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Typhoid intestinal perforations in Northern Ghana

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Abstract: *Background***:** Typhoid intestinal perforation (TIP) is a global health concern, with high incidence of morbidity and mortality in developing countries. This study examined the pattern of TIP and its associated factors in the Northern Region of Ghana. *Methods:* This retrospective study was conducted from January 2010 to December 2013 in patients treated for TIP at the Tania Specialist Hospital, Tamale, Ghana. All relevant data were retrieved using a standardized data collection form. *Results:* Out of the 150 patients presenting with typhoid fever, 65 patients had TIP giving a prevalence rate of 43.3% of which, 61.5% (n = 40) were males and 38.5% (n =25) were males. Patients aged 11-20 years recorded the highest number of TIPs (36.9%, n=24) followed by those aged 1-10 years (23.1%, n= 15)). The most common presenting symptom at the out-patient department were severe abdominal pains (56.7%, n=87), abdominal pains with abdominal distension (43.3%, n= 28) and abdominal distension (49.3%, n=32). Intra-operatively, 41 (63%) had single terminal ileal perforation, 19 (29.2%) had 2-3 perforations within the ileum, 2 (3.1%) had caecal perforation and the rest 3 (4.7%) had perforations in the jejunum. Fifty-three (81.5%) patients recovered fully, whilst 12 (18.5%) of them died due to post-operative complications. *Conclusion:* The prevalence rate of TIP was 43.3% and higher among males and those aged 10-20 years. The role of prevention, early reporting, and detection coupled with appropriate management cannot be overemphasized.

Keywords: Typhoid intestinal perforation; prevalence, surgical management, Northern Ghana

Introduction

In many developing countries, typhoid fever; a severe febrile illness primarily caused by Salmonella *typhi*, is still a disease of enormous public health concern, even though it is almost eliminated in developed countries [1-3]. Typhoid fever is generally transmitted by faeco-oral route and may occasionally lead to an epidemic, particularly in areas with poor waste disposal system, and limited availability of clean drinking water [2-5]. It has been estimated that 22 million cases of typhoid fever and 216 000 deaths occur annually worldwide [6]. In Africa, population-based incidence of typhoid fever is reported to range from 13 to 845 cases per 100000 population annually [6-9].

Effective public health measures such as the provision of clean, potable water and good waste disposal systems have led to a dramatic decrease of the disease in developed countries [10]. Developing countries on the other hand still bear the burden of the disease, due to the fact that most communities still fall short of standards for good drinking water, hygiene and sanitation [3, 6-7]. Clinical signs and symptoms of typhoid fever include malaise, headache, sustained fever, constipation and/or diarrhea, abdominal pain, and other gastrointestinal symptoms, cough and loss of appetite. Confirmatory laboratory findings are conducted by the isolation of Salmonella *Typhi* from bone marrow, blood, or other site in a patient with compatible illness [11].

With a case mortality rate approaching 30%–40%, typhoid intestinal perforations (TIPs) and intestinal bleeding [12-13] arising from necrosis of Peyer's patches in the terminal ileum [14-16] is the most lethal complications of typhoid fever. Just like typhoid fever, TIP is the most common surgical problem in developing countries, where it is associated with high mortality and morbidity, due to lack of clean drinking water, poor sanitation and lack of medical facilities in remote areas and delay in hospitalization [17-18]. The high incidence of TIP has also been attributed to the emergence of multidrug resistant and virulent strains of Salmonella typhi [18].

TIP affects mostly children and young adults who are the future leaders and contribute greatly to the economy of developing countries [19-21]. This results in devastating effects (socially and economically) on resource poor countries due to loss of productive hours as due to hospitalization of patients with acute disease and the complications and loss of income attributable to the duration of the clinical illness.

In resource-poor countries like Ghana, the management of the TIP which requires surgery has peculiar challenges relating to diagnostic and therapeutic measures [19, 22]. Some of these unique challenges include late presentation of the disease coupled with lack of clean drinking water, poor sanitation, and lack of diagnostic facilities and emergence of multi-drug resistant (MDR) strains of *S. typhi* [22-23]. This may result in poor treatment outcomes. Many factors such as late presentation, inadequate pre-operative resuscitation, delayed operation, the number of perforations, and the extent of faecal peritonitis, have been found to have a significant effect on the prognosis [24-27].

Despite the high morbidity and mortality rates of TIP in developing countries, little is known about the prognostic factors and pattern of in TIPs in Ghana. The purpose of this study was to examine the pattern of TIP and to determine the prognostic factors of the disease among patients attending the Tania Specialist Hospital, Tamale, Ghana.

Material and Methods

This retrospective study was conducted from January, 2010 to December, 2013 at the Tania Specialist Hospital. All patients who had typhoid fever during the study period were included in the study. With the aid of a standardized data collection form, all data were abstracted from the medical records of all patients treated for typhoid fever and intestinal perforations at the Tania Specialist Hospital. The extracted data included age, sex, signs/symptoms, and duration of symptoms before presentation, investigations, resuscitation, operative procedures/techniques, post-operative management, complications, outcomes and mortality. Patients with incomplete data were excluded from the study. Diagnosis of typhoid fever and perforations was based on clinical, laboratory and operative findings.

The diagnosis of typhoid fever was made by positive blood, stool, or urine culture, rising Widal titer levels (about 4-fold increase in titre). Typhoid intestinal perforations (TIPs) were diagnosed clinically by peritonitis which were supported by positive Widal test, detection of free air under the diaphragm on chest and abdominal radiographs and free intra peritoneal fluid on ultrasound abdomen and confirmed by intra-operative findings of oval perforation on the anti-mesenteric border of the intestine and an acutely inflamed and edematous intestine.

All patients were well resuscitated, prepared physically and psychologically before surgery as well as having adequate and appropriate antibiotics, analgelsics/anti-inflammatory, infusion and transfusion therapy, nasogastric tube, urethral catheterisation insitu and laboratory test done (Hb, PVC, electrolyte analysis, renal profile, blood, uric and stool analysis and sickling test). Post operatively, all patients were monitored carefully with adequate hydration. Appropriate antibiotics were provided post-operative based on the culture and sensitivity results.

Statistical analysis: All collected data were entered in Microsoft Excel 2007, analysed using GraphPad Prism version 5.00 (GraphPad software, San Diego California USA, www.graphpad.com) for windows and presented as frequency tables.

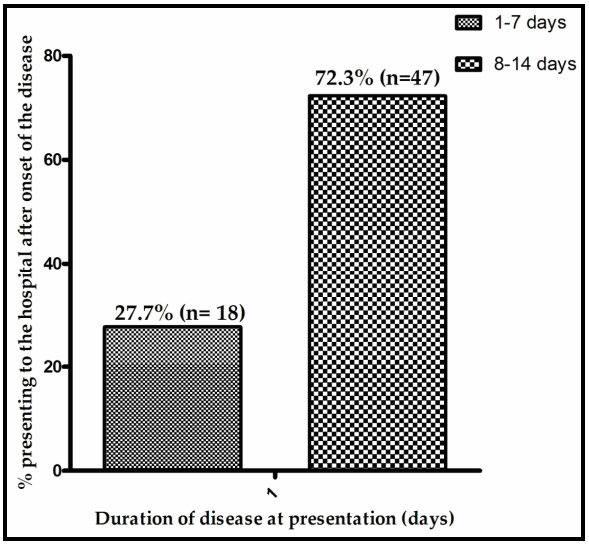
Results

Out of the 150 patients who presented to the Tania specialist hospital with typhoid fever, 65 of them had typhoid intestinal perforations yielding a prevalence rate of 43.3% during the period under study (2010 – 2013). All of these were included into the study according to our inclusion and exclusion criteria. As shown in table 1, severe abdominal pain, abdominal distension and fever were the main presenting symptoms at the out-patient department (OPD).

The onset of typhoid fever and time of presentation to the hospital are presented in figure 1. Forty-seven (72.3%) of the patients reported relatively (7-14) late to the hospital after the onset of the disease.

Table-1: Presentation symptoms and time of presentation		
Symptoms on presentation to the hospital	**Frequency**	**%**
Severe abdominal pain	87	56.7
Fever	20	31.3
Abdominal distension	28	43.3
Abdominal distension with fever	32	49.3

Figure-1: Time of presentation of typhoid after onset of the disease



Forty patients (61.5%) were males and the rest were females resulting in a male to female ratio of 1.6:1 (shown in table 2). The highest prevalence of typhoid intestinal perforations (TIP) were found in patients aged 11-20 years and the least occurring in those aged 21-30 years.

Table-2: Distribution of Typhoid Intestinal Perforations by sex and age		
Variable	**Frequency**	**(%)**
Sex		
Male	40	61.5
Female	25	38.5
Age (years)		
1-10	15	23.1
11-20	24	36.9
21-30	7	10.8
≥ 31 years	19	29.2

Anatomical sites of perforations are presented in table 3. Intra-operatively, 41 (63%) had single terminal ileal perforation and 2 (3.1%) had caecal perforation. No end-ileotomy was performed. Sixty (92.3%) underwent perforated hole excision and transverse closure in two layers with PDS 2/0 suture. Three (4.6%) had small bowel resection and end-to-end anastomosis with PDS 2/0. Two (3.1%) had hemicolectomy with end-to-side anastomosis performed.

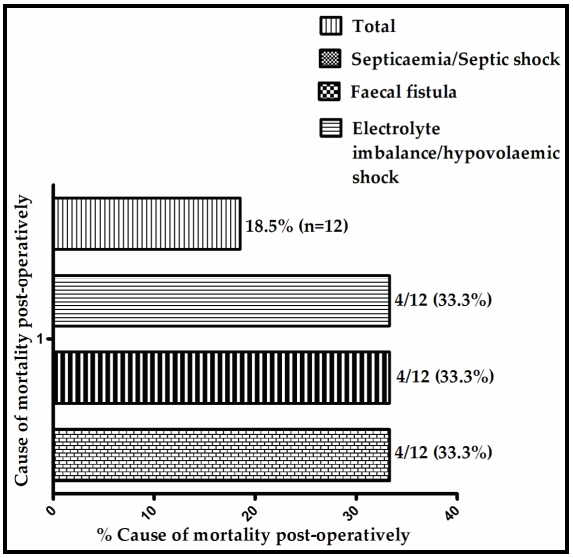
Table-3: Distribution of patients according to anatomical site of perforations (n = 65)		
Perforation	**Frequency**	**%**
Single ileal	41	63
2-3 ileal	19	29.2
Caecal	2	3.1
Jejunum	3	4.7

All patients were treated surgically and the clinical outcomes presented in table 4. Fifty-one patients (78.5%) recovered fully without any form of complications and 2 (3.0%) recovered later after complications. A mortality rate of 18.5% (n=12) was found.

Table-4: Clinical outcomes after treatment		
Variable	**Frequency**	**%**
Full recovery without complications	51	78.5
Recovered after complications	2	3.0
Mortality	12	18.5

As shown in figure 2, the causes of mortality post-operatively were septicaemia/septic shock (33.3%, n=4), faecal fistula (33.3%, n=4) and electrolyte imbalance/hypovolaemic (33.3%, n=4).

Figure-2: Causes of mortality post-operatively (n=12)



Discussion

Typhoid intestinal perforations (TIPs) are still the most common complications of typhoid fever in developing countries [10, 18-19, 26, 28-30]. Not surprisingly, the prevalence of TIPs was found to be 43.3%. This is among the highest rates reported in literature. Previous reports have estimated the prevalence of TIPs to range from 10%-33% in Africa, a continent noted for high prevalence of the disease [20, 27, 31-32]. Rates ranging between 0.6% and 4.9% of typhoid fever cases [7, 13] have been reported elsewhere.

The high prevalence rate of TIPs in this study could be due to the fact that the study is situated in a West African sub-region in which the disease have been shown to be endemic [10, 25, 28]. A more virulent strain of the Salmonella *typhi* has been identified in the West African sub-region probably contributing to the high rate of intestinal perforation among West Africans [10].

In addition an increased hypersensitivity reaction in the Peyer's patches is common among sufferers of the disease in the West African sub-region compared to other endemic areas of typhoid fever [25]. Also the high prevalence of TIP could also be attributed to poor nutritional status which is endemic in Ghana. Under nutrition a form of malnutrition has been shown to have a synergistic relationship with disease infection (e.g. typhoid fever) compromising the immune system of affected individuals.

Another important contributing factor to the higher prevalence of TIPs in this study could be due to the fact that a higher prevalence of TIPs was found in patients who presented late to the hospital (2-14 days duration of typhoid fever), than in those who presented early (1-7 days). This is expected in a resource-poor country like Ghana due to poverty, ignorance and poor access to healthcare. Inaccessibility and affordability issues results in poor, ignorant patients resorting to herbal medicines or patent medicine shops during which valuable time is wasted, granting the bacteria the opportunity to invade the tissue and also for the immune system to contribute to the pathogenesis of the intestinal lesions. This attitude also results in sub therapeutic antibiotic treatment [27] complicating the disease and a delay in presentation. In addition, the high incidence of malaria in Ghana, which mimics typhoid fever in the first week of the disease, is easily misdiagnosed without laboratory confirmation contributing to the late presentation of symptoms to the hospital [33].

In commonality with several studies from other West African countries [25, 27, 34-35], perforations occurred within 8-14 days after the onset of symptoms, confirming early perforations in West African patients reported in the literature. In keeping with several studies, the prevalence of TIPs was higher in males than in females in this study with a male to female ratio of 1.6:1 [10, 13, 19, 27, 30, 36]. It remains unclear the mediating mechanism of the susceptibility of the male gender to TIPs. Immune mechanisms and genetic predisposition factors have been suggested as possible underlying factors [37-38]. It is also possible that more males than females spend longer time outside their homes and are more likely to eat food outdoors, where food hygiene is generally poor [28]. This increases their risk of exposure to the causative bacteria, Salmonella *typhi* [10] making them susceptible to TIP.

Importantly, we found that the peak prevalence of TIPs occurred in the first, second and third decades of life, which constitute children and the youth. This is in consonance with previous reports [10, 26, 28,

39]. The effect of age on TIP is unclear. However, we postulate that children and the youth are generally more adventurous, outgoing and mobile and as a result are more likely to eat food outside of the home [10]. Majority of children and the youth attend school and are at increased risk of faecal contamination as they visit toilets at school or public toilets [10]. Nutrition pertaining to wasting and stunting is endemic among children in northern Ghana. Giving the negative impact of under nutrition on infection, it is postulated that under nutrition could have contributed to the higher prevalence of TIPs in children and the youth.

It is important to observe that the youth are the active and economic productive group and as a consequence the high prevalence of TIPs in this group poses a negative economic impact on the nation and their individual families [10, 19-20]. The occurrence of the disease in children and the youth does not negatively affect the economy of the developing nations only, but also has long-term effects on the future of the developing countries [40-41]. We therefore suggest that an urgent commitment, improvement and elaboration of the public policy response on preventive measures in the country. Efforts should be made to increase access to safe drinking water, improved healthcare delivery and sewage disposal systems. The occurrence of single perforations in a majority (63%) of our patients is in keeping with several studies previously reported [10, 19-20, 22, 42].

The mortality rate of 18.5% from TIPs falls within the 20-40% mortality rates previously reported from other developing countries [13, 22, 43]. This mortality rate is however lower than those reported from developed countries [44]. The high mortality rates in this study were attributed to general complications post-operatively. In agreement with several studies the most common presentation symptoms in this study were severe abdominal pains and abdominal distension [10, 19, 22, 30, 36].

It is pertinent to note the limitations of this study. Information was obtained retrospectively, introducing the potential of incomplete data which might have introduced some bias in the findings. Its retrospectively nature also makes it difficult to establish causality. Despite the limitations, this study has made available data on TIP from a resource-constrained country that can guide healthcare providers in the prevention, treatment and management of TIP in developing countries.

Conclusion

The prevalence rate of TIP was 43.3% among the study patients and higher among males and those aged 10-20 years. The role of prevention, early reporting, and detection coupled with appropriate management cannot be overemphasized.

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