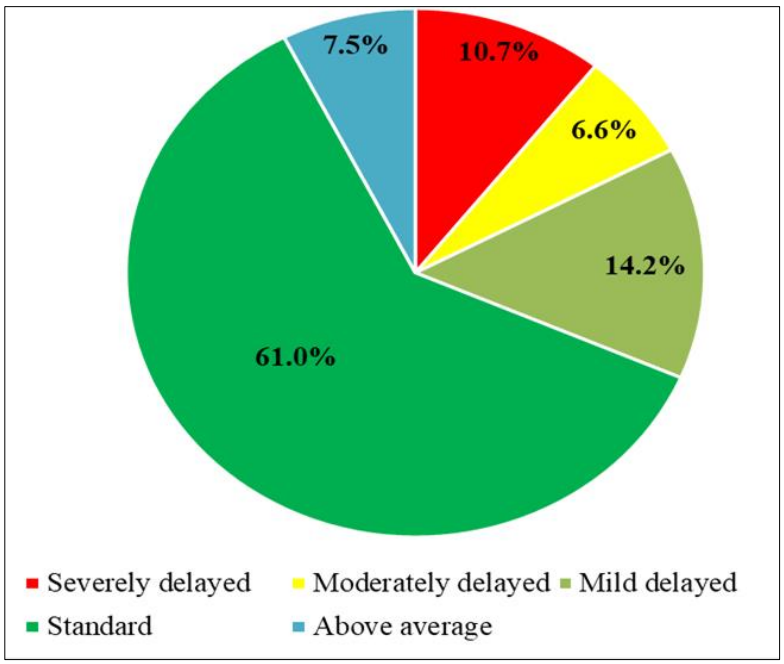

Figure 1 Proportion of status of cognitive development among 2-year-old children

Figure 1 revealed that the cognitive development of 10.7% of the respondents' children was severely delayed, and additional 6.6% had moderate delay, and 14.2% had mild delay, whereas 61.0% of children's cognitive development was at the standard level, and 7.5% of children's cognitive development was above average level.

4. Discussion

The current study found that among the two-year-old child of the participant mothers, cognitive development was at the standard level in 61.0% and 7.5% of children's cognitive development was above the average level on the other hand, the cognitive development was delayed in 31.5% of them. Similar findings was observed in a study in Egypt from 2016-2018 among the infants in first 2 years which showed 38.5% of them had cognitive delay (11). A relatively lower rate was observed by researchers in other studies. The Health Outcomes and Measures of the Environment (HOME) Study in Cincinnati, Ohio found that, children at the 24-month age with cognitive delay was 16.9% of the cohort (12). In a study among 3- to 4-year-old children in UNICEF's Multiple Cluster Indicators Surveys in 51 middle and low-income countries found 10.1% had significant cognitive delay and in 73 middle and low-income countries found 9.7% had significant cognitive delay (5,13). Another study among infants aged 1-12 months attending Reproductive and Child Health clinics in Dar es salaam, Tanzania in 2012 reported the Proportion of infants with cognitive developmental delay was 12.3% (14). A study in North India from 2011 to 2013 among 12-30 months old toddler observed nearly one-fifth (17.3%) of the toddlers had cognitive delay (15).

The discrepancy between the current study and the previous study might be as the study population for this current study was two-year-old (aged 24 months to 35 months) child where other studies included child of different ages. The difference in data collection tools for the assessment of cognitive development, study setting and site might also have contributed to it.

This study had some limitations and faced few challenges. The study was conducted only at one hospital at a specified point of time, so the results are not representative. The study did not explore the possible factors associated with cognitive development. As the study was conducted during the COVID-19 pandemic data collection by face-to-face interview was challenging.

5. Conclusion

It was found that approximately one-third of the children included in this study had a mild to severe cognitive developmental delay. Additional assessment is needed to be conducted on a larger scale for generation of evidence and establishment of a greater understanding of children's cognitive development.

Compliance with ethical standards

Disclosure of conflict of interest

The authors declare no conflict of interest

Statement of ethical approval

This study was conducted after getting approval from the Institutional Review Board, National Institute of Preventive and Social Medicine (Reference No. NIPSOM/IRB/2021/18, Date 13/12/2021).

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

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