

Perinatal factors among children with neurodevelopmental disorders attending tertiary care hospitals in Dhaka city

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Summary

Neurodevelopmental disorders (NDD) are public health burden worldwide. NDD causes disabilities and reduces the quality of life. Perinatal factors like maternal age, stress, maternal physical illnesses, birth complications, preterm birth, low birth weight and neonatal infections are the important risk factors for NDD. The objectives of the study were to determine the proportion of perinatal factors among children with neurodevelopmental disorders attending tertiary care hospitals in Dhaka city. This was a cross-sectional study conducted in outpatient department of National Institute of Mental Health (NIMH), Dhaka and Institute of Paediatric Neurodisorder and Autism (IPNA), Bangabandhu Sheikh Mujib Medical University (BSMMU) from January 2017 to July 2018. Among 115 children with NDD aged 0-17 years satisfying inclusion and exclusion criteria who were conveniently selected as sample. After diagnosing NDD using DSM-5 criteria by psychiatrists and paediatric neurologists, a semi structured questionnaire was applied by researcher herself that included socio-demographic and perinatal factors as well. Results showed that majority of the respondents (29.6%) were 5-8 years with male predominance (78.3%). The most common perinatal factors were maternal factors like maternal stress (68.7%), maternal physical illness (66.1 %), inadequate food/rest intake (53.9%) and inadequate weight gain during pregnancy (50.4%). Fetal and neonatal factors like birth complication (82.6%), preterm birth (80%), low birth weight (75.6%), neonatal illness (69.6%) and birth asphyxia (61.7%). Most common neonatal illness were pneumonia (30.0 %) followed by neonatal Jaundice (20%). Early identification of possible perinatal factors and providing safe perinatal period can give a positive impact in prevention of NDD in children.

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Introduction

NDD are key public health issues in developing countries but largely ignored for children.¹ Disability due to NDD is decreasing the health status as well as increasing the risk of death resulting from a range of potential mechanisms. However, children with neurodevelopmental disorders are not receiving appropriate preventive and therapeutic health intervention.² Some NDD like autism and other pervasive developmental disorders are multi factorial and there are many causes of NDD, ranging from deprivation, genetic, metabolic diseases, immune disorders, infectious diseases, nutritional factors, physical trauma, and toxic and environmental factors.³ NDD are not only caused by a single obstetric factor but also genetic factors or an interaction of these factors with the environment.⁴ In NDD genetic factors play only 35–40% role.^{5,6} According to Centre for Research and Information (CRI), prevalence of all kinds of

neurodevelopmental disability in Bangladesh is 7.1%.⁷ The most frequent perinatal factors were acute fetal distress (26%), prematurity, and difficult labor (18%). While postnatal risk factors were respiratory infections (24%).⁸ Perinatal Risk factors are preterm delivery, multi-fetal pregnancy, uterine abnormalities, placental bleeding, prenatal drug exposure, chronic maternal illness, hypertensive disorders, chorioamnionitis, prolonged rupture of the membranes and bacterial vaginosis. However, maternal smoke exposure, maternal medical conditions during pregnancy, maternal depression, gestational complications, abnormal gestational age (<35 or >42 weeks) and advanced paternal age at delivery (>30 year-old) also contribute to NDD.⁹ A systemic analysis done in 2010, worldwide an estimated 14.9 million babies were born preterm among (11.1%) of all live births.¹⁰ In Bangladesh, so far there were little data available on the prevalence of perinatal factors and other socio demographic

variables contributing in NDD. Considering this fact, the present study was conducted with the aim to determine the frequency of various perinatal factors and sociodemographic characteristics of children with NDD. This study will provide baseline information to stimulate further studies as well as be helpful for the prevention of neurodevelopmental disorders by ensuring safe delivery and perinatal period.

Materials and methods

This cross-sectional study was conducted to determine the proportion of perinatal factors among children with neurodevelopmental disorders attending tertiary care hospitals in Dhaka city in outpatient department (Child guidance clinic) of National Institute of Mental Health, Sher-E-Bangla Nagor, Dhaka, outpatient department of Institute of Pediatric Neurodisorder and Autism (IPNA), Bangabandhu Sheikh Mujib Medical University (BSMMU), Dhaka, Bangladesh during the period from January 2017 to July 2018. For this purpose, 115 children aged 0-17 years attending mentioned hospitals accompanied by mother and/or father and diagnosed as cases of NDD by psychiatrists and pediatric neurologists using DSM-5 criteria and after satisfying inclusion and exclusion criteria were included in the study conveniently. Informed consent was taken from the mother and/or father who were present during their childbirth before enrolment in this study. Children accompanied by paid attendance, father accompanying the child who was not present during child birth, parents not willing to participate, parents with language barrier and severely ill child or who will not be able to sustain the interview were excluded from the study. Ethical issues were maintained properly. Data was collected through face-to-face interview by using the semi structured questionnaire for socio demographic profile and perinatal factors in children with neurodevelopmental disorders. After collecting the data, editing was done manually and was analyzed with the help of statistical package for the social sciences (SPSS) software package version 20.

Results

This study revealed that out of 115 children with neurodevelopmental disorders, 34(29.6%) were 5-8 years with male predominance (78.3%). Among all children majority were from urban 66(57.4 %) background and were Muslim by religion 109(94.8%). Majority of the children with NDD never gone to school 51 (44.3%) and were mostly 58 (50.4%) 1st birth order child (Table 1). Among 115 NDD, Intellectual disability (ID) (32%), Attention deficit hyperactivity disorder (ADHD) (28%), Autism spectrum disorder (ASD) (16%), Communication disorder (14%), Specific learning disorders (8%), Motor disorder (2%) were identified (Figure 1). Regarding perinatal factors, the most common maternal factors were maternal stress (68.7%) physical

illness (66.1 %), medication used during pregnancy (47%), inadequate food/rest (53.9%) and inadequate weight gain during pregnancy (50.4%) (Table 2). Fetal and neonatal factors were birth complication (82.6%), preterm birth (80%), low birth weight (75.6%), neonatal illness (69.6%) and birth asphyxia (61.7%) (Table 3). The most common maternal illness during pregnancy were others (39.5%) (e.g. hyperemesis and fatigue) followed by preeclampsia (13.2%), hypertension 11.8% (Figure 2). The most common birth complications were prolonged labour (29.5 %) followed by premature rupture of membrane (24.2 %), others (per vaginal bleeding, fetal head obstruction, transverse lie (17.9%) and oligohydramnios (13.7%) (Figure 3). Out of 115 respondents, 80(69.6%) neonates had complications within one month after birth (Table 4). The most common neonatal illness found within 1 month were pneumonia (30.0%) followed by neonatal jaundice (20%) and febrile convulsion (15%) (Table 4).

Table 1: Socio-demographic characteristics of the respondents (n=115)

Variables	Frequency (n)	Percentage
Age (in years)		
0-4	28	24.3
5-8	34	29.6
9-12	34	29.6
13+	19	16.5
Mean age (± SD) = 8.76 (±4.8)		
Religion		
Islam	109	94.8
Hindu	6	5.2
Habitat		
Urban	66	57.4
Rural	49	42.6
Educational status		
Goes to school	43	37.4
Have never been to school	51	44.3
Dropped out from school	21	18.3
Birth order 2 >3	58 33 24	50.4 28.7 20.9

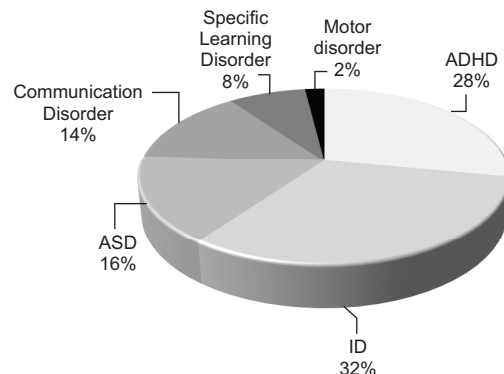
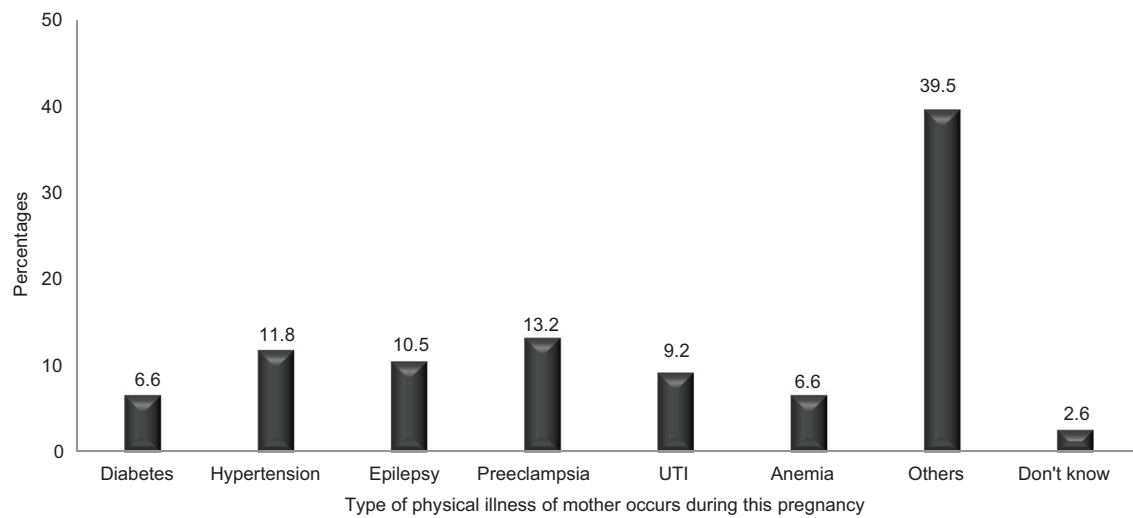


Figure 1: Distribution of neurodevelopmental disorders of the respondents (n=115)

Table 2: Characteristics of perinatal (maternal) factors (n=115)

Variables		Frequency (n)	Percentage
Maternal stress	Yes	79	68.7
	No	36	31.3
Physical illness	Yes	76	66.1
	No	39	33.9
Any infection during pregnancy	Yes	14	12.2
	No	101	87.8
Any medication taken	Yes	54	47
	No	61	53
Adequate food/rest	Yes	53	46.1
	No	62	53.9
Adequate weight gain	Yes	57	49.6
	No	58	50.4

**Figure 2: Distributions of the maternal physical illness of the respondents (n=115)****Table 3: Characteristics of perinatal (fetal and neonatal) factors (n=115)**

Variables		Frequency (n)	Percentage
Birth complication	Yes	95	82.6
	No	20	17.4
Head injury (before/ during/ after birth)	Yes	47	40.9
	No	63	54.8
	Don't know	5	4.3
Birth asphyxia	Yes	71	61.7
	No	40	34.8
Fetal complications	Yes	65	56.5
	No	50	43.5
Neonatal complications	Yes	80	69.6
	No	35	30.4
Preterm birth	Yes	94	81.7
	No	21	18.3
Low birth weight	Yes	87	75.624.3
	No	28	

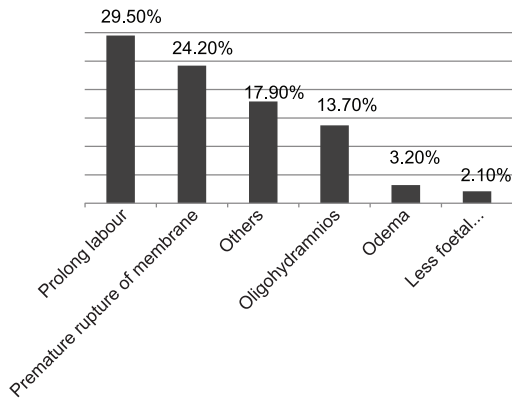


Figure 3: Distribution of birth complications during labour (n=115)

Table 4: Types of neonatal complications within 1 month after birth (n=115)

Neonatal illness	Frequency (n)	Percentage
Epilepsy	12	15
Febrile convulsion	10	12.5
Neonatal Jaundice	16	20.0
Pneumonia	24	30.0
Breathing difficulty	6	7.5
Umbilical infection	8	10.0
Others	4	5.0
Total	80 (out of 115)	69.56

Discussion

In this study, most of the child age was under 5-8 years (29.6%) and 9-12 years (29.6%). Mean age (\pm SD) of the respondents were 8.76 (\pm 4.8) Years. One study in USA similarly found NDD with a mean age of 9-11 years children.¹¹ However; obstetric complications were associated as a risk factor for developing mental disorders before age 15 years in children.¹²

In our present study, majority of respondents were male (78.3%), reason may be male get more prevalence in our society than females, prevalence of getting psychiatric services are more in male. Most of the respondents in our study was from urban areas (57.4%), followed by rural background (42.6%). This urban prominence in habitat may be interpretate as respondents belong to middle class migrated often from rural to urban area. Rapid urbanization of developing country may be another reason.¹³

In our present study, among 115 respondent proportion of ID was 32.2%, ADHD was 27.8%, ASD 16.5%, Communication Disorder 13.9%, Specific Learning Disorder 7.8%, Motor Disorder 1.7%. Borthwick Duffy¹⁴ and Emerson¹⁵ had found the frequency of respondents of ID was 10-39%. In another

study done in USA, noted that children frequency of children with ADHD with range 9.1-12%, where another cross-sectional study in Dhaka city showed frequency of hyperkinetic disorder was 7.6 and 12.9 respectively in SOS village and Shishuparibar.^{11, 16} But our result seems to be inconsistency with study done in USA, which may be due to use of different age group, study design and sample size.

In our study findings, 68.7% mothers were suffering from stress during pregnancy. Similar results were found in two studies.^{17, 18} This finding is indicating stress free antenatal period can be a protective factor against NDD.

In our study, regarding weight of the mother, most of the mother (50.4%) failed to get adequate weight gain, 53.9% mother did not get adequate sleep or nutrition during pregnancy, whereas similar and consistent findings was found in many studies.^{19, 20} As it can be explained by our country context as people believes less food intake during pregnancy leads to easy delivery. Moreover, mothers do not get enough rest and food may be due to excess workload.

In our findings, 51.3% mother had no frequent follow up during pregnancy, as mildly reflected that female health is always been neglected in our country. Where, in our study birth complications were found 82.6%, fetal complication was 56.5%, history of birth asphyxia 61.7%, head injury 40.9%, congenital anomalies 9.6%. This result is similar with two more studies.^{19, 21} This result indicating lack of safe delivery procedure leads to more birth related complications. This risk may be enhanced due to delivery being conducted mostly by untrained midwives during child birth in Bangladesh. In our study most of the mother (66.1%) had physical illness during pregnancy. The most common maternal illness during pregnancy was others (39.5%) (Commonly hyper emesis, oedema and fatigue were found in others group) followed by preeclampsia (13.2%), hypertension (11.8%), epilepsy (10.5%); which is similar in several studies.^{19, 22} This scenario can be explained as poor antenatal check up and poor health service system. Prenatal exposures to thalidomide or any drug were also reported to be associated with an increased risk of ASD which is found similarly in our study.²¹

In our study most common birth complication were prolonged labour (29.5%) followed by premature rupture of membrane (24.2%), others (17.9%) and oligohydramnios (13.7%) which is similarly found in two studies.^{4, 21} One Bangladeshi study done in Motlab also revealing similar results to our study.²² Prolonged labor is an important birth complication which indicates any obstruction within the pelvis.

In our study most of the children had 1.0-2.0 kg (46.1%), followed by 2.1-3.0 Kg (29.6%) and 3.1-4.0 (20.9%) at birth and history of birth asphyxia was 61.7% which is similar with two other

studies.^{12,20} One or more unfavorable obstetric events are higher risk factors for NDD which is consistently found in our study.^{4,22}

Though in our study 33.9% child born before 35 weeks which was born preterm and 18.3% born after 40 weeks, this finding is consistent with two studies where they showed risk factor for autism was preterm (16.8%) birth who were delivered before 35 gestational weeks.^{21,23} However in our study consistence finding was found with previous studies and birth asphyxia found to be predominantly with NDD may explain due to mode of delivery and birth complications in our country perspective more home delivery and poor maternal health system. Gustafsson and Källén,²³ had found similar association with NDD. In our study, the most common neonatal illness found within 1 month were pneumonia (30.0%) followed by neonatal jaundice (20%) and febrile convulsion (15%). This was similarly found in a study, where neonatal complications including apnoea and jaundice fourfold increased risk for infantile autism were observed in newborns exposed to hyper bilirubinaemia which is consistence with our study finding.²⁴

Despite of optimum care carried by the researchers, still there were some limitations like small sample size. It was a hospital based cross sectional study and researchers did the study in two hospitals in Dhaka city. So, it did not represent the whole group of such patients. Further researches should be aimed to include a larger sample size selected from a larger number of different multi-disciplinary hospitals of different parts of the country.

Conclusion

In our study we have found different perinatal factors both maternal and fetal factors responsible for NDD. So early identification of these perinatal factors and providing safe delivery and safe perinatal period can create a positive impact in prevention of NDD in children. This study will provide a guidance for further research and help in developing health policies in the field of child psychiatry.

References

- Davidson LL, Durkin MS, Khan NZ. Studies of children in developing countries. How soon can we prevent neurodisability in childhood? *Developmental Medicine and Child Neurology*. 2003 Aug 1; 45:18.
- Khan NZ, Ferdous S, Munir S, Huq S, McConachie H. Mortality of urban and rural young children with cerebral palsy in Bangladesh. *Developmental medicine & child neurology*. 1998 Nov; 40(11):749-53.
- Samaco RC, Hogart A, LaSalle JM. Epigenetic overlap in autism-spectrum neurodevelopmental disorders: MECP2 deficiency causes reduced expression of UBE3A and GABRB3. *Human molecular genetics*. 2005 Feb 15; 14(4):483-92.
- Glasson EJ, Bower C, Petterson B, de Klerk N, Chaney G, Hallmayer JF. Perinatal factors and the development of autism: a population study. *Archives of general Psychiatry*. 2004 Jun 1;61(6):618-27.
- Froehlich-Santino W, Tobon AL, Cleveland S, Torres A, Phillips J, Cohen B, Torigoe T, Miller J, Fedele A, Collins J, Smith K. Prenatal and perinatal risk factors in a twin study of autism spectrum disorders. *Journal of psychiatric research*. 2014 Jul 1;54:100-8.
- Hallmayer J, Cleveland S, Torres A, Phillips J, Cohen B, Torigoe T, Miller J, Fedele A, Collins J, Smith K, Lotspeich L. Genetic heritability and shared environmental factors among twin pairs with autism. *Archives of general psychiatry*. 2011 Nov 7;68(11):1095-102.
- Global Autism Movement and Bangladesh: Centre for research and information; 2014 [cited 2014 2 April 2016]. URL: <http://cri.org.bd/2014/09/03/global-autism-movement-and-bangladesh/>
- Hadjkacem I, Ayadi H, Turki M, Yaich S, Khemekhem K, Walha A, Cherif L, Moalla Y, Ghribi F. Prenatal, perinatal and postnatal factors associated with autism spectrum disorder. *Jornal de pediatria*. 2016 Dec;92(6):595-601.
- Zhang X, Lv CC, Tian J, Miao RJ, Xi W, Hertz-Picciotto I, Qi L. Prenatal and perinatal risk factors for autism in China. *Journal of autism and developmental disorders*. 2010 Nov;40(11):1311-21.
- Blencowe H, Cousens S, Oestergaard MZ, Chou D, Moller AB, Narwal R, Adler A, Garcia CV, Rohde S, Say L, Lawn JE. National, regional, and worldwide estimates of preterm birth rates in the year 2010 with time trends since 1990 for selected countries: a systematic analysis and implications. *The lancet*. 2012 Jun 9; 379(9832): 2162-72.
- Faraone SV, Sergeant J, Gillberg C, Biederman J. The worldwide prevalence of ADHD: is it an American condition? *World psychiatry*. 2003 Jun;2(2):104.
- Eaton WW, Mortensen PB, Thomsen PH, Frydenberg M. Obstetric complications and risk for severe psychopathology in childhood. *Journal of autism and developmental disorders*. 2001 Jun;31(3):279-85.
- Rahim SI, Cederblad M. Effects of rapid urbanization on child behaviour and health in a part of Khartoum, Sudan—II. Psycho-social influences on behaviour. *Social Science & Medicine*. 1986 Jan 1;22(7):723-30.
- Borthwick-Duffy SA. Epidemiology and prevalence of psychopathology in people with mental retardation. *Journal of Consulting and Clinical psychology*. 1994 Feb;62(1):17.
- Emerson E. Prevalence of psychiatric disorders in children and adolescents with and without intellectual disability. *Journal of intellectual disability research*. 2003 Jan; 47(1):51-8.
- Rahman W, Mullick MS, Pathan MA, Chowdhury NF, Shahidullah M, Ahmed H, Roy S, Mazumder AH, Rahman F. Prevalence of behavioral and emotional

- disorders among the orphans and factors associated with these disorders. *Bangabandhu Sheikh Mujib Medical University Journal*. 2012 Jun 27;5(1):29-34.
17. Motlagh MG, Katsovich L, Thompson N, Lin H, Kim YS, Scahill L, Lombroso PJ, King RA, Peterson BS, Leckman JF. Severe psychosocial stress and heavy cigarette smoking during pregnancy: an examination of the pre- and perinatal risk factors associated with ADHD and Tourette syndrome. *European child & adolescent psychiatry*. 2010 Oct;19(10):755-64.
 18. Clements CC, Castro VM, Blumenthal SR, Rosenfield HR, Murphy SN, Fava M, Erb JL, Churchill SE, Kaimal AJ, Doyle AE, Robinson EB. Prenatal antidepressant exposure is associated with risk for attention-deficit hyperactivity disorder but not autism spectrum disorder in a large health system. *Molecular psychiatry*. 2015 Jun;20(6):727-34.
 19. Durkin MS, Khan NZ, Davidson LL, Huq S, Munir S, Rasul E, Zaman SS. Prenatal and postnatal risk factors for mental retardation among children in Bangladesh. *American journal of epidemiology*. 2000 Dec 1;152(11):1024-33.
 20. Wilcox AJ. On the importance—and the unimportance—of birthweight. *International journal of epidemiology*. 2001 Dec 1;30(6):1233-41.
 21. Hultman CM, Sparén P, Cnattingius S. Perinatal risk factors for infantile autism. *Epidemiology*. 2002 Jul 1;13(4):417-23.
 22. Kusiako T, Ronsmans C, Van der Paal L. Perinatal mortality attributable to complications of childbirth in Matlab, Bangladesh. *Bulletin of the World Health Organization*. 2000;78:621-7.
 23. Gustafsson P, Källén K. Perinatal, maternal, and fetal characteristics of children diagnosed with attention deficit–hyperactivity disorder: results from a population based study utilizing the Swedish Medical Birth Register. *Developmental medicine & child neurology*. 2011 Mar;53(3):263-8.
 24. Maimburg RD, Væth M, Schendel DE, Bech BH, Olsen J, Thorsen P. Neonatal jaundice: a risk factor for infantile autism? *Paediatric and perinatal epidemiology*. 2008 Nov;22(6):562-8.