Abstract

INTRODUCTION

Development Specifies maturation of different biological functions at an anticipated age. A child is said to have developmental delay when he/she doesn’t attain the specified developmental milestones at the expected age (with the adequate provision for the broad variation among normal children.)

Developmental Delay is one condition not only affecting thinking capacity but also causing physical limitations in child. Statistics from different sources indicate that in India, 3.8 % of the population has some form of disability and the same was found to be more common in the children of lower socio-economic class. According to ICMR task force study carried out at three different centres (Delhi, Jaipur, Lucknow) the prevalence rate of disability among children below 6 year of age was found to be 8.8 per thousand in Delhi, 6.5 per thousand in Jaipur & 12.6 per thousand in Lucknow. In spite of improved understanding of causative factors, in large majority of cases, etiological factors cannot be attributed reliably. Hence there is a need to study this condition from different perspective.

From Ayurvedic perspective Developmental delay falls into ‘Anukta Vikara’ category where in direct references are not found in the Ayurvedic classics presenting all the aspects of this condition. To simplify the complexity of Anukta Vikara the key is to understand its Diagnostic Triad viz Dosha, Samutthan & Sansthan of Vikara. Samutthan or Hetu is also the important aspect of any disorder which is one of the features of Panchanidaan, its identification & prevention (Nidan parivarjan) becomes first line of treatment.

Clinical symptoms of Phakkaroga, in which child is not able to walk by the age of one year; correlates partially with Delay in Gross motor development. To understand other domain of Developmental delay, Samhitas were explored for finding references about formation of Prakruta Garbha, Vikruta Garbha Utpatti & Various Garbha- Upghatkar bhava. These references were utilized in identifying Etiological factors. Nidaan of Phakkaroga were also taken in to consideration.
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Compilations of all such Hetu from Ayurvedic Samhita were done & they were further categorized in Prenatal, Antenatal & Postnatal category. These Factors were the base in forming questionnaire.

A total of 256 children suffering from Developmental Delay were diagnosed with the help of Denver Developmental Screening test (2nd edition) & were subjected to questionnaire prepared to identify any such Hetus present in them. Data thus collected were analyzed with statistical test.

In This manner identification & assessment of Hetu or Samutthan, the etiological factor of Developmental delay might prove a vital step in diagnosing this condition from Ayurvedic perspective, which was the intention of this study.

Methodology

- Study design: Survey type of study
- Study Type: Clinical observational
  
  Sampling:
  - Sample size – Optimum Sample was calculated by using the formula with approximation for large population which came out as 228. Ultimately data were collected for 256 children (out of 289 children)
  - Sample collection - Stratified Open Sampling.
  - Stratification: (Minimum required 76 Patients in each group)
    - Age Group Birth to 2 years – 86 patients
    - Age Group 2 to 4 years – 82 patients
    - Age Group 4 to 6 years – 88 Patients

Inclusion Criteria:

- Children suffering from Neurological Developmental delay in any of Sub group; motor, fine motor, Language and social Development.
- Developmental assessment was done with Denver Developmental screening test (2nd edition) (Denver II)
- Age Eligible: Birth to 6 years.
- Gender – Either
Exclusion criteria:
- Children having Progressive Encephalopathy.
- The respondents who didn’t give consent, or whose mother was not available to give history or who had adopted children were excluded from the study, since perinatal details were not available.

Observation:
- Questionnaire (Survey Sheet) was Prepared on the basis of different Hetu described in Ayurvedic Samhita;
- The study was conducted to explore the conditions encountered during pre natal, antenatal & post natal period by mother & child, which probably led to Developmental Delay.
- Data were collected by face to face interview of the respondents, where Mothers were the respondents.
- Records of children were also referred for data including birth details & other investigations.

Data analysis:
- Chi square test of association was applied on the data collected.

Review of Literature:
- All Samhitas with respective commentaries have been referred.
- Various paediatric books are referred for better understanding of Developmental delay.
- Various journals are referred for Research article for Delayed Developmental entities

Results & Observation:
In this study entitled ‘Etiological assessment of developmental delay in children with Ayurvedic Perspective’ a total of 256 Respondent were observed. Age wise
distribution of data was found to be 34% in the age group birth to 2 years, 32% in the age group to 2 to 4 years & 34% in the age group 4 to 6 years.

Subjects were observed for Developmental delay in any one or all the four areas such as Delay in Gross motor (73%), Delay in Fine motor (69%), Delay in Language (87%) & Delay in Personal Social area (85%). Subjects having significant Developmental delay in two or more than two were termed as Global Developmental delay GDD (91%).

Observations regarding diagnosis of Developmental delay in present study in which children having developmental delay without any specific diagnosis were estimated to 46%, which correlates with the Textual reference.

All the Etiological factors observed were classified into Pre natal, Antenatal & Post natal group as given below.

Prenatal factors:

1. Atulya Gotra (Consanguinity):
2. Beeja Dushti - It is one important factor causing Vikruti in Garbha. Beeja Dushti implies Shukra dushti & Aartava dushti. These factors were indirectly assessed by H/o Treatment needed for conception or not in both parents & Maternal Menstrual History for irregularity.
3. Beeja Bhagavayav Dushti: Fraction part of Beeja is called Beeja Bhagavayava which is responsible for formation of various Avayava. Dushti of this factor was evaluated by the H/o Repeated abortion in mother.
4. Aatma Karma: It is nothing but Actions done in Past life. Assessment of this factor was not done in the study because it was out of scope of this study to prove Punarjanma.
5. Age of Mother.
6. Age of Father.

Antenatal factors:

Garbha- Upghatkar bhava:

Aaharatmaka: following factors were observed in this catgory

- Modification in Diet habits during pregnancy
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- Consumption of Sheet Aahar
- Consumption of Alpa Aahar
- Consumption of Ruksha Aahar
- Consumption of one rasa in excess

Viharatmaka: Viharatmaka Hetu were assessed for following factors.
- Sleep
- Vyayam
- Vyavay
- Travelling
- Fall/Injury/ Marmaghata

Manasika bhava: Manasika Bhava were assessed for following elements.
- Chinta
- Bhaya
- Krodha
- Shoka
- Utkantha

**Dauhrid Avman** (Cravings of mother during pregnancy): Daurhrida is the unique concept in which after the formation of heart, fetus expresses his desires through mother, which if remain unfulfilled leads to vitiation of Vata Dosha and in turn diseases in Garbha. In present study only 7 % respondent gave positive history of Dauhrid avaman

**Akaal Avi Pravartan:**

Proper Bearing down when strong contractions comes, cannot be evaluated retrospectively. Hence this factor could not be evaluated in current study.

Post Natal Factors:

**Natal Factors:**

Birth is an important event in a child’s life & so is uneventful natal history. Natal history was assessed for following factors
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- Place of Birth
- Maturity of child at birth
- H/o Multiple birth
- Mode of delivery

**Post Natal Brain Insult:**

Post natal events like hypoxic attack can have major impact on the future development of the child. Following factors were observed in this study.

- Birth Asphyxia
- H/o NICU Admission
- Birth cry
- Birth weight (In Kilograms)

**Data Analysis:**

All the data thus collected were analyzed with the help of Chi square test of Association.

**Discussion based on above statistical analysis:**

Based on analysis of Data obtained it is evident that Developmental delay is a multidimensional entity & so is Vata Prakopaka Aahar Vihar.

It was also observed that impact of one factor on all different area of development was not same. Also as compared to Prenatal & Post natal factors, more no. of Antenatal factor were statistically significant.

Statistically Significant effect of Etiology on different domain of Development is observed as follows.

Gross motor & statistically significant Etiological factors:

<table>
<thead>
<tr>
<th>Etiological factor - Chi Square Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age of mother – 6.42</td>
</tr>
<tr>
<td>Age of father - 4.20</td>
</tr>
</tbody>
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- Birth Asphyxia – 4.40
- Ruksha Aahar – 18.82
- Alpa Aahar – 5.58
- Sleep – 6.00

Fine motor & statistically significant Etiological factors::

- Consanguinity – 4.77
- Age of father – 7.29
- Birth Asphyxia – 10.37
- Ruksha Aahar – 16.98
- Sleep – 5.08
- Vyayam – 15.79
- Vyavaya – 5.08
- Manasika Bhava- 7.55

Language & statistically significant Etiological factors::

- Ruksha Aahar – 4.80
- Vyavaya – 15.10
- Travelling- 4.99

Social development & statistically significant Etiological factors::

- Birth Asphyxia – 4.40
- Ruksha Aahar – 6.01
- Vyavaya- 10.13
- Travelling – 5.71

Global Developmental Delay & statistically significant Etiological factors:

- Vyavaya – 7.20
- Sleep- 3.92
- Manasika Bhava- 5.10

[Probability of Larger Value of $x^2$ at degree of freedom 1 at $P < 0.05$ is 3.84, $P < 0.01=6.63$ & $P < 0.001 = 10.83$.]
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Thus individually fine motor delay was the area of development where maximum etiological factors were statistically Significant & Delay in language development had least causes that were statistically significant. Another important finding can be drawn from these results is whatever may be the Viprakrushta Hetu, Dominant Sannikrusta Hetu in all Developmental Delay remains Vata Prakopa.

Conclusion:

- Delay in development is a multi-factorial condition & there is no single entity described in Ayurvedic Classics that can be directly correlated to this condition completely.
- Gross motor developmental delay can be correlated with Phakkaroga, a disease diagnosed when child doesn’t walk by the age of one year.
- Developmental delay thus can be considered as Anukta Vikara. By combining & applying all the principles described to treat Anukta Vikara this condition can be simplified. Dosha, Samutthan & Adhisthan are the diagnostics triad to understand diseases not described in Ayurvedic Text.
- Predominant Dosha Affected in Developmental Delay is Vata Dosha, Specifically Praana Vayu, Udaan Vayu & Vyaan Vayu.
- Etiological factors in Developmental delay can be classified into Pre natal, Antenatal & Post natal category.
- Factors included under Prenatal factors are Atulya Gotra (Consanguinity), Beeja dushti, Beeja Bhagayayav Dushti, Aatma Karma, Age of Parents.
- All the Garbha Upghatkar bhava were included under Antenatal category where in consumption of Vata Prakopaka Aahar vihar causes Vitiation of Vata Dosha thus affecting Growth & development of fetus. They are further sub categorized into Aahar related, Vihar related, Manasika bhava related & Dauhrida avaman related
- Events Related with birth & post natal brain insult are considered as Post natal Hetu.
- Out of a total of 256 patients 46% of children were without any specific clinical diagnosis & 91% of Subjects are having Global Developmental delay which is significant developmental delay in two or more than two domain
- Developmental delay is a multidimensional entity & so is Vata Prakopaka Aahar Vihar.
• **Each & every etiological factors had different statistically significant impact on Different Domain of Developmental Delay.**

• More no. of Antenatal factors have statistically significant results as compared to Prenatal & post natal factors.

• Statistically significant Association of Etiological factors & Gross motor Delay was Age of mother, Age of father ,Birth Asphyxia ,Ruksha Aahar , Alpa Aahar & Sleep

• Maximum number of Etiological factors found to be statically significant in Fine motor development & they were Consanguinity, Age of father ,Birth Asphyxia, Ruksha Aahar , Sleep, Vyayam ,Vyavaya & Manasika Bhava.

• Three Etiological factors that were Statistically Significant in Language development were Ruksha Aahar, Vyavaya & Travelling.

• In the area of Social development Birth Asphyxia, Ruksha Aahar, Vyavaya & Travelling were statistically significant Etiological factors

• Three factors that had statistically significant association with Global Developmental delay are Sleep, Vyavaya & Manasika bhava.

• Individually fine motor delay was the area of development where maximum etiological factors were statistically Significant & Delay in language development had least causes that were statistically significant.