

## Research Article

# Study of clinical, biochemical evaluation and outcome in hypertrophic pyloric stenosis

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## ABSTRACT

**Background:** Gastric outlet obstruction (GOO) in infancy and childhood may result from congenital causes, antral diaphragm, pyloric atresia, heterotrophic pancreas, and infantile hypertrophic pyloric stenosis (IHPS), or acquired causes (peptic ulcer, caustic ingestion, tumour, chronic granulomatous disease and Eosinophilic gastroenteritis). Infantile hypertrophic pyloric stenosis (IHPS) is among the most common surgical disorders in infancy and presents in approximately 3:1000 live births in the United States. In India it is estimated to be 1 in 3,500 live births. The objective of the study was to analyse the age and sex of presentation, try to compare preoperative and postoperative biochemical alteration and find out how to reduce the incidence of complications of infantile hypertrophic pyloric stenosis (IHPS).

**Methods:** Children attending at surgery OPD or emergency UP RIMS & R for no bilious vomiting during 15 March 2015 to 15 February 2016 less than 1 Year of age of both sex.

**Results:** we found that IHPS was more common among first born male child in more commonly in Hindus and most common time of presentation is first 8 weeks dyselectrolytemia was a common feature.

**Conclusions:** Infantile hypertrophic pyloric stenosis (IHPS) which is caused by thickened antropyloric muscle is a disease which causes gastric outlet obstruction. It is the most common surgical condition in infants within two month of postnatal life. This disease is presented with projectile non-bilious vomiting which may be blood tinged if it is prolonged without correction may cause hypochloremic hypokalemic alkalosis and death in more than 50% of the affected patients.

**Keywords:** Infantile hypertrophic pyloric stenosis, Non bilious vomiting, Dyselektrolytemia

## INTRODUCTION

Gastric outlet obstruction (GOO) in infancy and childhood may result from congenital causes, antral diaphragm, pyloric atresia, heterotrophic pancreas, and infantile hypertrophic pyloric stenosis (IHPS), or acquired causes (peptic ulcer, caustic ingestion, tumour, chronic granulomatous disease and eosinophilic gastroenteritis).<sup>1-5</sup> When IHPS is excluded, the other causes of GOO in children are rare and the incidence of the other causes was only 1 in 100,000 live births.<sup>1,6</sup> Infantile hypertrophic pyloric stenosis (IHPS) is among

the most common surgical disorders in infancy and presents in approximately 3:1000 live births in the United States. In India it is estimated to be 1 in 3,500 live births.<sup>7</sup> There is a 4:1 male dominance, and white infants are more commonly affected. In literature IHPS is also reported in approximately 200 adult person.<sup>8-10</sup> Birth order seems to play a role, because first born male child are more likely to be affected by the disorder than their siblings. The precise cause of the pyloric circular muscle hypertrophy remains poorly understood. Numbers of theories for IHPS are present but none can explain fully the pathogenesis of infantile hypertrophic pyloric

stenosis, which implies that the cause may be multifactorial. Patients often present with a marked biochemical electrolyte abnormalities requiring correction prior to surgery to prevent anaesthetic complications e.g. apneas due to compensatory carbon dioxide retention.<sup>11-14</sup>

In IHPS hypertrophy of circular smooth muscle lead to partial luminal outflow obstruction. This partial obstruction causes vomiting of feeds and gastric content leads to dehydration, electrolyte imbalance and in late cases failure to thrive. IHPS Patients typically present with hypochloremic metabolic alkalosis. Although the serum potassium level may be normal or low, often there is total-body potassium depletion. The observed metabolic alkalosis is a result of two related but independent processes: loss of acid and retention of bicarbonate.

Initially, vomiting of gastric contents results in excessive loss of hydrogen chloride which leads to a metabolic alkalosis. Under normal circumstances, carbonic acid in the villi of the stomach dissociates into hydrogen and bicarbonate. The hydrogen ions cross the luminal membrane of the enterocyte and enter the stomach, from where they are transported to the duodenum. The entry of acid into the duodenum stimulates the secretion of an equal amount of pancreatic bicarbonate. This normal stimulus is absent in pyloric stenosis because of the mechanical obstruction: the diminished secretion of pancreatic bicarbonate into the GI tract contributes further to the metabolic alkalosis created by stomach acid lost through vomiting.

### **Aims and objectives**

In this study we are going to analyse the age and sex of presentation, try to compare preoperative and postoperative biochemical alteration and find out how to reduce the incidence of complications of infantile hypertrophic pyloric stenosis (IHPS).

- Age and sex of presentation
- Analysis of pre-operative clinical features
- Pre-operative observations of serum electrolytes ( $\text{Na}^+$ ,  $\text{K}^+$ ,  $\text{Cl}^-$ ,  $\text{HCO}_3^-$ ) and urine PH
- Postoperative observations are:
  - Hospital stay
  - Serum electrolytes ( $\text{Na}^+$ ,  $\text{K}^+$ ,  $\text{Cl}^-$ ,  $\text{HCO}_3^-$ ) and urine pH
  - Incidence of wound infection
  - Any other complications within 3 months

### **METHODS**

Children attending at surgery OPD or emergency UP RIMS & R for nonbilious vomiting during 15 March 2015 to 15 February 2016 less than 1 year of age of both sex.

### **Patient evaluation**

All patients with provisional diagnosis of IHPS admitted in our institute in the above mentioned period for,

- Clinically and systematically examined for presence of signs of dehydration or electrolyte imbalance.
- Investigations like USG, serum electrolytes parameter, urinary pH by strip/litmus paper and symptomatology.

### **Parameters studied**

- a) Mean age of the patient at the time of operation
- b) Sex incidence of the IHPS
- c) Religion wise incidence of patient and preponderance if any (Hindu/Muslim).
- d) Preoperative and postoperative blood biochemical and urinary pH alteration.
- e) Postoperative complication: wound dehiscence with bowel evisceration; wound gaping, sepsis, death.
- f) Hospital stay

### **RESULTS**

We studied 25 cases of IHPS relevance history, examined and investigated for sign and symptoms, admitted in the department during the above mentioned period.

We selected 25 of IHPS patient prospectively which have complete data regarding history, examination, operated in the department and full follow up with time.

In our study,

- We found that 25 cases of IHPS admitted in our department 84% (21) of patients were males and 16% (4) of patients were females.
- In these 25 patients Hindu patients were 64% (16) and Muslim patients were 36% (9).
- Among Hindu patient male were 81.25% (13) and female were 18.75% (3), in Muslim patient male were 77.77% (7) and female were 22.22% (3).
- IHPS children less than four week are 28% (7) in which all were male and among these Hindu was 16% (4) and Muslim was 12% (3).
- IHPS Children between four to eight week were 48 % (12), among these 24 % (6) of Hindu male, 4% (1) of Hindu female, 20 % (5) of Muslim male and 0% (0) Muslim female.
- IHPS children's more than eight week 24% (6), in which Muslim were 16% (4) (4 male and 0 female) and Hindu were 12% (2) (2 male and 0 female).
- 72% (18) infant are first birth order, 20% (5) are second birth order, 4% (1) are third birth order and 4% (1) of infant are fifth birth order.

- Patient's mother had no significant antenatal complications neither any more was any significant family history.
- All IHPS infant presented with clinical feature of non-bilious vomiting in our hospital. Children's with non-bilious vomiting 24 patient have history of Projectile vomiting and 1 baby non projectile regurgitation like history was present.
- Dehydration was present in 52% (13) of children's; no sign of dehydration was present in 48% (12) of patient.
- Visible peristalsis present in 60% (15) patient but no visible peristalsis seen in 40% (10) patient.
- Patient's electrolytes 64% (16) of patient had dyselektromia and 36% (9) of baby have no dyselektromia found. Urinary pH abnormality in pre-operative or post operatively was not found in any patient.
- Ultra sonography was diagnostic in all suspected cases.
- Patient has no electrolytes abnormalities first post-operative follow up cases.
- Most of patients were discharge on 2<sup>nd</sup> post of day.

## DISCUSSION

Gastric outlet obstruction (GOO) in infancy and childhood may result from congenital cause's e.g -antral diaphragm, pyloric atresia, heterotrophic pancreas, and infantile hypertrophic pyloric stenosis, supra ampullary duodenal obstruction or acquired causes e.g. (peptic ulcer, caustic ingestion, tumour, chronic granulomatous disease, and eosinophilic gastroenteritis).<sup>15-18</sup> Among them, IHPS is the most common cause. When IHPS is excluded, however, the other causes of GOO in children are relatively rarely encountered, and the incidence of the latter causes was only one in 100,000 live births.<sup>14,19</sup> Debate still continues as to whether it is congenital or acquired.<sup>20</sup>

Our study carried out in UP RIMS & R, Department of surgery from Jan 2015 to Dec 2015. We studied a total of 25 cases of infantile hypertrophic pyloric stenosis that were fully examined and investigated for symptom and signs.

76% of patient below eight week which is similar to Puri and Lakschmanadass study.<sup>21</sup> In the study of Puri and Lakschmanadass they found in there study that IHPS is the most common condition requiring surgery in the first few months of life, typically occurring between 3 and 6 weeks of age.

Our study revealed male to female ratio found 5.25:1 which is more than Liao Z et al study but approximately same as Mitchell LE et al study.<sup>22,23</sup> Liao Z, et al they found in there study that male female ratio in IHPS

patient varies from 4:1 and Mitchell LE et al found in there study male female ratio 2:1 to 5:1 in IHPS patient.

Birth order in IHPS patients of our study 72% of Patients are first birth order similar to Mac Mahon study in the Mac Mahon study they found that the prevalence of IHPS decline with increasing birth order and highest prevalence among first-born infants.<sup>24</sup>

Visible peristalsis present in 60% which is higher than Taylor ND et al in there study they seen 25% visible peristalsis in IHPS patient.<sup>25</sup>

Electrolytes abnormalities found in 64 % which was low from David J. Wilkinson, et al study.<sup>26</sup> David J. Wilkinson et al in there study observe 69.53% electrolytes abnormalities.

Ultra sonography was diagnostic in all IHPS suspected cases similar to Iqbal CW et al study.<sup>27</sup> Iqbal CW et al in there study they found that overall, US had 100% sensitivity and specificity for PS. Thickness of 3 mm or higher was 100% sensitive and 99% specific, and pyloric length of 15 mm or higher was 100% sensitive and 97% specific.

In our IHPS patients, total hospital stay was 3-6 day similar to Behrouz Banieghbal study.<sup>28</sup> Standard fluid protocol resulted in near-complete correction of alkalosis and hypochloremia within 12-48 h.

## CONCLUSION

Infantile hypertrophic pyloric stenosis (IHPS) which is caused by thickened antropyloric muscle is a disease which causes gastric outlet obstruction. It is the most common surgical condition in infants within two month of postnatal life.

This disease is presented with projectile non-bilious vomiting which may be blood tinged if it is prolonged without correction may cause hypochloremic hypokalemic alkalosis and death in more than 50% of the affected patients. Characteristic history of projectile non-bilious vomiting, gastric visual peristalsis and Palpation of an olive-like mass in the right upper quadrant (RUQ) is considered diagnostic. Sometimes clinical examination of a crying infant is difficult, doubtful and time consuming so help of imaging findings increases yield of the diagnosis and definitively exclude other pathology of gastric outlet obstruction. The sensitivity and specificity of US to diagnosis of IHPS is 89%-100% and an accuracy approximately of 100%. In ultrasonography muscle thickness >3 to 4 mm and a canal diameter >15-16 mm is diagnostic. Patient should be corrected for hypovolemia and serum biochemical abnormality prior to operative procedure. Mini laparotomy or laparoscopic surgery is option of current surgical treatment. laparoscopic surgery have good cosmetic result, less postoperative pain, early return of bowel habit, early

enteral feeding are few advantages over open or mini laparotomy. Carefully evaluation and biochemical management prior to surgery reduces mortality approximately 50% (untreated cases) to less than 1%.

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