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Original Research Article

Maternal, perinatal, and socio-demographic factors associated with childhood disabilities: evidence from a cross-sectional study in Rajshahi, Bangladesh

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ABSTRACT

Background: Childhood disability pertains to an important public health issue with a complex etiology which includes genetic, biological and environmental factors. However credible prevalence information about disability profiles and its associated factors are scarce, especially outside the major urban areas of Bangladesh. This study was designed to determine the prevalences of common disabilities among children in Rajshahi and their relationship with maternal, prenatal, and socio-demographic factors.
Methods: A cross-sectional study was conducted among 120 children attending Islami Bank Medical College and Hospital in Rajshahi, selected through purposive sampling. Data were collected via face-to-face interviews with mothers/guardians using a structured questionnaire. Descriptive statistics and chi-square tests were employed to analyze the distribution of disabilities and their associations with risk factors using SPSS version 22.
Result: This was a descriptive cross-sectional study done in the Department of Medicine, Islami Medical College and Hospital, Rajshahi, Bangladesh, July 2024 to June 2025. A purposive sample of 120 disabled children who visited the hospital in the study period were recruited. Relevant data were gathered through personal interview of mothers or caretakers, employing a predesigned and pretested semi-structured questionnaire. All disabled children then attending the institute during the study period were already included, and no one declined to participate.
Conclusion: The results highlight a multi-etiology of childhood disability in the study area, and underscore the contribution of perinatal events, maternal age and family disposition to its etiology. Integrated public health management strategies that address issues such as lack of prenatal care, early screening, parental awareness, and inclusive community-based support are urgently needed to reduce disability risks and improve quality of life of affected children.

Keywords: Childhood disability, autism, cerebral palsy, Maternal risk factor, Prenatal care

INTRODUCTION

Childhood disability constitutes a major public health concern with implications on individual development, family health and productivity at societal-level.[1] Physical, sensory, intellectual or mental health impairments that restrict a child's ability to participate in life activities are classified as disabilities and include the autism spectrum disorders (ASD), cerebral palsy, Down syndrome, intellectual disability and sensory impairments.[2,3] Worldwide, it is estimated that 4-6.5% of all children have some kind of disability, and this figure continues to increase as a result of better survival among preterm infants, better recognition of disability and broader definitions.[4-7] Personal and environmental factors are also taken into account, because only such a holistic view contrasts with focal descriptions of disease prevention. Based on the international classification of functioning,

disability and health (ICF) a classification for children.[8] WHO has confirmed the medical model and social perspective as both being relevant. This model acknowledges that disability is due to the interaction between health condition(s) and personal and environmental factors–a concept essential for designing interventions (and support structures). In Bangladesh, the situation is exacerbated for children with disabilities by limited access to healthcare, social stigma and absence of appropriate education and rehabilitation services.[10]

Although awareness is increasing, there is a lack of evidence about the epidemiological profile and risk factors associated with childhood disabilities at local level especially from areas away from capital city. Rajshahi, one of the largest cities in northwest Bangladesh, illustrates such a divide where children with disabilities and their families struggle to find way through fragmented care and support systems. The aetiology of childhood disabilities is complex with multiple factors and there exists an intricate interplay among genetic, pre-natal, perinatal and socio-environmental factors.[11]

Maternal characteristics including age at conception, nutritional status, antenatal care and exposure to infections or chronic diseases have significant impacts on fetal neurodevelopment.[12,13] A number of perinatal events, such as prematurity, LBW (low birth weight), birth injury and neonatal asphyxia have been recognized as risk factors for disorders such cerebral palsy and intellectual disability.[5,6,9] Risk is in turn further modified by paternal health behaviors, family history of disability, consanguinity and socioeconomic status.[14-16] With clear evidence on the contribution of these factors, to date limited integrated analysis exists in Bangladesh for understanding how maternal, perinatal and socio-demographic features collectively contribute to a disability profile at community level.

The majority of existing literature is based on service-use data, or their focus is confined to single disability types, and, therefore do not reflect the complex network of interrelated conditions that shape strategies for prevention and management. The present study thus sought to examine the prevalent types of disabilities among the children studying at a specialized institute in Rajshahi and to explore associations between these types of disabilities and selected maternal, perinatal, and socio-demographic factors. By highlighting common disability types and their associates, we aim to provide the evidence necessary for targeted interventions, strengthened clinical and community-level support systems, and policy changes for the betterment of lives of children with disabilities and their care givers in Bangladesh.

METHODS

This was a descriptive cross-sectional study carried out in the Department of Medicine, Islami Medical College and Hospital, Rajshahi, Bangladesh. The length of the study was 1 year, between July 2024 and June 2025. The study group comprised the disabled children visiting the hospital, who were under observation at that period. A purposive sample of 120 children was included. The sample size was determined by applying the formula $n = (z^2pq)/d^2$, resulting 323 subjects. But, as there were no eligible participants to enroll in the study at that time, 120 children have been enrolled in this study as a result. A pre-tested, semi-structured questionnaire was used for face-to-face interviews by the principal investigator for data collection.

Mothers/guardians of the children were interviewed. Best effort was placed to collect accurate and non-discriminative data. All disabled children enrolled with the institute during the study period were included. Refusal to participate was the sole exclusion criterion. The study was approved by the Ethical Review Committee. Written informed consent was given by all participants in response to the explanation of aim and methods for the study. The identity of those filling the survey is always respectfully thoughtful and all data was anonymous. Data entry and analysis were done by using (SPSS) software version 22. Data were analyzed with descriptive statistics and $p < 0.05$, $p < 0.01$ levels of statistical significance respectively.

RESULTS

The study assessed the maternal and perinatal history of 120 respondents. The mean maternal age at conception was 26.18±6.15 years, with the highest conception rate occurring in the 26–30 age group (26.7%). Approximately 21.7% conceived at or before 20 years, and 10.0% conceived after 35 years. Most mothers (90.8%) received Antenatal Care (ANC), and 86.7% completed Tetanus Toxoid (TT) vaccination. However, only 7.5% took Folic Acid during the first trimester. Maternal morbidity included systemic diseases in 39.2% of mothers and a history of infectious diseases in 15.0%. Additionally, 15.0% of pregnancies involved fertility-assisting drugs.

It was found that 29.2% of the respondents had post-graduation and class VI-XII level of education, 25.8% were graduates, 14.2% had class I-V level of education and 1.7% were illiterate (Figure 1).

The study examined paternal and household factors related to childhood disabilities. Half of the fathers (50.0%) reported a history of substance use, and 25.0% had systemic diseases like hypertension, diabetes, or asthma. A family history of disability was found in 39.2% of children, suggesting a potential genetic link. Consanguineous marriage was reported in 11.7% of cases. Regarding the familial environment, 91.7% of mothers described their relationship during pregnancy as "average," while 3.3% reported it as harmonious and 5.0% as bad.

It was found that 37.5% of the respondents were from upper middle-class family, 28.3% were from lower

middle-class family, 18.3% were rich and 15.8% were from poor family (Figure 2).

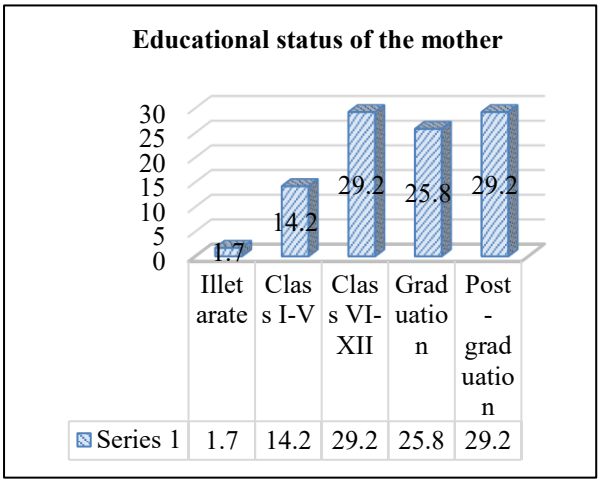

Figure 1: Distribution of the respondents by educational status.

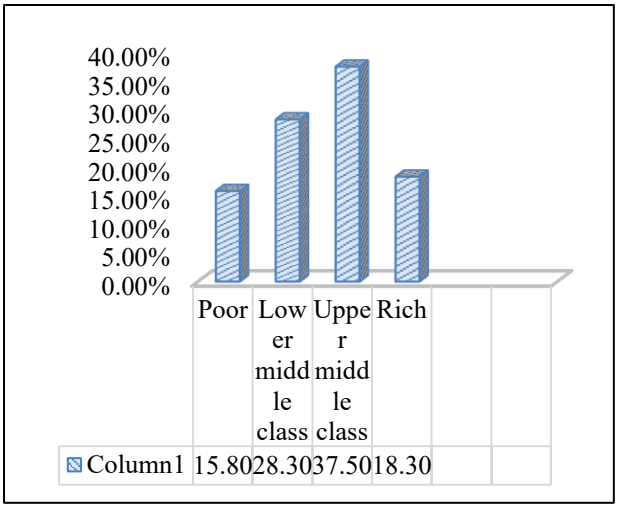

Figure 2: Distribution of the respondents by social status of the family.

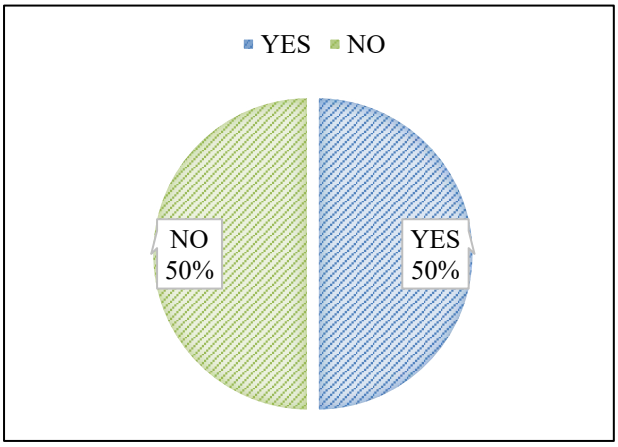

Figure 3: Distribution of the child by smoking or addicting habit of fathers.

It was found that half (50%) of the child's fathers had smoking habit and 50.0% did not have this habit (Figure 3). The study identified key perinatal factors linked to childhood disabilities. Thirty percent of children were either preterm or had LBW. Birth trauma, including mechanical injury or prolonged labor, was reported in 29.2% of cases. Additionally, more than half of the respondents (55.8%) observed that their baby did not cry immediately after birth, a potential indicator of neonatal asphyxia or distress, while 43.3% cried immediately. The status was unknown for 0.8% of the cases.

A significant association was found between the child's sex and the type of disability diagnosed (x^2=14.92, p <0.05). The study included 80 males (66.7%) and 40 females (33.3%). Autism was more common in males, affecting 53.8% of them compared to 25.0% of females, while Down Syndrome was more prevalent in females (27.5%) than males (8.8%). Mental disorders were more frequent in females (17.5%) than males (6.2%). The prevalence of cerebral palsy was similar in both sexes, affecting 16.2% of males and 15.0% of females. Multiple disorders were seen in 13.8% of males and 12.5% of females. A highly significant association was found between prematurity or LBW and the type of disability diagnosed (X^2=25.55, p<0.001). Thirty percent of the study population had a history of prematurity or LBW. Children in this group were more likely to have Multiple Disorders, with 30.6% presenting with multiple disabilities compared to just 6.0% in the full-term, normal birth weight group. Additionally, cerebral palsy (19.4%) and mental disorders (13.9%) were more common in the LBW/preterm group. However, autism was more prevalent in the normal birth weight group (51.2%) compared to 27.8% in the LBW group, and down syndrome was more common in the normal birth weight group (20.2%) compared to 2.8% in the LBW group. These findings suggest that conditions like autism and down syndrome may be more influenced by factors such as maternal age or genetics rather than birth weight.

The study found a significant association between birth trauma and the type of disability diagnosed in the child (X^2=18.64, p<0.01). Birth trauma was reported in 29.2% of cases. Cerebral palsy (CP) was strongly linked to birth trauma, with 31.4% of children in the trauma group diagnosed with CP, compared to just 9.4% in the group without trauma. Mental disorders and multiple disorders were also more prevalent in the trauma group, each affecting 17.1% of these children. In contrast, autism and down syndrome were more common in the group without birth trauma, with 50.6% of children without trauma diagnosed with autism (compared to 28.6% in the trauma group) and 20.0% diagnosed with down syndrome (compared to 2.9% in the trauma group). These findings suggest that while birth trauma contributes to the development of cerebral palsy, autism and down syndrome are likely influenced by other factors, rather than mechanical birth injuries. The study found a significant association between maternal age at conception and the type of disability diagnosed in the child (X^2=79.04,

p<0.001). Children conceived by mothers over 35 years of age had the highest prevalence of down syndrome (91.7%), indicating a strong age-related risk for chromosomal abnormalities. Autism was most prevalent in children conceived by mothers in the 26–30 years (59.4%) and 31–35 years (57.9%) age groups. The youngest maternal age group (≤20 years) showed the greatest variety of disabilities, with the highest rates of multiple disorders (23.1%) and cerebral palsy (19.2%), suggesting that while advanced maternal age primarily increases the risk of down syndrome, younger maternal age may be linked to more complex or multiple disabilities.

Table 1: Distribution of maternal and perinatal characteristics of the study participants (n=120).

Factor	Category/Value	Respondents	
		N / Mean±SD	%
Mother's age at conception (in years)	≤20	26	21.7
	21–25	31	25.8
	26–30	32	26.7
	31–35	19	15.8
	>35	12	10.0
Mean age at conception		26.18 ± 6.15 years	
Antenatal care received	Yes	109	90.8
	No	11	9.2
Tt vaccination completed	Yes	104	86.7
	No	16	13.3
Folic acid in 1st trimester	Yes	9	7.5
	No	111	92.5
Systemic disease during pregnancy	Yes	47	39.2
	No	73	60.8
Infectious disease during pregnancy	Yes	18	15.0
	No	102	85.0
Used fertility-assisting drugs	Yes	18	15.0
	No	102	85.0

Table 2: Distribution of paternal and familial characteristics (n=120).

Factor	Category/Value	Respondents	
		N	%
Father's smoking/drug/alcohol use	Yes	60	50.0
	No	60	50.0
Father's systemic disease	Yes	30	25.0
	No	90	75.0
Family history of disability	Yes	47	39.2
	No	73	60.8
Consanguineous marriage	Yes	14	11.7
	No	106	88.3
Familial relationship during pregnancy	Harmonious	4	3.3
	Bad	6	5.0
	Average	110	91.7

Table 3: Birth-related factors (n=120).

Factor	Category	Respondents	
		N	%
Prematurity/LBW	Yes	36	30.0
	No	84	70.0
Trauma during birth	Yes	35	29.2
	No	85	70.8
Crying at birth	Yes	52	43.3
	No	67	55.8
	Don't know	1	0.8

Table 4: Association between sex of child and type of disability.

Sex	Autism	Down syndrome	Cerebral palsy	Mental disorder	Multiple disorder	Others	Total
Male	43 (53.8%)	7 (8.8%)	13 (16.2%)	5 (6.2%)	11 (13.8%)	1 (1.2%)	80
Female	10 (25.0%)	11 (27.5%)	6 (15.0%)	7 (17.5%)	5 (12.5%)	1 (2.5%)	40
Total	53	18	19	12	16	2	120

X^2=14.92, df=5, p<0.05

Table 5: Association between prematurity/LBW and type of disability.

Prematurity/LBW	Autism	Down syndrome	Cerebral palsy	Mental disorder	Multiple disorder	Others	Total
Yes	10 (27.8%)	1 (2.8%)	7 (19.4%)	5 (13.9%)	11 (30.6%)	2 (5.6%)	36
No	43 (51.2%)	17 (20.2%)	12 (14.3%)	7 (8.3%)	5 (6.0%)	0 (0.0%)	84
Total	53	18	19	12	16	2	120

X^2=25.55, df=5, p<0.001

Table 6: Association between birth trauma and type of disability.

Birth trauma	Autism	Down syndrome	Cerebral palsy	Mental disorder	Multiple disorder	Others	Total
Yes	10 (28.6%)	1 (2.9%)	11 (31.4%)	6 (17.1%)	6 (17.1%)	1 (2.9%)	35
No	43 (50.6%)	17 (20.0%)	8 (9.4%)	6 (7.1%)	10 (11.8%)	1 (1.2%)	85
Total	53	18	19	12	16	2	120

X^2=18.64, df=5, p<0.01

Table 7: Association between maternal age at conception and type of disability.

Maternal age (in years)	Autism	Down syndrome	Cerebral palsy	Mental disorder	Multiple disorder	Others	Total
≤20	7 (26.9%)	3 (11.5%)	5 (19.2%)	3 (11.5%)	6 (23.1%)	2 (7.7%)	26
21–25	15 (48.4%)	1 (3.2%)	6 (19.4%)	4 (12.9%)	5 (16.1%)	0 (0.0%)	31
26–30	19 (59.4%)	0 (0.0%)	5 (15.6%)	4 (12.5%)	4 (12.5%)	0 (0.0%)	32
31–35	11 (57.9%)	3 (15.8%)	3 (15.8%)	1 (5.3%)	1 (5.3%)	0 (0.0%)	19
>35	1 (8.3%)	11 (91.7%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	12
Total	53	18	19	12	16	2	120

X^2=79.04, df=20, p<0.001

DISCUSSION

This cross-sectional study aimed to determine the pattern of disabilities in differently able children visiting Islami Bank Medical College and Hospital, Rajshahi and to correlate various socio-demographic, maternal, perinatal and familial factors with the same. Results Significant associations between disability type, and the child's sex, prematurity/LBW, birth trauma and maternal age at conception were identified. Autism spectrum disorder (ASD) represented the most common disability in our sample, affecting 44.2% of children, followed by cerebral palsy with a 15.8% rate and Down syndrome with a 15.0% prevalence rate. This proportions are consistent with worldwide data that report an increasing prevalence of autistic diagnosis in the past decades, a phenomenon which is weighed by better awareness and diagnostic criteria.[7] That such a high ASD prevalence was observed in children from rural India reinforces the call for systematic screening, early intervention services, and special education support to be implemented for this category of comorbidity. An association between sex of the child and type of disability was statistically significant (p35 years) was a significant predictor of Down syndrome (91.7%) which is also consistent with the literature, which shows that the risk for chromosomal abnormalities increases with maternal age.[11] On the other hand, children of mothers aged 26–35 years were more likely to have autism, indicating that intermediate maternal age can be an ASD risk in this group and may involve gene-environment interactions. While ANC coverage (90.8%) and TT vaccination completion (86.7%) were high, there were critical deficiencies in terms of nutritional supplementation. A minority of the mothers (7.5%) received folic acid in the first trimester, despite its established role in preventing neural tube defects and for neuro development.[13] This underscores a lost chance for primary prevention.

Furthermore, 39.2% of the mothers were found to have systemic diseases while they were pregnant and this may also lead to fetal complications by means like placental dysfunction or metabolic disorders.[12] Half the fathers used substances (such as smoking, alcohol or drugs) and one quarter had systemic illness. Paternal health and behaviour may affect fetal development via genetic, epigenetic or environmental pathways.[14] A positive family history of disability was reported in 39.2 % of cases, suggesting a genetic cause in some. Consanguineous marriage, which was reported in 11.7% of the study families, is a known risk factor for autosomal recessive disorders and could potentially be associated with the aggregation of disability within some families.[15,16] The majority of the families belonged to either the upper-middle or lower- middle classes.

However, 35% had family income of 30,001–60,000 Taka/month whereas the mean family income was 89,543 Taka. Impoverishment, combined with lack of resources, can compound the effect of disability by limiting access to medical care, therapy and inclusive education.[1,18] It is of interest 91.7% of the mothers reported pregnancy familial relationships as "normal," which indicates that psychosocial stress may not have served as a major influence in this sample.

Limitations

The purposive sampling method and relatively small sample size (n=120) limit the generalize ability of findings. The cross-sectional design cannot establish.

CONCLUSION

In conclusion, this study highlights childhood disabilities in Rajshahi, Bangladesh, with autism as the most common condition, followed by cerebral palsy and Down syndrome. Key risk factors include sex (autism more common in boys, Down syndrome in girls), prenatal events like prematurity and birth trauma linked to cerebral palsy and multiple disorders, and advanced maternal age as a risk factor for Down syndrome. The study also identified gaps in prenatal nutrition, such as low folic acid uptake. These findings stress the complex nature of childhood disabilities and the need for integrated strategies, from preconception care to lifelong support, to reduce risks, promote early identification, and foster inclusive development for children with disabilities.

Recommendations

The study recommends several actions to address childhood disabilities. First, healthcare should be strengthened by mandating folic acid supplementation, improving obstetric care, and offering genetic counselling for older mothers. Second, community-based early screening and intervention systems should be established. Third, public awareness campaigns should educate families about risk factors like paternal substance use and consanguineous marriage. Fourth, mainstream schools should adapt infrastructure and train teachers in inclusive education, supported by community rehabilitation programs. Lastly, policies prioritizing disability in health and education, along with ongoing research, are essential to support these initiatives

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