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ORIGINAL ARTICLE

ASSESSMENT OF THE CAUSES OF PORTAL HYPERTENSION AMONG CHILDREN UNDER 15 YEARS OF AGE

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ABSTRACT

Background: *Portal hypertension is caused by a wide variety of conditions, each with a different course and natural history. It frequently presents with bleeding from oesophageal varices, which is the commonest cause of serious upper gastrointestinal hemorrhage in children.*

Objective *This study was done to assess the causes of portal hypertension among children <15 years coming to Tikur Anbessa Specialized Hospital.*

Methods*: This was a descriptive cross-sectional study conducted at Tikur Anbessa Specialized Hospital by collecting all children who have a clinical diagnosis of portal hypertension and/or gastroscopy findings suggestive of the condition, like evidences of esophageal varices. Data was collected by trained nurses and analyzed using SPSS version (23.0).*

Results*: A total of 214 cases were included with mean age of 9.3 (±3) years. Hepatic causes were the commonest causes (53.3%) with cirrhosis being the leading (18.6%) of hepatic cause of portal hypertension. Ultrasound was done for 116 cases and identified the causes of portal hypertension, which was evidenced by reversal flow of the portal vein or cavernous transformation.*

Conclusion*: The commonest cause of portal hypertension identified in this study is cirrhosis (18.6%) Hence, Patients with cirrhosis should always be followed for the features of portal HTN.*

Key words*:- Portal hypertension, prehepatic, hepatic, post hepatic, Ethiopia*

INTRODUCTION

Portal hypertension (PHTN) is common in Africa and other developing regions, particularly as a result of endemic hepatitis B or C–related cirrhosis and, in affected areas, schistosomiasis and some particularly unique toxins that cause veno-occlusive disease (1).Seventy percent of the total blood supply to the liver is contributed by the portal vein while the hepatic artery contributes to the remaining thirty percent. The portal venous system is the only venous system in our body, which begins with capillaries and ends with capillaries. The intrahepatic branches of the portal vein terminate in small vessels that supply the hepatic sinusoids (2). Portal hypertension is defined as a portal pressure gradient exceeding 5mm Hg. It is a major hallmark of cirrhosis (3). In portal hypertension, portosystemic collaterals decompress the portal circulation and give rise to esophageal varices. Successful management of portal hypertension and its complications requires knowledge of the underlying pathophysiology, the pertinentanatomy, and the natural history of the collateral circulation, particularly the gastroesophagealvarices (4).

People with cirrhosis are at a high risk for developing portal hypertension. About 25,000 people in the United States die from cirrhosis every year, according to the University of California at San Francisco (UCSF) Medical Center. Cirrhosis complications, the most serious risks for portal hypertension, include fluid buildup in the abdomen, bleeding in the esophagus and upper stomach, abdominal inflammation and infection and brain damage from harmful substances (5). Portal hypertension is most commonly caused by cirrhosis but it can also be present in the absence of cirrhosis, a condition referred to as "noncirrhotic portal hypertension". The causes of noncirrhotic portal hypertension can be divided into prehepatic, intrahepatic (presinusoidal, sinusoidal, and postsinusoidal), and posthepatic causes (4).

The other cause of portal hypertension among children is portal vein thrombosis. The initial clinical manifestation is characterized either by episodes of upper gastrointestinal bleeding or by splenomegaly on routine clinical examination. The major complications include upper gastrointestinal bleeding, hypersplenism(huge splenomegaly), growth retardation, and portal biliopathy.

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The diagnosis can be made by abdominal Doppler ultrasonography (6). Portal pressure is most commonly determined by the hepatic vein pressure gradient (HVPG), which is the difference between the wedged hepatic venous pressure (reflecting the hepatic sinusoidal pressure) and free hepatic vein pressure (7, 8). In combination with venography, right-sided heart pressure measurements, and transjugular liver biopsy, measurement of the HVPG usually delineates the site of portal hypertension (ie, presinusoidal, sinusoidal, or postsinusoidal (4)).

Extrahepatic portal vein obstruction (EHPVO) is an important cause of PHTN among children. It is characterized mainly by portal vein thrombosis (PVT), and is detected in 40% of children with upper gastrointestinal bleeding (UGIB) caused by esophageal varices. It may be asymptomatic.However, the mortality and morbidity rates are high, due to UGIB. Approximately 79% of children diagnosed with PVT will have at least one episode of UGIB in their lifetime(6).People with portal hypertension are at risk for developing complications such as kidney failure and pulmonary hypertension(5). The present study aims to build up the profile of children with PHTN, to investigatecauses and design management and preventive modalities.

PATIENTS AND METHODS

A descriptive cross-sectional facility-based study was conducted to assess the causes of portal hypertension among children <15 years of age at TikurAnbesa Specialized Hospital from November to July, 2016.

The diagnosis of portal hypertension was made by clinical features like features of esophageal varices (UGIB), presence of splenomegaly, hypersplenism, caput medusa and upper GI-endoscopy findings (evidences of esophageal varices, portal hypertensive gastropathy, fundal varices, duodenal varices). All children presented with the above clinical features were included in the study. Data was taken until the required amounts of samples were collected.

The calculated sample size was 214, it was calculated using computer program EPI INFO (Version 3.5.3). The data was collected by trained nurses with daily checking by the principal investigator. Data was entered using EPI- INFO (Version 3.5.3) and analyzed using SPSS (version 23.0).

Data was collected after obtaining ethical clearance from Addis Ababa University, college of health sciences research board (IRB—Institutional review board), Department of pediatrics and child health and informed consent from care takers.

Inclusion criteria

- All children ≤ 15 years with clinical features of portal hypertension
- Children referred for endoscopic examination due to upper gastrointestinal bleeding
- Children with suspected symptoms of Portal hypertension

Exclusion criteria

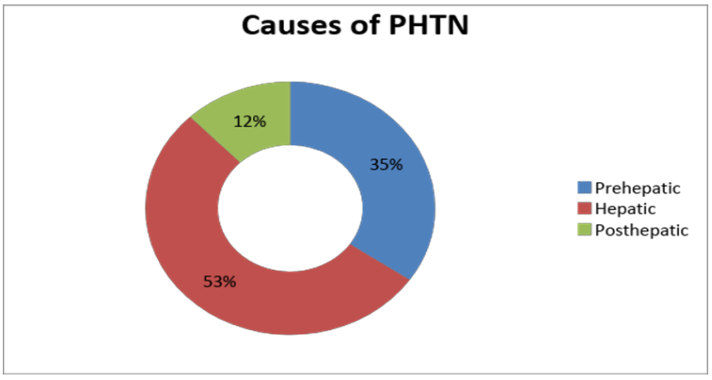
- Children greater than 15 years old
- Care givers or parents not interested to participate in the study

RESULTS

In this prospective descriptive study, a total of 214 cases were included among which 108 (50.5%) were males and the rest 106 (49.5%) were females with mean age of 9.3 (± 3) years. The mean height and weight of study subjects were 1.2m & 42 kgs, respectively.

Among the three causes identified, hepatic causes were the leading cause of portal hypertension (53.3%) followed by prehepatic causes (34.6%) and posthepatic causes (12.1%) (Figure 1).

Figure-1:-Causes of portal hypertension among children <15 years of age in Tikur Anbessa Hospital, 2016



Among hepatic causes, cirrhosis accounted for 18.6%, idiopatic portal hypertension 14.5%, schistosomiasis 14% and congenital hepatic fibrosis 6.1%. Regarding prehepatic causes, thrombosis of portal vein (16.8%), congenital atresia of the liver (8.4%), thrombosis of splenic vein (4.7%), and umbilical catheterization (4.7%) were the underlying causes.

Among posthepatic, causes identified were increased splenic flow (7%) and constrictive pericarditis (5.1%). Viral hepatitis was considered a the major risk associated with PHTN; it was documented in 43.5% of the patients (Table 1).

Table-1:- Causes of portal hypertension among children <15 years of age in TikurAnbesa Hospital, Addis Ababa, 2016.

Variables	Frequency(N=214)	Percent
Prehepatic	**N= 74**	
Congenital atresia or stenosis	18	8.4
Thrombosis of portal vein	36	16.8
Thrombosis of splenic vein	10	4.7
Umbilical catheterization	10	4.7
Hepatic	**N=84**	
Cirrhosis	40	18.6
Congenital hepatic fibrosis	13	6.1
Idiopathic portal hypertension	31	14.5
Schistosomiasis	30	14.0
Posthepatic	**N=26**	
Constrictive pericarditis	11	5.1
Increased splenic flow	15	7.0
Other causes (causes may have overlapping symptoms)	**N=134**	
Viral hepatitis Symptoms of UGIB(tarry stool, hematemesis, Ascites with splenomegaly Esophageal varices, etc.)	93 41	43.5 19.2

Gastroscopic examination was performed for 78 children. One fourth of the cases (25.6%) had grade III EV (esophageal varices), 16.8%, had grade II EV and only 8.9% had grade I esophageal varices. Majority of the gastroscopy results, (48.7%) were normal. Ultrasound was done for 125 children. Among this, chronic liver disease (Coarse echotexture of the liver parenchyma, nodularity, white liver, and vascular changes), were detected in 18.4% of children, and periportal fibrosis in 17.6%.

One fourth of the cases were under normal findings which was 24.8%, and 19.2% had non- specific findings (like edematous GB, hepatosplenomagally, liver masses) (Table 2).

Table-2:- Gastroscopy and ultrasound findings among children <15years old in TikurAnbesa, Addis Ababa, 2016.

Variables	Frequency (N = 78)	Percent
Gastroscopy examination		
Normal	38	48.7
Grade I EV	7	8.9
Grade II EV	13	16.8
Grade III EV	20	25.6
	Frequency N (125)	**Percent**
Ultrasound findings		
Normal	31	24.8
Chronic liver disease (CLD)	23	18.4
Peri portal fibrosis(PPF)	22	17.6
Portal vein thrombosis (PVT)	15	12
Decompensated cirrhosis	5	4
Hydatic cyst of the liver	3	2.4
Congenital hepatic fibrosis	2	6.1
Non specific findings	24	19.2

Laboratory investigations revealed that (10.7%) of children are positive for anti- hepatitis A antibody (IgG), 8.6 % and 3.8% are tested positive for HBSAG and anti HCV antibody respectively. Only 7 % of the study participants were stool antigen positive for *H. pylori* and 9.8 % positive for chisto-somiasis (*schistosoma mansoni*).

Regarding hematological profiles, most children (81.8 %) were having hematocrite in anemia ranges. However, 28.1 % of children had thrombocytopenia (Table 3).

Table -3: Laboratory findings among children <15 years of ae, Tikur Anbesa Hospital, Addis Ababa, 2016.

Variables	Results	Frequency (N=214)	Percentage
Hct,	15-36	175	81.8
	37.1-50	39	18.2
Platelets	60,000-150,000	60	28.1
	>150000	154	71.9
H. pylory test	Positive	15	7.0
	Negative	188	87.9
	Not done	11	5.1
HBSAG	Positive	19	8.6
	Negative	154	72
	Not done	41	19.7
HCV antibody	Positive	8	3.8
	Negative	196	91.6
	Not Done	10	4.7
HBVSAG and HCV antibody positive		25	11.5
Anti HA antibody	Positive	23	10.7
	Negative	149	69.6
	Not done	42	19.6
Stool (Schistosomiasis) 3x	Positive	21	9.8
	Negative	179	83.6
	Not done	14	6.5

DISCUSSIONS

Liver disease with portal hypertension contributes to the high burden of illness and death among children under15 years of age, the major causes being hepatic (53.3 %), followed by prehepatic causes (34.6 %) and rare causes being posthepatic (12.1 %.). Early screening and prevention may help to reduce the burden and severity of the disease.

In this retrospective descriptive study, viral hepatitis is found to be the commonest cause of portal hypertension (43.5%) with 9.8 % and 12 % of them were having portal vein thrombosis and Schistosomiais as being the cause of liver disease resulting in portal hypertension respectively.

Idiopathic portal hypertension accounting 14.5%, is not an uncommon cause of this problem in children, which are similar to the study done the USA, portal hypertension and variceal hemorrhage (2), Noreen Anderson, more causes and risk factors of portal hypertension (3), and Alexander R. Ferreira, portal vein thrombosis in children(4). This implies that early screening and treatment of viral hepatitis, periodic abdominal ultrasound and mass treatment for schistosomiasis should be started and strengthened, and targets by health professionals and policy makers.

Among the participants (8.6%) and (3.8%) are tested positive for HBSAg and Anti HCV antibody respectively with their co-infection rate accounting 11.5% meeting the high burden for hepatitis B and C infections .

Regarding hematological profiles, most children (81.8%) were having hematocrite in anemia ranges, and anemia was a persistent finding in grade II to III esophageal varices. But, very few (28.1%) of children had thrombocytopenia and no association was identified between esophageal varices of any grade with no hypersplenism and thrombocytopenia.

The most common signs of portal hypertension found were symptoms of upper GI-bleeding (tarry stool and hematemesis) (19.2%), and ascites with splenomegaly, and most associated complications being esophageal varices (35.3%), Anemia (81.8%) and gastropathy (8.9 %).

These results are comparable with studies cited in textbook of gastroenterology, 2004 (9) , a long term follow-up study in 568 portal hypertensive patients (10) and by Kristine Novak, AGA (11.)

Cognizant of these results, problem centered strategy and commitment to health education for health professionals and the community at large should be the targeted program and be a routine practice and essential to make part of a curriculum.

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