American Journal of Medical Case Reports, 2017, Vol. 5, No. 6, 171-173
Available online at http://pubs.sciepub.com/ajmcr/5/6/10

DOI:10.12691/ajmcr-5-6-10

Unusual Case of Glucose-Galactose Malabsorption with Oculocutaneous Albinism

Hossain Ibrahim Ageel*, Ghadah Mtaen Gosadi, Adeeb Ali Ageel

Department of Pediatrics, King Fahd Central Hospital, Jazan, Saudi Arabia
*Corresponding author: hibageel@yahoo.com

Abstract Congenital Glucose-Galactose Malabsorption (GGM) is a rare inherited disease due to defects in the sodium-glucose cotransporter (SGLT1). It carries high morbidity and mortality if not recognized and treated early. Patients with GGM usually present with severe, life-threatening diarrhea and dehydration from neonatal period. The only treatment is to eliminate the glucose and galactose from the diet. Association of GGM with another inherited disease is unusual and rarely described in the literature. Here, we report a Saudi boy presented at one month of age with a history of chronic watery diarrhea since birth complicated with hypernatremic dehydration, and eventually, we diagnosed him as GGM. He has hypopigmented skin, hair, and eyes with bilateral nystagmus consistent with oculocutaneous albinism (OCA). As far as we know this is the first reported case worldwide of having both GGM and OCA in the same patient. It alerts the pediatricians to this association during their approach for these cases.

Keywords: *Glucose-galactose malabsorption, Oculocutaneous albinism, child, Saudi Arabia*

Cite This Article: Hossain Ibrahim Ageel, Ghadah Mtaen Gosadi, and Adeeb Ali Ageel, "Unusual Case of Glucose-Galactose Malabsorption with Oculocutaneous Albinism." *American Journal of Medical Case Reports*, vol. 5, no. 6 (2017): 171-173. doi: 10.12691/ajmcr-5-6-10.

1. Introduction

Glucose-Galactose Malabsorption (GGM) is a rare congenital diarrheal disorder with an autosomal recessive pattern of inheritance [1]. Sodium-glucose cotransporter type 1 (SGLT1) is responsible for glucose and galactose transport across the intestinal brush border [2]. SLC5A1 gene located on chromosome 22q13.1 codes for SGLT1 and selective defect in this gene will cause GGM [3]. Accumulation of these monosaccharides in the intestine will lead to osmotic diarrhea with an early onset in the neonatal period [4]. Severe dehydration and metabolic acidosis are significant complications and can cause death if the disease left untreated [7]. We describe here an infant with GGM and rare association with oculocutaneous albinism (OCA). We believe that this is the first report of GGM with OCA in the literature.

2. Case Report

We describe a Saudi boy seen at one month of age at King Fahd Central Hospital, Jazan with a history of yellowish watery diarrhea since birth. He was a full-term product of normal spontaneous vaginal delivery with uneventful intra-natal and pre-natal period. The baby was the 12th sibling to consanguineous parents, two siblings died (one female at four years of age because of meningitis, and another sibling at three days of age because of prematurity). Nine siblings are alive and healthy. Two cousins have oculocutaneous albinism. Gross examination revealed that the child has hypopigmentation of the skin, hair, and eyes with bilateral nystagmus suggestive of oculocutaneous albinism. He did not show any dysmorphic features. He was dehydrated. Systemic examination was unremarkable. Investigations revealed Complete Blood Count (CBC) with a total white cell count (WBC) of 13.7 × 10^9/L, hemoglobin (Hb) 12.1 g/dL and platelet (Plt) 601 × 10^9/L. Complete metabolic panel (CMP) was unremarkable aside from persistent hypernatremia (Na >150 mmol/L), Arterial blood gas (ABG) analysis showed metabolic acidosis with a pH of 7.27, serum bicarbonate (HCO3) 10.9 mmol/L, base excess (BE) -12 mmol/L. The stool was acidic and reducing substances were present. Stool workup was negative for infection, and urine culture showed no growth. Urine volume, Urine sodium, and osmolality all were within normal range. Hypernatremic dehydration was corrected slowly with intravenous (IV) fluid. The baby was tried sequentially on IV antibiotics, lactose-free formula, semi-elemental formula (Pregestemil) but he showed no response. Based on chronic osmotic diarrhea with hypernatremic dehydration that did not respond to different feeding regimens, he was diagnosed to have glucose-galactose malabsorption (GGM). We are unable to do stool sugar chromatography and hydrogen breath test because of a lack of such facilities in our hospital. We started the patient on fructose based formula (Galactomin-19) to which he responded promptly. Diarrhea stopped on the same day, Sodium was normalized, and the baby's condition remained stable. The child developed later in his follow up recurrent severe epistaxis. CBC showed WBC of 10.8 × 10^9/L, Hb 7.6 g/dL, and Plt 749 × 10^9/L. Coagulation profile was within the reference range. Iron

studies showed low serum iron and ferritin. ENT specialist could not find any structural nasopharyngeal lesions to explain his nasal bleeding. The ophthalmologist evaluated him during his visits to the clinic and found to have reduced visual acuity and poor development of macula.

3. Discussion

GGM is a rare inherited disease with only a few hundred cases reported worldwide [9]. Laplane and Polonovski described the first case of GGM in 1962 from France [5]. Since then several case reports from different parts of the world came out [6,7,8,9]. Xin and Wang described the largest cohort of Old Order Amish pedigree in 33 individuals with GGM in 2011 [3]. Abdullah et al. described the first child with GGM in 1992 from Saudi Arabia [10]. Subsequently, 45 children with GGM reported from this country with the largest number of patients (24 cases) published recently in 2014 by Omer Saadah and his group from the Western region of Saudi Arabia [11-17]. Because of the high rate of consanguineous marriage, the prevalence of GGM in Saudi Arabia probably is greater than previously thought [14]. The previous less reporting presumably due to a lack of awareness and facility for diagnosis.

The diagnosis of GGM is based on the early onset of watery diarrhea soon after birth and evidence of carbohydrate malabsorption by the presence of reducing sugars in the stool [16,18]. Infants with GGM usually fail to respond to lactose-free and hydrolyzed formulas, but they demonstrate immediate cessation of diarrhea following the complete elimination of glucose and galactose from the diet [16,18]. Our patient showed all these features adequately. We tried this patient on lactose-free formula and hydrolyzed formula with no response. Diarrhea stopped only with the use of fructose-based formula namely Galactomin 19. Exclusion of infections is another important issue to consider when approaching patients with chronic diarrhea. Stool work up was negative, and urine culture revealed no growth. The initial treatment with IV antibiotics did not show any improvement in this case.

The presence of Hypernatremic dehydration in this patient is another clue to the diagnosis of GGM. About 25% of children with GGM may develop hypernatremic dehydration [19]. Several reports confirmed this common association [7,14,15,16].

Hydrogen breath test with glucose or galactose, stool sugar chromatography, and oral glucose/galactose tolerance test are various methods may help in the diagnosis of GGM [14,20]. Unfortunately, we were not able to do any one of these methods because of a lack of facilities. Many authors, however, use clinical evolution with different types of feeding to consider GGM [15].

The mutation analysis of the SLA5A1 gene confirms the diagnosis of GGM. Over 40 mutations in the SLA5A1 gene associated with GGM mainly missense mutation have been identified up to now [21]. The missense mutation impairs sugar transport by reducing the number of SGLT1 transporters trafficked to the plasma membrane [22]. A novel, homozygous deletion mutation was identified recently within the SLC5A1 gene and reported in 2012 [21].

The interesting issue in this reported case is the rare association with OCA. To the best of our knowledge, this is an index case and never described in the literature. OCA is another inherited disease with an autosomal recessive pattern that affects the melanin biosynthesis and leads to the reduction or complete absence of melanin pigment in the skin, hair, and eyes [22]. Several visual problems may occur including nystagmus, iris transillumination, macular hypoplasia, reduced visual acuity, and strabismus [24]. We diagnosed OCA in this patient based on the strong family history of albinism and clinical findings of hypopigmentation of the skin, hair, and eyes. Visual defects with bilateral nystagmus, poor development of macula and decreased visual acuity were other features found in this patient.

There are two forms of OCA; the nonsyndromic form which consists of seven types identified based on the molecular diagnosis, and the syndromic form such as Hermnasky-Pudlack Syndrome (HPS), Chediak-Higashi Syndrome (CHS), and Griscelli Syndrome (GS) [22,23]. Bleeding diathesis secondary to platelet storage pool deficiency characterizes HPS [25]. Recurrent epistaxis in this patient raises the possibility of the syndromic type, in particular, HPS. At least nine genes associated with HPS and mutations of these genes characterize nine types of HPS [23]. The interesting thing to note is the proximity of the HPS4 gene located at 22q12.1 and the GGM gene at 22q13.1. Most of the mutations described in GGM and OCA are point mutations [21,23]. However, significant gene deletions or insertions may result in the loss of one or more genes according to the size of the event and may explain the occurrence of two genetic diseases at once. Whatever the inherited cause of oculocutaneous albinism in our case, this is the first report of association with GGM which makes this case as an index for any further similar observation in the future.

The occurrence of congenital GGM with another inherited disease was found only in a single report from the eastern region of Saudi Arabia published in 2016 [17]. In this report, the child had GGM associated with Infantile Neuroaxonal Dystrophy (INAD).

In conclusion, an association of two inherited diseases may occur, in particular among the populations with a high rate of consanguinity. This report will alert the pediatricians to this combination when approaching cases of GGM.

References

[1] Abdullah AM, el-Mouzan MI, el Shiekh OK, al Mazyad A. Congenital glucose-galactose malabsorption in arab children. J Pediatr Gastroenterol Nutr 1996; 23(5): 561-564.

[2] Raja M, Kinne RK. Structural insights into genetic variants of Na (+)/glucose cotransporter SGLT1 causing glucose-galactose malabsorption: vSGLT as a model structure. Cell Biochem Biophys 2012; 63(2): 151-158.

[3] Xin B, Wang H. Multiple sequence variations in SLC5A1 gene are associated with glucose-galactose malabsorption in a large cohort of Old Order Amish. Clin Genet 2011; 79(1): 86-91.

[4] Gracey M, Burke V. Sugar-induced diarrhea in children. Arch Dis Child 1973; 48(5): 331-336.

[5] Laplane R, Polonovski C, Etiene M, Debray P, Lods JC, Pissarro B. L'intolerance aux sucres a transfert intestinal actif. Arch Fr Pediatr 1962; 19: 895-944.

[6] Lindquist B, Meeuwisse GW. Chronic diarrhoea caused by monosaccharide malabsorption. Acta Paediatr 1962; 51: 674-685.

[7] Mutlu M, Cakir M, Aslan Y. Glucose Galactose Malabsorption: A Case Report. HK J Paediatr 2010; 15: 320-323.

[8] Chdane-Girault C, Dabadie A, Maurage C, Chailloux E, Colin E, Pelatan C, Giniès JL. Neonatal diarrhea due to congenital glucose-galactose malabsorption: report of seven cases. Arch Pediatr 2012; 19(12): 1289-1292.

[9] Anderson S, Koniaris S, Xin B, Brooks SS. Congenital Glucose-Galactose Malabsorption: A Case Report. J Paediatr health Care 2017; 31(4): 506-510.

[10] Abdullah AM, Abdullah MA, Abdurrahman MB, al Husain MA. Glucose-galactose malabsorption with renal stones in a Saudi child. Ann Trop Paediatr 1992; 12(3): 327-329.

[11] Abdullah AM. Aetiology of chronic diarrhea in children: experience at King Khalid University Hospital, Riyadh, Saudi Arabia. Ann Trop Paediatr 1994; 14(2): 111-117.

[12] Abdullah AM, el-Mouzan MI, el Shiekh OK, al Mazyad A. Congenital glucose-galactose malabsorption in Arab children. J Pediatr Gastroenterol Nutr 1996; 23(5): 561-564.

[13] El-Naggar W, Balfe JW, Barbar M, Taha D. Nephrocalcinosis in glucose-galactose malabsorption, association with renal tubular acidosis. Pediatr Nephrol 2005; 20(9): 1336-1339.

[14] Assiri A, Saeed A, Alnimri A, Ahmed S, Saeed E, Jameel S. Five Arab children with glucose-galactose malabsorption. Paediatr Int Child Health 2013; 33(2): 108-110.

[15] Ghazali B, Almedhesh SA, Alsuheel AM, Batti D, Shati AA. Congenital glucose-galactose malabsorption: A rare cause of chronic diarrhea. Int J Med Med Sci 2014; 6(2): 59-62.

[16] Saadah OI, Alghamdi SA, Sindi HH, Alhunaitti H, Bin-Taleb YY, Alhussaini BH. Congenital glucose-galactose malabsorption: A descriptive study of clinical characteristics and outcome from Western Saudi Arabia. Arab J. Gastroenterol. 2014; 15(1): 21-23.

[17] Al-Baradie RS, Chaudhary MW, Burshaid D, Mir A. Unusual Case of Glucose-Galactose Malabsorption with Infantile Neuroaxonal Dystrophy. Austin J Clin Neurol 2016; 3(2): 1093.

[18] Berni Canani R, Pezzella V, Amoroso A, et al. Diagnosing and Treating Intolerance to Carbohydrates in Children. Nutrients 2016; 8(3): 157.

[19] Steinherz R, Nitzan M, Iancu TC. Hypernatremic dehydration as a sign leading to the diagnosis of glucose-galactose malabsorption in breast-fed neonates. Helv Paediatr Acta 1984; 39(3): 275-277.

[20] Lee WS, Tay CG, Nazrul N, Paed M, Chai PF. A Case of Neonatal Diarrhoea Caused by Congenital Glucose-galactose Malabsorption. Med. J. Malaysia 2009; 64(1): 83-85.

[21] Vallaeys L, Van Biervliet S, De Bruyn G, Loeys B, Moring AS, Van Deynse E, Cornette L. Congenital glucose-galactose malabsorption: a novel deletion within the SLC5A1 gene. Eur J Pediatr 2013; 172(3): 409-411.

[22] Grønskov K, Ek J, Brondum-Nielsen K. Oculocutaneous albinism. Orphanet J Rare Dis 2007; 2: 43.

[23] Kamaraj B, Purohit R. Mutational analysis of oculocutaneous albinism: a compact review. Biomed Res Int. 2014; 2014: 905472.

[24] Khanal S, Pokharel A, Kandel H. Visual deficits in Nepalese patients with oculocutaneous albinism. J Optom. 2016 Apr-Jun; 9(2): 102-109.

[25] Seward SL Jr, Gahl WA. Hermansky-Pudlak syndrome: health care throughout life. Pediatrics 2013; 132(1): 153-160.