

Relationship between birth complications and externalizing behavioral disorders among children and adolescents

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Summary

Exposure to obstetric complication was known to be associated with development of psychiatric disorders. The aim of the study was to see the association of externalizing behaviors in children and adolescents with birth complications in a tertiary care hospital in Bangladesh. It was a cross sectional study conducted among 96 cases from July, 2018 to June, 2019. Birth complications and psychosocial adversity were assessed from hospital record and from parental interviews whereas externalizing behavioral problems were assessed by psychiatrist according to diagnostic and statistical manual of mental disorders (DSM) 5. The frequency and severity of externalizing disorders were analyzed by chi-square test and paired-t test and p value ≤ 0.05 was significant. Data analysis was done by statistical package for social sciences (SPSS) version 26. The results showed that, among the cases 48.9% were within 10-14 years and male were 79.1%. The present study showed that attention deficit hyperactivity disorder (ADHD) was present among 54.1% of cases, oppositional defiant disorder (ODD) was present among 19.4% of cases, and conduct disorder was present among 5.1% of cases whereas 21.4% were suffering from both ADHD and ODD. Obstetric complications had no significant association with externalizing disorders. A little was known about the association between birth complications and externalizing behavior. The study revealed no significant association between birth complications and externalizing behavior. So steps were required to rule out other factors which might contribute significant role to develop externalizing disorders.

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Introduction

Psychiatric disorders in children and adolescents are unquestionably ubiquitous and burdensome. Current global epidemiological data reports that up to 20% of children and adolescents suffer from a disabling mental illness, and 50% of all adult mental disorders start in adolescence. Studies from developing world showed prevalence range from 1-49%.¹ Recent national mental health survey in Bangladesh revealed prevalence of child mental disorders is 13.6%. Among this Disruptive, impulse control and Conduct disorders are 1.9%.² The children who move away from the world called internalizing disorders like depressive disorders, anxiety disorders and children who moved against the world called externalizing disorders namely conduct disorder and attention deficit hyperactivity disorder.³ Psychiatric disorders are multifactorial in origin. Among this, birth complications interact with psychosocial risk factors in predisposing to increased externalizing behavior in childhood and criminal behavior in adulthood.⁴ There was evidence that mothers of children

with ADHD were more likely to experience birth complications, such as toxemia, lengthy labor and complicated delivery. Prenatal, perinatal and postnatal insults were important biologic risk factors for developing ODD and conduct disorder.⁵

Child and adolescent mental health services were limited throughout the globe. Mental Health Atlas (2005) of World Health Organization (WHO) found that the need for child and adolescent mental health services were not fully met anywhere in the world. The scenario in developing countries including Bangladesh was more deteriorating and a large treatment gap was present here. Furthermore, very little was known about the direct relationship between birth complications and externalizing behavior and the mechanism by which the birth complications predisposed to externalizing behavior was not well explored.⁶ There were very few related studies had been done in Bangladesh in this field. A study published on 2016 revealed 9% of children and adolescents attending in pediatric outpatient department (OPD) suffered from behavioral disorders.

This study aimed to assess whether birth complications predispose to early adolescent externalizing behavior among the child and adolescent came in psychiatric OPD of Khulna Medical College Hospital (KMCH) and Shishu Bikash Kendro (SBK), KMCH hospital. The information would help to define needs and priorities of this patient group. It would also help to integrate perinatal care, child rearing and child psychiatric services to deal with such patients more effectively.

Materials and methods

It was a cross sectional study conducted among 96 cases from July, 2018 to June, 2019. Data were taken from patients attended to psychiatry OPD and Shishu Bikash Kendro, Khulna Medical College Hospital, Khulna. Purposive sampling technique was used and total 116 sample was taken. Children having Externalizing Disorders of either sex were included in this study. Patients were recruited initially according to selection criteria. Among them 6 guardians of children did not gave consent, 6 filled the questionnaire inappropriately and 8 of them withdrew themselves in after interview. Birth complications and psychosocial adversity were assessed from parental interviews and externalizing behavior problems were assessed by psychiatrist according to DSM-5.⁷ The frequency and severity of externalizing behavioral disorders among children and adolescents were analyzed by chi-square test and paired

student-t test. P-value \leq 0.05 was taken as significant. Data analysis was performed by statistical package for social science (SPSS) version 26.

Results

Among 116 approached, total 96 cases were participated in this study; therefore, the participation rate was 82.7%. Most of the patients (48.9%) were within 10-14 years of age and next (23.9%) within 6-9 years. Among the patients 79.1% were male and 21.8% were female. Almost all were Muslim (95.8%), mostly (57.2%) eldest among the siblings, 64 patients (66.6%) were from nuclear family. Most of them had poor economic status and their monthly income $<$ 20,000 Bangladeshi taka (BDT). ADHD were more and was the most prevalent co-morbidity with other externalizing disorders. (Table 1).

Among the cases; 46 gave history of birth by hospital delivery (47.9%) whereas 70.8% had history of birth normal vaginal delivery. Most of the cases (76%) had no history of anti-partum or postpartum hemorrhage (79.1%) or no history of pre-eclampsia (89.5%) in their birth period. Among the cases 78.1% were delivered in full term and had not experienced any birth trauma or birth asphyxia or Infection (84.3%). Most of them (66.7%) had no congenital anomaly or kernicterus (81.2%). Most of them had normal birth weight (77%). (Table 2).

Table 1: Association between socio-demographic variables and externalizing behavioral disorders (n=96)

Variables	ADHD, ODD	ADHD	ODD	Conduct	p value
Age					
2-5	4(19.0)	13 (25.0)	1 (5.3)	0 (0.0)	0.409
6-9	5(23.8)	13 (25.0)	4 (21.1)	1 (20.0)	
10-14	10(47.6)	23 (44.2)	10 (52.6)	4 (80.0)	
14-18	2(9.5)	3 (5.8)	4 (21.1)	0 (0.0)	
Sex					
Male	17(81.0)	42 (79.2)	13 (68.4)	4 (80.0)	0.896
Female	4(19.0)	10 (18.9)	6 (31.6)	1 (20.0)	
Others	0(0.0)	1 (1.9)	0 (0.0)	0 (0.0)	
Religion					
Islam	21(100.0)	50 (94.3)	19 (100.0)	4 (80.0)	0.153
Sonaton	0(0.0)	3 (5.7)	0 (0.0)	1 (20.0)	
Christian	0(0.0)	0 (0.0)	0 (0.0)	0 (0.0)	
Others	0(0.0)	0 (0.0)	0 (0.0)	0 (0.0)	
Sibling position					
Eldest	15(75.0)	30 (60.0)	7 (43.8)	3 (60.0)	0.460
Youngest	5(25.0)	16 (32.0)	7 (43.8)	1 (20.0)	
Others	0(0.0)	4 (8.0)	2 (12.5)	1 (20.0)	
Family type					
Nuclear	12(57.1)	36 (67.9)	13 (72.2)	3 (60.0)	0.750
Joint	9(42.9)	17 (32.1)	5 (27.8)	2 (40.0)	
Monthly income in BDT					
$<$ 10000	4(19.0)	22 (42.3)	6 (33.3)	3 (60.0)	0.242
10000-20000	10(47.6)	20 (38.5)	5 (27.8)	2 (40.0)	
$>$ 20000	7(33.3)	10 (19.2)	7 (38.9)	0 (0.0)	
Total number (%)	21 (21.4)	53 (54.1)	19 (19.4)	5 (5.1)	

p value measured by chi-square test

Table 2: Association between obstetric complications and externalizing behavioral disorders (n=96)

Obstetric factors	ADHD, ODD	ADHD	ODD	Conduct	p value
Delivery place					
Home delivery	10(47.6)	31 (58.5)	10 (52.6)	1 (20.0)	0.381
Hospital delivery	11(52.4)	22 (41.5)	9 (47.4)	4 (80.0)	
Clinic delivery	0(0.0)	0 (0.0)	0 (0.0)	0 (0.0)	
Delivery type					
Normal vaginal delivery	13(61.9)	35 (66.0)	15 (78.9)	5 (100.0)	0.277
Caesarian section	8(38.1)	18 (34.0)	4 (21.1)	0 (0.0)	
Anti-partum hemorrhage					
Yes	6(28.6)	8 (15.4)	4 (26.7)	2 (40.0)	0.388
No	15(71.4)	44 (84.6)	11 (73.3)	3 (60.0)	
Postpartum hemorrhage					
Yes	6(28.6)	8 (15.1)	2 (13.3)	2 (40.0)	0.321
No	15(71.4)	45 (84.9)	13 (86.7)	3 (60.0)	
History of pre-eclampsia					
Yes	3(14.3)	4 (7.5)	0 (0.0)	1 (20.0)	0.361
No	18(85.7)	49 (92.5)	15 (100.0)	4 (80.0)	
Delivery time					
Pre term	4(19.0)	5 (9.6)	3 (20.0)	1 (20.0)	0.511
Full term	17(81.0)	44 (84.6)	11 (73.3)	3 (60.0)	
Post term	0(0.0)	3 (5.8)	1 (6.7)	1 (20.0)	
Birth trauma					
Yes	8(38.1)	9 (17.0)	2 (13.3)	0 (0.0)	0.102
No	13(61.9)	44 (83.0)	13 (86.7)	5 (100.0)	
Birth asphyxia					
Yes	3(14.3)	11 (21.2)	3 (20.0)	1 (20.0)	0.928
No	18(85.7)	41 (78.8)	12 (80.0)	4 (80.0)	
Infection					
Yes	2(10.0)	4 (8.0)	1 (6.7)	2 (40.0)	0.144
No	18(90.0)	46 (92.0)	14 (93.3)	3 (60.0)	
Others	0(0.0)	0 (0.0)	0 (0.0)	0 (0.0)	
Congenital anomaly					
Yes	8(40.0)	15 (28.8)	3 (20.0)	2 (40.0)	0.590
No	12(60.0)	37 (71.2)	12 (80.0)	3 (60.0)	
Kernicterus					
Yes	3(15.8)	6 (11.5)	2 (14.3)	1 (20.0)	0.930
No	16(84.2)	46 (88.5)	12 (85.7)	4 (80.0)	
Birth weight					
Low(<2.5kg)	1(5.3)	8 (16.3)	3 (18.8)	2 (40.0)	0.574
Normal (2.5-4.2kg)	18(94.7)	40 (81.6)	13 (81.2)	3 (60.0)	
Over(>4.2kg)	0(0.0)	1 (2.0)	0 (0.0)	0 (0.0)	
Total number (%)	21 (21.4)	53 (54.1)	19 (19.4)	5 (5.1)	

(As few respondents fulfilled more than one diagnosis, so the frequency didn't correspond to the total number)

Discussion

Exposure to obstetric complication was known to be associated with subsequent development of psychiatric disorders. Here in this study we had tried to see the association of externalizing behaviors in children and adolescents with birth complications. Present study observed ADHD among 54.1% (n=23) of patients. ODD was diagnosed among 19 patients (19.4%). Five (5.1%) were suffering from conduct disorder and 21 (21.4%) were

suffering from both ADHD and ODD. Although not statistically significant, it was hypothesized in our study that the frequency and severity of externalizing behavioral disorders was associated with exposure to obstetric complication, that was consistent with different past studies. Previous studies had shown that birth complications when combined with psychosocial factors increase the risk for externalizing behavior in children.⁸ Birth complications might be a contributory factor to

neuropsychological deficits that were associated with externalizing disorders.⁹

Findings in a study had shown a direct effect of birth complications on child externalizing behavior at age 11 years and also the mediating effect of intelligent quotient (IQ) on this relationship, indicating that birth complications resulted in brain dysfunction as reflected by low IQ which in turn predisposed to behavior problems. To the authors' knowledge, this was the first study showing a direct effect of birth complications on late-childhood externalizing behavior and there was no prior research on the mediating effect of IQ on birth complication and externalizing behavior. Different studies had found associations between life-course persistent type conduct problems and perinatal complications, minor physical anomalies and low birth weight.¹⁰ Most studies supported a biosocial model in which obstetric complications might confer vulnerability to other co-occurring risks such as hostile or inconsistent parenting.¹¹

We found that higher birth complication scores were associated with higher scores on externalizing behavior. In general, while this finding was broadly consistent with prior findings that obstetric factors were in some way associated antisocial behavior in both child and adult samples, most prior studies observed interaction effects but not main effects of obstetric factors.¹² Or alternatively showed only that low birth weight was associated with increased attention hyperactivity disorder.¹³ It was not known exactly how birth complications played a role in the development of childhood externalizing behavior, but it had been suggested that birth complications might lead to externalizing behavior problems through damage/disruption to the prefrontal cortex, hippocampus, and dopamine system. More specifically, birth complications such as preeclampsia, maternal bleeding, or maternal infection could first cause an insufficiency in blood supply to the placenta. This in turn might lead to fetal hypoxia or anoxia (lack of oxygen), which further hampered fetal brain development, particularly the hippocampus.¹⁴

Animal studies had shown that perinatal complications involving anoxia were associated with reductions in central dopamine transmission.¹⁵ Several lines of research suggested that dopaminergic neurotransmission was involved in the regulation of impulsive aggression and violence.¹⁶ In addition, perinatal complications impaired neurotransmitter functioning in the left prefrontal cortex in animals and reduced prefrontal functioning was one of the best-replicated findings from the brain imaging literature on violent offenders.¹⁷ These findings therefore suggested that birth complications might lead to externalizing behavior problems through the mechanism of damage/dysfunction to the prefrontal cortex, hippocampus and the dopamine system. Psychosocial adversity was significantly

related to externalizing behavior problems. This result was consistent with other studies which had examined biosocial risk factors on child behavior problems. For example, in a prospective study found that although early birth complications and psychosocial adversity both affected later childhood development (motor, cognitive, and social-emotional functioning), the latter effect outweighed the former in terms of strength of relationship in all areas of functioning.¹⁸

While the association between early psychosocial adversity and later externalizing behavior problems was significant, the question arose as to the mechanism by which they influenced externalizing behavior. Unlike the above two biological risk factors which were hypothesized to mainly impact behavior through neurological processes, psychosocial adversity might influence the child's behavior through poor parental supervision. That was, adversity might be a marker of poor supervision and poor parental supervision rather than general adversity that might predispose to externalizing behavior. This parenting construct had been found to be one of the strongest psychosocial correlates of delinquency.¹⁹ A number of environmental risk factors had been tested for their association with ADHD.²⁰ Prematurity seemed to be the factor most consistently associated with ADHD.²¹

Limited evidence also pointed to intra-utero exposure to tobacco²² and low birth weight as possible risk factors.¹³ More studies were needed to assess the impact of intra-utero exposure to alcohol and drugs, maternal psychological problems during pregnancy, perinatal and pre-natal complications, traumatic brain injury, duration of breastfeeding, early deprivation and familial and psychosocial factors as well as intrauterine exposure to caffeine. Different confounding variables that might affect the results of the study like drug compliance, dietary habit, substance abuse and other stressors. But the effects of those variables could not be ruled out strictly due to lack of proper support. So, results of the study should be considered keeping in mind the fact.

Conclusion

Prior studies had shown that birth complications interacted with psychosocial risk factors in predisposing to increased externalizing behavior in childhood and criminal behavior in adulthood. However, little was known about the direct association between birth complications and externalizing behavior. Furthermore, the mechanism by which the birth complications predispose to externalizing behavior was not well explored. In our study, the association between birth complications and early adolescent externalizing behavior was not statistically significant. So, steps were required to rule out the psychosocial or other factors which might contribute significant role to develop externalizing disorders and to reduce sufferings and improvement of life qualities of child

and adolescents. A strong consultation-liaison psychiatric service as well as close psychiatric follow up should be required to reduce negative outcomes of externalizing disorders.

References

- Jesmin A, Mullick MSI, Rahman KM, Muntasir MM. Psychiatric disorders in children and adolescents attending pediatric outpatient departments of tertiary hospitals. *Oman Med J* 2016;31(4):258-62.
- Alam MF, Ahmed HU, Alam MT, Sarkar M. National Mental Health Survey 2018-2019, Dhaka: NIMH Press; 2019.
- Rahman W, Mullick MSI, Pathan M, Chowdhury N, Shahidullah M, Ahmed HU, et al. Behavioral and emotional disorders among the children living in orphanage: a review. *Bang J Psychiatry* 2011;25(1):72-82.
- Koglin U, Lösel F. Pregnancy and birth complications and externalizing behavioral problems in preschoolers: an empirical study. *Monatsschr Kriminol* 2014;97:451-61.
- Nelson WE. *Nelson Textbook of Pediatrics*. 21st ed. Philadelphia: Elsevier; 2019.
- Liu J, Raine A, Wuerker A, Venables PH, Mednick S. The association of birth complications and externalizing behavior in early adolescents: direct and mediating effects. *J Res Adolesc* 2009;19(1):93-111.
- American Psychiatric Association. *Diagnostic and statistical manual of mental disorders*. 5th ed. Washington, D.C: American Psychiatric Publishing; 2013.
- Oland AA, Shaw DS. Pure versus co-occurring externalizing and internalizing symptoms in children: the potential role of socio-developmental milestones. *Clin Child Fam Psychol Rev* 2005;8(4):247-70.
- Tan S, Nor N, Fong L, Wahab S, Marimuthu S, Chan LF. *IACAPAP Textbook of Child and Adolescent Mental Health*. Geneva: International Association for Child and Adolescent Psychiatry; 2012. p. 1-16.
- Brennan PA, Le Brocque R, Hammen C. Maternal depression, parent-child relationships, and resilient outcomes in adolescence. *J Am Acad Child Adolesc Psychiatry* 2003;42(12):1469-77.
- Arseneault L, Tremblay RE, Boulerice B, Saucier JF. Obstetrical complications and violent delinquency: testing two developmental pathways. *Child Dev* 2002;73(2):496-508.
- Hodgins S, Kratzer L, McNeil TF. Obstetric complications, parenting, and risk of criminal behavior. *Arch Gen Psychiatry* 2001;58(8):746-52..
- Mick E, Biederman J, Prince J, Fischer MJ, Faraone SV. Impact of low birth weight on attention-deficit hyperactivity disorder. *J Dev Behav Pediatr* 2002;23(1):16-22.
- Mednick SA, Brennan PA, Kandel E. Predisposition to violence. *Aggress Behav* 1988;14:25-33.
- Brake WG, Sullivan RM, Gratton A. Perinatal distress leads to lateralized medial prefrontal cortical dopamine hypofunction in adult rats. *J Neurosci* 2000;20(14):5538-43.
- Reif A, Rösler M, Freitag CM, Schneider M, Eujen A, Kissling K, et al. Nature and nurture predispose to violent behavior: serotonergic genes and adverse childhood environment. *Neuropsychopharmacol* 2007;32:2375-83.
- Henry B, Moffitt TE. Neuropsychological and neuroimaging studies of juvenile delinquency and adult criminal behavior. In Stoff DM, Breiling J, Maser JD, editors. *Handbook of antisocial behavior*. Washington, DC: John Wiley & Sons Inc; 1997. p. 280-8.
- Gardner DM, Baldessarini RJ, Waraich P. Modern antipsychotic drugs: a critical overview. *CMAJ* 2005;172(13):1703-11. -
- Loeber R. Development and risk factors of juvenile antisocial behavior and delinquency. *Clin Psychol Rev* 1990;10(1):1-41.
- Banerjee TD, Middleton F, Faraone SV. Environmental risk factors for attention-deficit hyperactivity disorder. *Acta Paediatr* 2007;96(9):1269-74. -.
- Bhutta AT, Cleves MA, Casey PH, Craddock MM, Anand KJ. Cognitive and behavioral outcomes of school-aged children who were born preterm: a meta-analysis. *JAMA* 2002;288(6):728-37. -
- Linnet KM, Dalsgaard S, Obel C, Wisborg K, Henriksen TB, Rodriguez A, et al. Maternal lifestyle factors in pregnancy risk of attention deficit hyperactivity disorder and associated behaviors: review of the current evidence. *Am J Psychiatry* 2003;160(6):1028-40. -