RESEARCH ARTICLE

STUDY OF NEW ONSET TYPE 1 DIABETES AMONG CHILDREN BEFORE AND AFTER COVID 19 PANDEMIC IN A TERTIARY CARE SETTING

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Manuscript Info

Abstract

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Background: On March 11, 2020 the WHO announced a coronavirus disease 2019 (COVID-19) pandemic. Lockdown restrictions, compromised access to medical care and fear of potential exposure to SARS-CoV-2 have forced patients with non-COVID-19 illnesses like type 1 diabetes (T1D) to stay home. This situation lead to delay in T1D diagnosis and treatment resulting in rapid progression to diabetic ketoacidosis (DKA) and therefore increased risk of complications and death **Objective:** To compare between frequency and characteristic of new onset of T1D in children before and after pandemic.
Methods: This retrospective cohort study comprises 2 datasets- children diagnosed with new-onset T1D and admitted in MVJ medical college prepandemic from 1sep 2017 to 29 feb 2020 and pandemic from 1 march 2020 to 30 august 2022. We compared frequency and characteristics of children with newly diagnosed T1D before and after pandemic.
Results: The number of children admitted to MVJ medical college due to new-onset T1D prepandemic were 9 cases which increased to 25 cases during the study period, with most of children had severe DKA during and after COVID-19.
Conclusion: Most of children who admitted with T1D had severe DKA at diagnosis during the pandemic in comparison to prepandemic. The main stems for increase case and severity is delayed diagnosis following changes in parental behaviour and healthcare accessibility and another probability would be viral infections triggering T1D and/or DKA during pandemic. However, it needs to evaluate potential effects of SARS-CoV-2 on increased percentage of new onset T1D.

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Introduction:-

Coronavirus disease 2019 (COVID-19) caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), was first reported in December 2019 in Wuhan City, China . On the 11th of March 2020 the WHO announced a COVID-19 pandemic known as coronavirus pandemic . It has affected many aspects of our lives.An increase in the number of children with newly diagnosed type 1 diabetes (T1D) has been reported during the COVID-19 pandemic, suggest that more children with new-onset T1D present with severe diabetic ketoacidosis (DKA). Lacking epidemiological studies, it is unclear whether there is a true increase in the T1D incidence, or rather an

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exacerbation of the disease presentation. Furthermore, the mechanisms of a potential association between COVID-19 and new-onset T1D are unknown. The signs and symptoms of T1D in children usually develop quickly. The presence of diabetic ketoacidosis (DKA) is predominantly a consequence of delayed diagnosis and initiation of insulin therapy .Our previous clinical experience shows that common symptoms of diabetes such as weight loss, fatigue, polyuria, nocturia, Kussmaul breathing, vomiting and other symptoms may be misdiagnosed as common childhood infection like pneumonia ,gastroenteritis ,ect.These may result in delayed T1D diagnosis and, in turn, rapid progression to diabetic ketoacidosis (DKA) and therefore increased risk of complications and death.

The current epidemiological situation may have worsened the already existing difficulties in T1D diagnosis in children and led to further delay in insulin treatment. However, to date, there is limited evidence supporting this hypothesis.

Aims &Obectives:-
1. To evaluate the frequency and severity of DKA at the onset of T1D in children admitted to our center before and during the COVID-19 pandemic .
2. **Primary objective** - To evaluate the number of children admitted to the PICU with DKA and to compare disease characteristics, the severity of DKA, and laboratory features between the pre-pandemic period and during COVID-19 pandemic.
3. To evaluate contributing factor for development of DKA

Research Methodology:-
This is a retrospective cohort study which was conducted in theDepartment of Pediatrics, rural tertiary centre from prepandemic from 1sep 2017 to 29 feb 2020 and pandemic from 1 march 2020 to 30 august 2022. We compared frequency and characteristics of children with newly diagnosed T1D before and after pandemic.

Statistical Methods
Data was entered into Microsoft excel data sheet and was analyzed using SPSS 22 version software. Categorical data was represented in the form of Frequencies and proportions. Chi-square test was used as test of significance for qualitative data. Continuous data was represented as mean and standard deviation. Normality of the continuous data, was tested by Kolmogorov–Smirnov test and the Shapiro–Wilk test. Independent t test was used as test of significance to identify the mean difference between two quantitative variables.

p value (Probability that the result is true) of <0.05 was considered as statistically significant after assuming all the rules of statistical tests.

Statistical software: MS Excel, SPSS version 22 (IBM SPSS Statistics, Somers NY, USA) was used to analyze data.

Inclusion Criteria
All children aged 1 to 18 years with newly diagnosed T1D with DKA admitted in our department.

Exclusion Criteria
Type one diabetes without DKA

Results:-
Total number of cases 34 in which 9 were prepandamic ,25 were during pandemic and after pandemic.

Characteristics of the children who admitted during prepandemic period (Sep 2017 to Feb 2020) was compared with pandemic period (March 2020 to August 2022) .TABLE 1
TABLE:1
TABLE:2
Laboratory parameters of the children who admitted during prepandemic period (Sep 2017 to Feb 2020) was compared with pandemic period (March 2020 to August 2022)TABLE 2

CHARACTERISTICS	PREPANDEMIC (SEP 2017-FEB 2020)	PANDEMIC (MAR 2022-AUG 2022)	P VALUE
Number of patients	9	25	
Age group (in years) <5 5-12 >12	1 5 3	4 12 9	0.978
Sex Male female	4 5	10 15	0.414
Duration of illiness(days) <7 7-21 >21	4 4 1	16 7 2	0.589
Admission to ward picu	6 3	7 19	**0.021**
Severity Mild Moderate severe	4 3 2	8 5 12	0.395

LABORATORY PARAMETERS	PREPANDEMIC (SEP 2017-FEB 2020)	PANDEMIC (MAR 2022-AUG 2022)	P VALUE
BLOOD PH SODIUM BICARBONATE	7.05 7.26	7.09 4.26	0.484 0.751
COVID IgG/IgM/PCR	N/D	3/0/1	--
HBA1C GLUCOSE	9[9.44] 7[283]	25[3.15] 14[454]	0.734 **0.013**
SODIUM POTASSIUM	139 3.4	136 3.2	0.134 0.235

Disccussion:-

In this retrospective cohort study of children with newly diagnosed T1D during the COVID-19 pandemic there is a significant increase in the number of children requiring PICU care for severe ketoacidosis **.** Whereas other demographic features is similar in both the study group and difference are not statistically significant .In Laboratory parameter there is a significant much high glucose value at the time of admission ,however other parameter were similar. Among children with newly diagnosed T1D in our study , SARSCoV-2 was detected by PCR in 1/3 and SARS-CoV-2 antibodies in 3/9 children tested. Without a control group, it is difficult to interpret these results.The children tested had SARS-CoV-2 antibodies, suggesting that SARS-CoV-2 infection would also be the trigger for more severe presentation of T1D or for the increase in children diagnosed with T1D**.** As T1D may be triggered by viral infections in susceptible individuals, the potential association of SARS-CoV-2 with increasing frequency of T1D needs to be addressed.As long-term consequences of SARS-CoV-2 infection remain to be seen and not all patients infected with SARS-CoV-2 develop antibodies, large scale population-based studies are needed to confirm these findings.Our findings are in line with recent Italian, German, UK and Australian studies reporting an increased incidence of DKA in children with new-onset T1D during the COVID-19 pandemic and a recent report from UK suggesting that also the incidence of paediatric T1D had increased. In contrast, a German study reported no increase in the incidence of T1D

Conclusion:-

As compared with previous years, more children with newly diagnosed T1D presented and severe ketoacidosis in 2020.12/25 in pandemic tested for covid infection were done in 12 cases 4 (33%) were positive.Most of children who were admitted with T1D had severe DKA at diagnosis during the pandemic in comparison to prepandemic

period. The reason for increase in case and severity is delayed diagnosis following changes in parental behaviour and healthcare accessibility and another probability would be covid infections triggering T1D and/or DKA during pandemic. However, it needs evaluation for potential effects of SARS-CoV-2 on increased percentage of new onset T1D.

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