

# Magnetic Resonances Imaging Findings in Delayed Milestones Pediatric Patients

MRI in Delayed Milestones Pediatric Patients

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## ABSTRACT

**Objective:** The main objective of this study is delayed in the process of achieving milestones is rare but still devastating effect with vast amount of etiologies resides in it. At least 89% of patient with development delay showed additional clinical features.

**Study Design:** cross Sectional study

**Place and Duration of Study:** This study was conducted at the Liaquat University Hospital Jamshoro and Hyderabad, over a period of six months from Jan 2019 to June 2019.

**Materials and Methods:** To include total of 22 patients presenting with additional clinical feature associate to development delay. History and clinical examination with MRI was done on GE 1.5 Tesla with appropriate sequence after sedation. Various anatomical structures like ventricles, corpus collasum etc were systematically examined.

**Results:** Total numbers of 22 patients were enrolled with 11 male and 11 female. Most of the presentation i.e. 45.5% around the age of 2-5 years. Mostly affected structures are white matter except Corpus Collasum (63.6 %), Ventricles (50%), abnormalities of cerebellum (40.9 %), abnormalities of Grey matter (31.8%) and Corpus collasum changes (22.7 %).

**Conclusion:** MRI findings in delayed milestones patient's shows mostly affected structures is white matter except Corpus Collasum (63.6 %) and Ventricles (50%), that can be the inductive factor for clinical manifestation that warrant patient to be admitted in hospital. Further Cross-sectional studies are required to develop the findings with clinical features.

**Key Words:** Magnetic Resonances Imaging, Delayed Milestones, Pediatric Patients

**Citation of article:** Shahzad G, Jatoi A, Memon HS. Magnetic Resonances Imaging Findings in Delayed Milestones Pediatric Patients. Med Forum 2022;33(7):7-9.

## INTRODUCTION

From the conception to maturity, the human brain itself grows through a continuous process of development and it can be amended by genetic, environmental, nutritional and chronic diseases. This can result it into significant delayed achievement of Milestones, which can be evaluate by motor i.e. gross & fine, social and language skills and can be labeled as development delay if one or more than one skill are delayed.<sup>1, 10</sup> The estimation of 5-10% children with 1-3% younger than 5 years and 40,000-120,000 children born each year out of four million annual births in United States and Canada reported to have development delay but still the exact prevalence is not known.<sup>2, 9</sup>

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Received: February, 2022  
Accepted: April, 2022  
Printed: July, 2022

Evident revelation of development delay can occur during infancy, early childhood and early school years and it doesn't represent the diagnosis but it is actually the manifestation of various etiologies like genetic, metabolic, vascular, malformation syndrome, traumatic, infections, toxins and environmental, besides careful evaluation can reveal cause in 55-85% individuals.<sup>1,3</sup>

Regarding investigations Brain MRI is one of major and important investigation in these individuals and about 60-84% had abnormal Scan with most findings are found in ventricles and corpus callosum.<sup>1,4</sup> Abnormal findings on MRI is somewhat blur in development delay patients. By pointing out some kind of relationship, we can simply develop either the consequence or inductive factors that can be associative with development delay.

## MATERIALS AND METHODS

A cross Sectional study designed to include total of 22 patients presenting with additional clinical feature associate to development delay in Liaquat University Hospital Jamshoro and Hyderabad; over a period of six months (Jan 2019 to June 2019). The patients that were referred from Pediatric and Neurosurgery ward to radiology department for Magnetic Resonance

Imaging. The patient that were included in the study through convenient sampling by excluding patients who have ongoing protein energy malnutrition, infection and other co morbidities. The patients were included who came with any clinical symptoms like epilepsy, neurological findings, speech deformities. The history and clinical examination is done and patient's files were studied with multi-disciplinary approach. The designed questionnaire was filled that included already set variables, which were adopted from previous study.<sup>5</sup> Patients went under MRI scans of brain on machine name GE 1.5 Tesla with sequenced used T1W, T2W, FLAIR, and Diffusion weighted DWI and ADC sequences. Strict sedation protocol was followed, for infants "feed and scan" technique was used, for older children oral or IV drugs i.e. Syrup Chloral Hydrate 5 to 10 mg/kg were used with consent and under the supervision of anesthetics and pediatrician. All children were monitored with pulse oximetry and continuous respiration was advocated during the entire scan and strict vigilance for two hours after scan. The patients were placed in supine position and immobilization of head was achieved by surrounding the head with air-evacuated bag of polystyrene balls. Systematically scans were taken by starting with Ventricles, Corpus Callosum, Grey and white matter, Basal Ganglia, Brain stem and cerebellum. The discreet data was spread on SPSS software version 23 and results were taken out.

**RESULTS**

Total numbers of 22 patients were enrolled with 11 male and 11 female. Most of the presentation i.e. 45.5% around the age of 2-5 years, 95.5% delivered in term gestational age, 86.4% normal obstetric history and 54.5% have no history of consanguinity. Complete demographic data was shown. (Table 1).

**Table No.1: Demographic Data of Patients**

Age	Number	Percentage
3 months-1 year	7	31.8
2-5 years	10	45.5
6-8 years	4	18.2
9-12 years	1	4.5
<b>Gender</b>		
Male	11	50
Female	11	50
<b>Gestational Age</b>		
Preterm	1	4.5
Term	21	95.5
<b>Obstetric history</b>		
Normal	19	86.4
Bad	3	13.6
<b>Consanguinity</b>		
Present	10	45.5
Absent	12	54.5

Regarding the Magnetic Resonance Scan findings of patients that are present either singular or mix and

mostly affected structures is white matter except Corpus Collasum (63.6 %), Ventricles (50%), abnormalities of cerebellum (40.9 %), abnormalities of Grey matter (31.8%) and Corpus collasum changes (22.7 %). Corpus collasum changes include agenesis, colpocephaly, abnormal splenium and Genu and thinning. The complete findings are shown. (Table 2).

**Table No.2: Findings of Magnetic Resonance Scan (Table 2)**

Structure	Number	Percentage
Abnormalities of Ventricles	11	50
White matter changes except Corpus collasum	14	63.6
Corpus Collasum changes	5	22.7
Abnormalities of Grey matter	7	31.8
Abnormalities of cerebellum	9	40.9
Abnormalities of brain stem	3	13.6
Abnormalities of basal Ganglia	1	4.5
Abnormal sulci	3	13.6
Dilation of ventricle with bat wing shape	4	18.2
Molar tooth appearance	1	4.5
Absence of cerebellar Vermis	3	13.6
Deep & wide interpedunclar Cisterns	1	4.5

**DISCUSSION**

A continuous process of development can be amended by genetic, environmental, nutritional and chronic diseases. This can result it into significant delayed achievement of Milestones, which can be evaluate by motor i.e. gross & fine, social and language skills and can be labeled as development delay if one or more than one skill are delayed.<sup>1,6,12</sup>

Evaluation of 22 patients that was present with development delay or delay milestone achievement. The patients were referred from pediatrics and neurosurgery ward to radiology department for Magnetic resonance scan. All the patients with developmental delay, as cited by previous study "development delay plus" showed some kind of MRI scan abnormality in relation to previous study, which showed only 89% had finding on MRI.<sup>1,5</sup> It may be due to difference in inclusion criteria.

As all of the patients that were included in our study, shows some kind of abnormal findings on MRI scan with most of the presentation around the age of 2-5 years (45.5%), (95.5%) delivered in term gestational with no gender prediction, which is in contrast to previous finding that shows peak age 3 to 12 months with male preponderance.<sup>5, 6,11</sup>

This study shows that MRI scans showed variety of changes either in singular or mix and mostly affected

structures is white matter except Corpus Collasum (63.6 %), Ventricles (50%), abnormalities of cerebellum (40.9 %), abnormalities of Grey matter (31.8%) and Corpus collasum changes (22.7 %). Corpus collasum changes include agenesis, colpocephaly, abnormal splenium and Genu and thinning. These findings are in contrast to those previous findings that shows most of the changes in Ventricles and Corpus Collasum and it can be highlighted factor that lead to clinical pictures associated with development delay.<sup>5,7</sup>

It is highly important to note that most changes occur in white matter except corpus collasum, as compared to previous studies that shows most of the changes in corpus collasum, Corpus collasum its self a component of white matter but highlighting other white matter components is also important to rule out other pathological process.<sup>1,5,7</sup>

MRI plays an important part in detection of specific etiological and pathophysiological processes easily but with association of clinical feature and residing etiology. The major drawback of the study that it doesn't discuss clinical features with radiological findings. Which leads to the necessity to be discussed in further Cross- Sectional studies?

## CONCLUSION

MRI findings in delayed milestones patient's shows mostly affected structures is grey matter except corpus collasum (63.6 %) and ventricles (50%), that can be the inductive factor for clinical manifestation that warrant patient to be admitted in hospital. Further Cross-sectional studies are required to develop the findings with clinical features.

### Author's Contribution:

Concept & Design of Study: Ghazala Shahzad  
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**Conflict of Interest:** The study has no conflict of interest to declare by any author.

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