WORLD JOURNAL OF PHARMACEUTICAL RESEARCH
SJIF Impact Factor 8.084
Volume 9, Issue 1, 409-421. Research Article ISSN 2277– 7105

THE EFFECT OF MATERNAL AND CHILD RISK FACTORS ON DEVELOPMENTAL MILESTONE IN CHILDREN LESS THAN 2 YEARS IN KHANAQIN DISTRICT

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Article Received on
11 Nov. 2019,

Revised on 01 Dec. 2019,
Accepted on 21 Dec. 2019,

DOI: 10.20959/wjpr20201-16217

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ABSTRACT

Background: Developmental delay occurs when children do not reach their developmental milestones at the expected time. The main causes of developmental delay are often unknown, but maternal and child risk factors are some of the possibilities. Parents often neglect to mention these problem because they think the physician is un interested or can not help. Therefore the need to investigate and screen for the presence of such problem in every health supervision visit developed. **Objectives:** Study the effect of maternal and child risk factors on developmental milestone in children less than 2 years in khaniqin district. **Subjects and Methods:** A cross-sectional study has been conducted at a primary health care centers in khaniqin district, from first of March 2019 to end of October 2019. In this study 300 children are included whose aged less than 2 years. 156(52%) fales and 144(48%) males. History(prenatal, natal, post natal) has been taken through direct interview using special questionnaire and assessment of milestone using Denver Developmental Screening Test II which depend on four domains (motor, adaptive, language, and social) is done for all the 300 child. **Results:** The study participants in the study consisted of 156 girl (52%) and 144 boy (48%). The age of children was less than two years. There were significant relations between developmental delay with child risk factors in motor, adaptive and language domians and with maternal risk factors in motor and language domains. **Conclusions:** Delay in Motor domain is more frequent in children of no antenatal care mother, delay in adaptive domain is more frequent in children of low birth weight child, delay in language domain is more frequent in child with history of hyperbilirubinemia.

KEYWORDS: Developmental delay; Denver Developmental Screening Test II; Maternal risk factors; Child risk factors.

INTRODUCTION

Developmental delay occurs when children do not reach their developmental milestones at the expected time.[1] The main causes of developmental delay are often unknown, but biological factors, complications of pregnancy, and environmental factors are some of the possibilities.

Developmental delay (DD) is a term that is commonly applied to the preschool child of less than 5 years old, whose developmental level is substantially behind the average expectations of children of the same age in two or more developmental domains. These domains include cognitive and intellectual, gross motor, fine motor, language, social and adaptive development.[2]

Children are the most valuable asset of any society, and their health can be considered as an index of the Nation's prosperity.[3]

The growth in childhood is one of the important components of health throughout their life.

Whether a child has a developmental delay or disorder, early identification and intervention are essential for achieving the best possible outcome.[4-5] After infection and trauma, developmental and behavioral disorders are the most common problems in pediatric medicine. The infant's development during the first two years be plotted from the infants estimated due date rather than the infant's birth date. The Denver prescreening Developmental Questionnaire, the Denver Developmental Screening Test and the Gesell Screening Inventory are all accepted tests.[6]

The most widely used and researched test is the Denver Developmental Screening Test-II (DDST II). However, despite its popularity, it does not function well as a screening test, having limited sensitivity for subtle delays and modest predictive validity.[7]

Approximately 15%–18% of children in the US suffer from developmental or behavioral disabilities.[8] Developmental screening for children from 4 to 60 months in a study conducted in Tehran showed prevalence of developmental delay was 18 percent.[9] In Hong Kong, around 1500 children were diagnosed to have DD in the year 2004. This number

accounted for one quarter of the referrals to the Child Assessment Service(CAS) of Department of Health, which was a substantial proportion of the new referrals to the service.[10] Follow up is crucial, because complex problems often present as simple problem, referral to developmental disability will vary according to the expertise of the primary health clinician, after referral, the clinician is needed to help coordinate and interpret the evaluation and recommendation. A study of 193 males and 68 females, corresponding with a male/female ratio of 2.84:1. There were 34 (12.2%) of 261 with mild DD, 112 (43.0%) of 261 with moderate DD, and 115 (44.1%) of 261 with severe delay. Overall, a cause was found in 98 (38%) of 261 children.[11]

Because prematurity is considered a notable risk factor in a child's development, premature children tend to be followed more closely in clinical settings. The stress and medical complications associated with premature birth make these births qualitatively different from full-term birth; thus, clinicians are faced with the dilemma of how to account for these events when evaluating a premature infant. Advocates of this method warned that misdiagnosis of mental retardation within the first 2 years was likely unless the child's age was adjusted for prematurity.[12]

With a sample of 46 healthy infants (half of which were born between 29 and 32 weeks gestation), Palisano used motor-specific assessment measures (i.e., Peabody Developmental Motor Scale, Gross Motor Scale) to assess infants' skills at 12, 15, and 18 months. His results showed that when being assessed by chronological age, the premature infants had significantly lower gross and fine-motor scores than their full-term counterparts.[13]

Based on their study of 100 high-risk preterm infants (< 32 weeks gestation), Allen and Alexander concluded that the motor delay noted in preterm infants was better attributed to transient developmental lag versus true deficit.[14]

A study of a total of 261 patients eventually met criteria for study inclusion. Mean age at initial evaluation was 33.6 months. An underlying cause was found in 98 children. Commonest etiologic groupings were genetic syndrome/chromosomal abnormality, intrapartum asphyxia, cerebral dysgenesis, psychosocial deprivation, and toxin exposure. Factors associated with the ability to eventually identify an underlying cause included female gender (40 of 68 vs 58 of 193), abnormal prenatal/perinatal history (52 of 85 vs 46 of 176), absence of autistic features (85 of 159 vs 13 of 102), presence of microcephaly (26 of 40 vs

72 of 221), abnormal neurologic examination (52 of 71 vs 46 of 190), and dysmorphic features (44 of 84 vs 54 of 177). In 113 children without any abnormal features identified on history or physical examination, routine screening investigations (karyotype, fragile X molecular genotyping, and neuroimaging) revealed an underlying etiology in 18.[11]

SUBJECTS AND METHODS

Design of Study

The current study represented an Observational cross-sectional study (The effect of maternal and child risk factors on developmental milestone in children less than 2 years in khanaqin district), which is conducted in the primary health care centers in khanaqin city, from first of March 2016 to the end of October 2016.

Inclusion criteria

Khanaqin district department of primary health care has an estimated number of children less than 2 years of age of (2870) a total number of children who visit primary health care centers monthly.[15] A total of 300 child were included whose aged less than 2 years. 156 females and 144 males were assessed whom appear healthy, and they were selected randomly during the period of the present study.

Criteria of Exclusion

The criteria of exclusion were classified as follow:

1. Child who had neurological problem like cerebral palsy.
2. Child who had dysmorphic features due to chromosomal syndroms.
3. Child who had acute illness.
4. Child who had chronic debilitating disease.
5. Child age more than 2 years.

Data collected

Data was collected through direct interview using special questionnaire arranged by investigator and approved by the supervisor, related demographic history include name, age(below 2 years), sex prenatal history (attend antenatal care, smoking, maternal illness and exposure to drugs or toxin), natal history include gestational age(premature or full term), birth weight (low or normal), birth asphyxia and prolong labour and hyperbilirubinemia (the level which needs therapies), Assessment of developmental milestone using DDST II which

depends on four domains (motor, adaptive, language and social) was done, and the history taken from the mother of each child visited the primary health care centers.

Development of Questionnaire

Statistical Analysis

The study is an observational cross – section study (transverse), the description of the characteristics of the sample choosing the methods of analysis depends on the type of data collection.

The result of this study were represented by using Tables. Statistical analysis of the results in this study were done by using SPSS version 7.5 computer software (Statistical Package for social Sciences), and Chi – square test were used to test the results of the present study[16,17], when the test more than P value at 0.05 conceder significant.

RESULTS

Table 1. shows distribution of motor domain in relation to maternal risk factors, which revealed that 108 (33.8%) of the assessed children have no antenatal care mother from them 81(25.4%) have normal developmental milestone, 22(6.89%) delay and 5(1.5%) advance, 9 (2.8%) of them have smoking mother from them 6(1.8%) have normal developmental milestone and 3(0.9%) delay, 167 (52.3%) of them have history of exposure to medication or toxin from them 146(45.7%) have normal developmental milestone, 19(5.9%) delay and 2(0.6%) advanceve and 35 (10.9%) of the assessed children have maternal illness from them 23(7.2%) have normal developmental milestone and 12(3.7%) delay, Statistically there is significant difference between these groups by using Chi–square test.

Table 1: Distribution of Motor Domain in Relation to Maternal risk Factors.

	Normal		Delay		Advance		Total	
	NO.	%	NO.	%	NO.	%	NO.	%
No antenatal care	81	25.4	22	6.89	5	1.5	108	33.8
Smoking	6	1.8	3	0.9	0	0	9	2.8
Exposure to medication or toxin	146	45.7	19	5.9	2	0.6	167	52.3
Maternal illness	23	7.2	12	3.7	0	0	35	10.9
Total	266	83.3	46	14.4	7	2.2	319	100

Chi-square= 19.38 P value at 0.05 =12.592 significant.

Table 2. shows distribution of motor domain in relation to child risk factors, which revealed that 25 (10.2%) of the assessed children premature from them 7(2.8%) have normal

developmental milestone, 15(6.17%) delay and 3(1.2%) advance, 65 (26.7%) of them low birth weight from them 42(17.3%) have normal developmental milestone, 18(7.4%) delay and 5(2.05%) advance, 96 (39.5%) of them have history of hyperbilirubinemia from them 76 (31.2%) have normal developmental milestone, 14(5.6%) delay and 6(2.4%) advance, 16 (6.5%) of them have asphyxia and prolong labour from them 11(4.5%) have normal developmental milestone and 5(2.05%) delay, 41 (16.8%) of them have family history of delay developmental milestone from them 14(5.6%) have normal developmental milestone, 26(10.7%) delay and 1(0.4%) advance, Statistically there is significant difference between these groups by using Chi– square test.

Table 2: Distribution of Motor Domain in Relation to Child risk Factors.

	Normal		Delay		Advance		Total	
	NO.	%	NO.	%	NO.	%	NO.	%
Prematurity	7	2.8	15	6.17	3	1.2	25	10.2
Low birth weight	42	17.3	18	7.4	5	2.05	65	26.7
History of hyper bilirubinimia	76	31.2	14	5.6	6	2.4	96	39.5
Asphyxia and prolong labur	11	4.5	5	2.05	0	0	16	6.5
Family history of delay milestone	14	5.6	26	10.7	1	0.4	41	16.8
Total	266	61.7	78	32.1	15	6.17	243	100

Chi-square= 46.22 P value at 0.05 =15.507 significant.

Table 3 shows distribution of adaptive domain in relation to maternal risk factors, which revealed that 108 (33.8) of the assessed children have no antenatal care mother from them 84(26.3%) have normal developmental milestone, 22(6.9%) delay and 2(0.6%) advance, 9 (2.8%) of them have smoking mother all of them have normal developmental milestone, 167 (52.3) of them have history of exposure to medication or toxin from them 142(44.5%) have normal develop- mental milestone, 21(6.58%) delay and 4(1.2%) advance, and 35 (10.9%) of the assessed children have maternal illness from them 31(9.7%) normal, 3(0,9%) delay and 1(0.3%) advance Statistically there is no significant difference between these groups by using Chi– square test.

Table 3: Distribution of Adaptive Domain in Relation to Maternal risk Factors.

	Normal		Delay		Advance		Total	
	NO.	%	NO.	%	NO.	%	NO.	%
No antenatal care	84	26.3	22	6.9	2	0.6	108	33.8
Smoking	9	2.8	0	0	0	0	9	2.8
Exposure to medication or toxin	142	44.5	21	6.58	4	1.2	167	52.35
Maternal illness	31	9.7	3	0.9	1	0.3	35	10.9
Total	266	83.3	46	14.4	7	2.2	319	100

Chi-square= 8.58 P value at 0.05 =12.592 Not significant.

Table 4. shows distribution of adaptive domain in relation to child risk factors, which revealed that 25 (10.2%) of the assessed children premature from them 22 (9.05%) have normal developmental milestone, 1(0.4%) delay and 2(0.8%) advance, 65 (26.7%) of them low birth weight from them 45(18.5%) have normal developmental milestone, 17(6.9%) delay and 3(1.2%) advance, 96 (39.5%) of them have history of hyperbilirubinemia from them 92(37.8%) have normal developmental milestone, and 4(1.6%) delay, 16 (6.5%) of them have asphyxia and prolong labour from them 9(3.6%) normal developmental milestone 6(2.4%) delay and 1(0.4%) advance, 41 (16.8%) of them had family history of delay developmental milestone from them 36(14.8%) have normal developmental milestone, 3(1.2%) delay and 2(0.8%) advance, Statistically there is significant difference between these groups by using Chi– square test.

Table 4: Distribution of Adaptive Domain in Relation to Child Risk Factors.

	Normal		Delay		Advance		Total	
	NO.	%	NO.	%	NO.	%	NO.	%
Prematurity	22	9.05	1	0.4	2	0.8	25	10.2
Low birth weight	45	18.5	17	6.9	3	1.2	65	26.7
History of hyperbilirubinemia	92	37.8	4	1.6	0	0	96	39.5
Asphyxia and prolong labour	9	3.6	6	2.4	1	0.4	16	6.5
Family history of delay milestone	36	14.8	3	1.2	2	0.8	41	16.8
Total	204	83.9	31	12.8	8	3.3	243	100

Chi-square= 36.424 P value at 0.05 =15.507 significant.

Table 5 shows distribution of language domain in relation to maternal risk factors, which revealed that 108 (33.8%) of the assessed children have no antenatal care mother from them 79(24.7%) have normal developmental milestone, 20(6.2%) delay and 9(2.8%) advance, 9 (2.8%) of them have smoking mother all of them have normal developmental milestone, 167 (52.35%) of them have history of exposure to medication or toxin from them 129(40.4%) have normal developmental milestone, 36(21.2%) delay and 2(0.6) advance, and 35 (10.9%) of the assessed children have maternal illness from them 28(8.7%) have normal developmental milestone and 7(2.2%) delay, Statistically there is significant difference between these groups by using Chi– square test.

Table 5: Distribution of Language Domain in Relation to Maternal Risk Factors.

	Normal		Delay		Advance		Total	
	NO.	%	NO.	%	NO.	%	NO.	%
No antenatal care	79	24.7	20	6.2	9	2.8	108	33.8
Smoking	9	2.8	0	0	0	0	9	2.8
Exposure to medication or toxin	129	40.4	36	21.2	2	0.6	167	52.35
Maternal illness	28	8.7	7	2.2	0	0	35	10.9
Total	245	76.8	63	19.7	11	3.4	319	100

Chi-square= 14.256 P value at 0.05= 12.592 significant.

Table 6. shows distribution of language domain in relation to child risk factors, which revealed that 25 (10.2%) of the assessed children premature from them 21(8.6%) have normal developmental milestone and 4(1.6%) delay, 65 (26.7%) of them had low birth weight from them 60(24.7%) have normal developmental milestone and, 5(2.05%) delay, 96 (39.5%) of them had history of hyperbilirubinemia from them 83(34.2%) have normal developmental milestone, 8(3.2%) delay and 5(2.05%) advance, 16 (6.5%) of them have asphyxia and prolong labour from them 12(4.8%) have normal developmental milestone and 4(1.6%) delay and, 41 (16.8%) of them had family history of delay developmental milestone from them 32(13%) have normal developmental milestone, 7(2.9%) delay and 2(0.8%) advance, Statistically there is significant difference between these groups by using Chi– square test.

Table 6: Distribution of Language Domain in Relation to Child Risk Factors.

	Normal		Delay		Advance		Total	
	NO.	%	NO.	%	NO.	%	NO.	%
Prematurity	21	8.6	4	1.6	0	0	25	10.2
Low birth weight	60	24.7	5	2.05	0	0	65	26.7
History of hyper bilirubinemia	83	34.2	8	3.2	5	2.05	96	39.5
Asphyxia and prolong labour	12	4.8	4	1.6	0	0	16	6.5
Family history of delay milestone	32	13	7	2.9	2	0.8	41	16.8
Total	208	85.6	28	11.5	7	2.9	243	100

Chi-square= 16.7 P value at 0.05 = 15.507 significant.

Table 7 shows distribution of social domain in relation to maternal risk factors, which revealed that 108 (33.8) of the assessed children have no antenatal care mother from them 82(25.7%) have normal developmental milestone, 22(6.9%) delay and 4(1.2%) advance, 9 (2.8%) of them have smoking mother from them 7(2.2%) have normal developmental milestone and 2(0.6%) delay, 167 (52.3) of them have history of exposure to medication or toxin from them 132(41.3%) normal developmental milestone, 33(10.3%) delay and 2(0.6%) advance, and 35 (10.9%) of the assessed children have maternal illness from them 30(9.4%)

have normal developmental milestone and 5(1.5%) delay, Statistically there is no significant difference between these groups by using Chi– square test.

Table 7: Distribution of Social Domain in Relation to Maternal Risk Factors.

	Normal		Delay		Advance		Total	
	NO.	%	NO.	%	NO.	%	NO.	%
No antenatal care	82	25.7	22	6.9	4	1.2	108	33.8
Smoking	7	2.2	2	0.6	0	0	9	2.8
Exposure to medication or toxin	132	41.3	33	10.3	2	0.6	167	52.35
Maternal illness	30	9.4	5	1.5	0	0	35	10.9
Total	251	78.6	62	19.4	6	1.8	319	100

Chi-square= 4.0366 P value at 0.05 = 12.592 Not significant.

Table 8. shows distribution of adaptive domain in relation to child risk factors, which revealed that 25 (10.2%) of the assessed children are premature from them 19(7.8%) have normal developmental milestone and 6(2.4%) delay, 65 (26.7%) of them low birth weight from them 54(22.2%) have normal developmental milestone, 10(4.1%) delay and 1(0.4%) advance, 96 (39.5%) of them have history of hyperbilirubinemia from them 83(34.2%) have normal developmental milestone, 10(4.1%) delay and 3(1.2%) advance, 16 (6.5%) of them have asphyxia and prolong labour from them 10(4.1%) have normal developmental milestone and 6(2.4%) delay, and 41 (16.8%) of them have family history of delay developmental milestone from them 29(11.9%) have normal developmental milestone, 9(3.7?%) delay and 3(1.2%) advance, Statistically there is no significant difference between these groups by using Chi– square test.

Table 8: Distribution of Social Domain in Relation to Child Risk Factors.

	Normal		Delay		Advance		Total	
	NO.	%	NO.	%	NO.	%	NO.	%
Prematurity	19	7.8	6	2.4	0	0	25	10.2
Low birth weight	54	22.2	10	4.1	1	0.4	65	26.7
History of hyperbilirubinemia	83	34.2	10	4.1	3	1.2	96	39.5
Asphyxia and prolong labour	10	4.1	6	2.4	0	0	16	6.5
Family history of delay milestone	29	11.9	9	3.7	3	1.2	41	16.8
Total	195	80.3	41	16.8	7	2.9	243	100

Chi-square= 14.246 P value at 0.05 =15.507 Not significant.

DISCUSSION

The Assessment of Motor Domain

Significant association shows in assessment of motor milestone in relation to maternal risk factors, the highest percentage of delay (25.4%) is show in group of children whose mother had no antenatal care. This result may be due to multiple factors which effect the fetus during pregnancy this agrees with Garn SM. et al[18], To T. et al, a study in Canadian children[19] and with American study which revealed that one of the most common etiologies of developmental delay was toxin exposure (7%) during pregnancy when there is no antenatal care[11], and disagrees with Kalbfleisch JD. et al, a study in New Jersey[20] and Baker D. et al, study of motor and intellectual development in Philadelphia.[19]

The Assessment of Adaptive Domain: Significant association also show in assessment of adaptive domain in relation to child risk factors, the highest percentage of delay (6.9%) is in group of children who have history of low birth weight. This result may be due to incomplete formation of CNS and other system that cause delay adaptive milestone. This agrees with New York State Department of Health.[21] and with Palisano used motor-specific assessment measures to assess infants' skills at 12, 15, and 18 months. His results showed that when being assessed by chronological age, the premature infants had significantly lower gross and fine-motor scores than their full-term counterparts[13] and disagree with New York: Author and Campbell SK, Hedeker D.[22]

No significant association in relation to maternal risk factor. This result agrees with multicenter study by WHO in Brazil (South America), Ghana (Africa), India (Asia), Norway (Europe), Oman (the Middle East) and the USA (North America).[23] And disagree with Cooper RS, et a study in Englandian children[24], and with a considerable proportion of etiologies, including toxin exposure, in utero infection, are theoretically potentially preventable, these etiologies represented more than one third (42%) of etiologies actually identified in children with DD.[11]

The Assessment of Language Domain

Significant association is show in assessment of language domain in relation to maternal risk factors, the highest percentage of delay (12.2%) was in group of children whose mother had history of exposure to medication or toxin. This result may be due to the effect of these medication and toxin on the CNS of the fetus, agrees with Garn SM, et al[18] and Baker D, ed

a study in philadephia[19] and with American study which revealed that one of the most common etiologies of developmental delay toxin exposure (7%).[13]

Significant association shows in assessment of language domain in relation to child risk factors the highest percentage of delay (3.2%) was in group of children who has history of hyperbilirubinemia.

This result may be due to the effect of the high level of bilirubin on the language center in the CNS, this agrees with American study which revealed that factors associated with the ability to eventually identify an underlying cause included abnormal prenatal/ perineatal history (52 of 85 vs 46 of 176)[11], and Kalbfleisch JD, et al a study in New gersy[20] which explain the effect of hyperbilirubinemia in neonatal period on the future behavior of the child.

The Assessment of Social Domain

No significant association in assessment of social domain shown in relation to child risk factors and maternal risk factor. This result agree with Argentinean study by Wing, L. & Gould, J.[25] revealed that the type of the feeding has the least effect on social developmental milestone, and disagree with Bagnato, S. J., & Neisworth, J. T.[26], with Weiss, K. a study in Las Vegas[27], with developmental study in England do governing milestone achievement are influenced significantly by environmental and/or genetic factors specific to individual sites[28,29] and with American study which revealed that factors associated with the ability to eventually identify an underlying cause included abnormal prenatal/perinatal history (52 of 85 vs 46 of 176).[11]

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