In A Single Institution Study, Determine the Prevalence and Risk Factors for Paediatric Central Diabetes Insipidus

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Abstract

Objective: The goal of this study is to look at the diagnostic differences between primary polydipsia (PP) and primary pediatric central diabetes insipidus (PCDI) and provide a rough estimate of the prevalence [1].

Method: From January 2014 to December 2018, we gathered data from 27 patients who presented with polyuria and/or polydipsia as their primary complaints in the Department of Pediatrics at Our University Hospital.

Results: 16 patients were diagnosed with type 1 diabetes mellitus (T1DM), 5 had CDI, 5 had PP, and 1 had nocturnal enuresis. The approximate annual incidence rate for pediatric CDI was 0.71 per 100,000. Body mass index (BMI), morning urine gravity, 24-hour urine volume and intake volume, and bright spots in the posterior pituitary on an MRI were the diagnostic factors. The morning urine gravity cutoff value for CDI was 1.010, with 100% sensitivity and 100% specificity [2]. The end worth of pee volume more than 24 h for CDI was >2299 mL/m2, with a responsiveness of 100% and explicitness of 85.7 %. No pediatric CDI patients had the brilliant spot in the back pituitary of their X-ray, utilizing a sort 1-weighted picture; However, the bright spot was only observed in one out of every four PP patients.

Conclusion: The best guess occurrence of pediatric CDI with polydipsia and polyuria under the restricted condition was 0.71/100,000/year, which was extremely low. Discernable variables between CDI patients and PP patients were BMI, pee and admission volumes north of 24 h, and a brilliant spot on an X-ray. To confirm these findings, additional studies with more patients and multiple institutes are required.

Keywords: Central diabetes insipidus; Primary polydipsia; Polydipsia; Polyuria; Rough estimate incidence

Introduction

Polyuria and polydipsia are moderately normal grumblings prompting reference to a Branch of Pediatric Endocrinology. Patients with diabetes insipidus (DI) and primary polydipsia (PP), if the patient does not have hyperglycemia, are two common diagnoses for polyuria and polydipsia. A water deprivation test is required to distinguish between DI and PP and/or a saline hypertonic test [3].

According to descriptive data from a nationwide survey conducted in Denmark, the annual incidence of pediatric central diabetes insipidus (CDI) patients ranged from 3–4/100,000. According to Haddad et al., the prevalence of pediatric CDI patients with primary complaints of polyuria and polydipsia was categorized as "low." 2016), albeit the specific numbers were obscure [4].

Pediatric CDI has been connected to germinoma, craniopharyngioma, Langerhans cell histiocytosis, non-Langerhans cell histiocytosis, nearby aggravation, immune system sicknesses, vascular illnesses, injury, sarcoidosis, metastases, and cerebral or cranial abnormalities) [5]. Contrasted with PP patients, pediatric CDI patients are many times more established youngsters who are bound to hydrate and to search out water; nonetheless, an examination of indicative variables between pediatric CDI and PP patients has not been accounted for up to this point. This study aims to identify the diagnostic differences between pediatric CDI and PP and the prevalence of primary pediatric CDI [6].

Material and Methods

A retrospective chart review was used in this study. From January 2014 to December 2018, we recruited 1611 patients under the age of 15 who were referred to the Department of Pediatric Endocrinology at Our University Hospital [7].

Supplementary Figure depicts a diagnostic flow chart for complaints of polydipsia and/or polyuria. 1, and the determination of CDI or PP was made basically as indicated by a calculation that, with the exception of copeptin, switched from the water deprivation test to the hypertonic saline test. We compared and contrasted the following diagnostic factors between CDI and PP patients: body mass index (BMI) below the standard deviation (SD), age, sex, height, and body weight BMI–SD), time from onset to diagnosis, hemoglobin, serum sodium, albumin, blood urea nitrogen (BUN), creatinine, plasma osmolarity, urine osmolarity, arginine vasopressin (AVP), morning urine gravity, 24-hour urine volume, 24-hour intake volume, hypertonic saline test results, and enhanced pituitary magnetic resonance imaging (MRI) findings [8].

Our University Hospital's medical area includes 140,000 children under the age of 15 according to the 2015 national census (Portal Site of Official Statistics of Japan, n.d.). The Department of Pediatric Endocrinology at Our University Hospital served as a point of contact for any and all medical patients who required a referral. When 1) a national or regional database is used to collect all cases diagnosed in a region and 2) a study period of 10 to 15 years is established with a sufficient sample size, incidence can only be accurately calculated (Ward, 2013). An approximate incidence estimation was derived from this study if the aforementioned assumptions were fulfilled [9].

According to Refardt (2020), polydipsia is defined as an excessive thirst or intake of water. According to Di Iorgi et al., polyuria is defined as consuming 2 L/m2/day or 150 mL/kg/day at birth, 100–110 mL/kg/day up to age 2, and 40–50 mL/kg/day in older children and adults. 2012). According to Di Iorgi et al., PP is characterized by an excessive amount of dilutional urine and deficiency of AVP, a large amount of dilutional urine with resistance to AVP, and a large amount of dilutional urine with deficiency of AVP. 2012). A hypertonic saline test was used in this study to differentiate between CDI and PP due to its greater sensitivity and specificity than a water deprivation test [10].

Results

Our study population was reduced to 27 patients whose primary complaints included polyuria and polydipsia. In total, we identified 16 patients with type 1 diabetes mellitus (T1DM), 5 with CDI, 5 with PP, and 5 with nocturnal enuresis. Table 1 displays the characteristics of 10 patients with CDI and PP. In addition, Table 2 displays individual characteristics in detail. There was no case with hypercalcemia, hypercalciuria, or nephrogenic DI. In patients with polydipsia and polyuria, the approximate incidence of T1DM

was 2.29 per 100,000 annually, and the approximate incidence of pediatric CDI was 0.7 per 100,000 annually [11].

BMI–SD, morning urine gravity, 24-hour urine volume, 24-hour intake volume, and the presence of a bright spot on an MRI of the posterior pituitary were the diagnostic factors. Pediatric CDI patients had a significantly lower BMI–SD than PP patients. Pediatric CDI patients had significantly lower morning urine gravity than PP patients. The morning urine gravity cutoff value for CDI was 1.010, with 100% sensitivity and 100% specificity. Pediatric CDI patients had a larger urine volume over the course of 24 hours than PP patients did. CDI's cutoff for 24-hour urine volume was >2299 mL/m2, with a 100% sensitivity and 85.7 % specificity. Pediatric CDI patients consumed more in 24 hours than PP patients did [12]. With a sensitivity of 100% and a specificity of 100%, the cutoff value for the intake volume over the course of 24 hours was 2469 mL/m2. Using a type 1–weighted image (T1WI), no pediatric CDI patients had a bright spot in the posterior pituitary on their MRI; However, only one out of every four PP patients lacked a bright spot. An MRI was not performed on one PP patient. Each third pediatric CDI or PP patient was analyzed utilizing a hypertonic saline test.

Discussion

BMI–SD, urine gravity in the morning, urine volume over 24 hours, intake volume over 24 hours, and the presence of a bright spot on an MRI were found to be distinguishable factors between pediatric CDI and PP in this study. Additionally, the incidence of pediatric CDI was estimated to be 0.71/100,000/year.

In the writing, we just found 2 frequency rates and 1 pervasiveness rate for polydipsia and polyuria in essential pediatric CDI patients: According to Juul et al., the annual incidence of primary and secondary pediatric CDI patients ranged from 3 to 4 per 100,000. In primary pediatric CDI patients (Haddad et al., 2014), the incidence was described as "low." 2016), and the prevalence was 1/25,000 among primary and secondary DI patients. As a result, CDI is a rare condition [13]. It could be because (1) there are very few CDI patients in our population; 2) the examination of CDI patients who are primarily adults in departments of urology, neurosurgery, psychosomatic medicine, or diabetes/endocrinology; (3) instances of partial or mild CDI that were ignored; and (4) patients entering and exiting the study, delayed care as a result of a single-center study, and diagnoses made at other centers.

Our research has both advantages and disadvantages. A strength is the prohibition of post-usable CDI patients; Specifically, only patients with polydipsia and polyuria as primary complaints were included [14]. The restrictions were the consideration of information from just 1 establishment, the age cut off characterized pediatric CDI as under 15 years of age, and the modest number of patients, with just 5 CDI patients and 5 PP patients. The Japanese medical community defines a child as one who is less than 15 years old, whereas the global definition of a child is one who is less than 18 years old. Deficient were adolescents between the ages of 16 and 18 in this study. As it addresses a huge extent (16.6 %), being even less precise as a worldwide rate of pediatric cases might be possible. Single-focus studies can't give precise frequency gauges from enumeration information because of judgments made at different focuses, patients coming all through study, postpone in getting care, and so on [15].

Conclusions

The good guess frequency of pediatric CDI with polydipsia and polyuria was 0.71/100,000/year. It's possible that pediatric CDI occurs very rarely. BMI–SD, morning urine gravity, 24-hour urine and intake volumes, and the presence of a bright spot on an MRI were the distinguishing characteristics between CDI and PP patients. To confirm these findings, additional studies with more patients and multiple institutes are required.

Acknowledgement

None

Conflict of Interest

None

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