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Editorial

Protection against Covid-19: Use of Mask, Bangladesh perspective

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Since the beginning of Covid-19 pandemic WHO advocated several important measures to be followed by general people for prevention of corona virus infection. Three things are being given importance along with other precautionary measures. Use of face mask, regular hand washing and maintaining social distance are the main things given emphasis. These are very effective for prevention of transmission of corona infection.

Countries where these measures are followed strictly are found to have lower transmission rate. People's awareness and participation are very important in this regard. Use of mask is mandatory by everyone and it plays a vital role in prevention of Covid-19 infection. WHO is giving regular Updates regarding use of masks among general people[1].

Covid-19 infection is mainly transmitted by respiratory route as droplet infection generated during talking, sneezing, coughing of the infected person. The virus also remains viable in the air for some hours and can be inhaled by people at risk without mask. It has been told by WHO that only use of mask regularly can reduce chance of infection by more than 80%. WHO advised 3 layers fabric mask or surgical mask for general people in the community.

In Bangladesh Covid-19 pandemic started in the month of March 2020. Initially general people were found to be more careful and practiced wearing of masks in a significant number and maintained the other precautionary sanitary measures for prevention of covid-19 infection. The government agencies and media played an important role for making people aware about the preventive measures at that time.

But with time gradually it has been observed that use of masks is getting reduced among general people and people are getting reluctant about maintaining health guidelines for protection against covid-19. It is seen that younger people are very unwilling to maintain health guidelines assuming that they will be less infected or mildly affected. But they forget that they may act as carrier and infect the senior members of the family or community very seriously[2]. In the rural areas the situation is worse, most people are not aware about the consequence of corona infection and very much disinclined in using face masks & following the health guidelines. Therefore, it is very much important at the moment to address this issue so that people of all classes and all over country become more conscious before any disaster occur.

In Bangladesh the covid-19 infection is continuing and the attack rate, death rate still significant. It has been predicted by WHO that a second wave may come during winter. So without delay we need to increase our precautionary measures beside case detection and treatment. Government and non government agencies should come forward for vigorous campaign to make proper awareness and motivation of general mass. Also some legislative actions may be considered for those who will not follow health guidelines particularly use of Masks.

Reference

1. WHO Media News (www.who.int).
2. Daily Prothom Alo, 2020

Original Article

Outcomes of Percutaneous Nephrolithotomy (PCNL) and Open Surgery for the Treatment of Staghorn Calculi

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Abstract

Purpose: *In Bangladesh incidence of staghorn calculi is not statistically proved but a large number of cases attend in various surgical and urological centers every day. Open stone surgery is an established procedure. But it is not devoid of complications like hemorrhagic, renal parenchymal damage, infection and residual stones. So, urologists were searching for a better option for the management of large renal calculi. Recently PCNL has been introduced in our country. The aim of the study is to compare the outcomes of PCNL and open surgery for treating staghorn* calculi.

Materials and Methods: *A hospital based observational study was conducted to evaluate the results of PCNL and open surgery for the management of staghorn calculi to determine the better option between the two. Patients of staghorn calculi who were admitted in the Urology department, Dhaka medical college hospital from July 2014 to June 2016 and included 60 patients of staghorn calculi by inclusion and exclusion criteria and divided into two groups of 25 patients each of which one group for PCNL and another group for open surgery. By this way, 50 patients were selected as cases. All the odd numbered cases were allocated for Group - A for PCNL and the even numbered cases were allocated for open surgery for Group - B. The first case entering into the operation theater was allocated to Group - A for PCNL and the next patient was allocated to Group - B for open surgery.*

Results: *In this study, majority of the renal stones were found in the age range 36-45years. The mean age of group-A and group-B were 44.44 ± 14.13 and 45.00 ± 13.15 years respectively. Gender distribution of the study population shows in Group- A, 16(64%) were male and 9 (36%) were female. In Group- B, 19(76%) were male and 6 (24%) were female. 15(60%) patients in group A and 8 (32%) patients in group B required single dose of narcotic analgesic while 10(40%) and 17 (68%) patients required multiple doses in group A and group B respectively. Major postoperative complications including haematuria requiring blood transfusion, urine leakage, wound infection was observed in 6(24%) patients in group A and 11(44%) patients in group B. In group A 4(16%) and in group B 6 (24%) patients had suffered postoperative haematuria. The rate of urine leakage in group A were 2(8%) and none in group B. The rate of wound infection was none in group A & 5(20%) in group B. Mean hospital stay in postoperative period in group A and group B were 4.44 ± 1.66 and 8.56 ± 2.29 days, respectively. An overall stone clearance rates was 13 (52%) in group-A & 18 (72%) in group-B. Insignificant residual stones (<4mm) were present in 7 (28%) patients in group A and 5(20%) patients in group B.*

Conclusion: *Based on the study findings inference could be drawn in favors of PCNL to be the better option than open surgery for treating renal staghorn stones.*

Key word: *Staghorn calculi, calices, PCNL*

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Introduction

Urinary calculi are common urological problem and third most common affliction of the urinary tract, after urinary tract infections and pathologic conditions of the prostate. Urinary stones have plagued human since the earliest records of civilization.[1] Countries in the Afro-Asian stone belt stretching from Egypt and Sudan, through the Middle East, India, Pakistan, Burma, Thailand, Indonesia and the Phillipines have consistently reported a high incidence of urolithiasis.[2] In the United States, the prevalence of stone disease has been estimated at 10% to 15%. Stone occurrence is relatively uncommon before age 20 but peaks in incidence in the fourth to sixth decades of life[3] Staghorn calculi are branched stones that occupy a large portion of collecting system. Typically, they fill the renal pelvis branch into several or all of the calices[4]. Most staghorn stones are composed of struvite (magnesium ammonium phosphate). This crystal forms only in the presence of bacteria that produce the enzyme urease; other stones can assume a staghorn configuration: cystine, calcium oxalate monohydrate, and uric acid all may grow to the point where they fill the collecting system [5].

Staghorn stones represent a troublesome therapeutic challenge to urologists. Because of the lack of consensus on how to define the stones and how to assess the burden, treatment recommendations and reported results are highly variable. There is no consensus regarding treatment of complete staghorn stones[6]. Until the early 1970 some physicians believed that staghorn calculi were better untreated. If left untreated, is associated with progressive deterioration of renal function and eventually destroy the kidney and pose a significant risk to the patient's life. Struvite stones must be removed completely to minimize the risk of continued urea splitting bacteriuria. The primary goal of surgical stone management is to achieve maximal stone clearance with minimal morbidity to the patient[7].

Management of staghorn calculi depends on three factors: The overall stone burden, the location of the stone burden, the anatomy of the collecting system (i.e. a dilated collecting system)[8]. In the past two decades, advances in endoscopic management of nephrolithiasis, in the form of newer refined endoscopes and stone fragmentation energies, have resulted in a major shift toward minimally invasive therapy, in spite of these advances, there remains a need for open surgical stone removal as a second- or third-line treatment option in few cases. Due to the availability of the equipment, expertise and experience in surgical treatment of urinary stones, most urological centers worldwide report a need for open surgery in only 1–5.4% [9]. In developing countries, a large stone burden, neglected stones with renal failure, the paucity of urological facilities and residence of poor patients away from tertiary centers necessitate open surgical procedure as the therapy of choice in about a third of the patients. So minimally invasive surgery is the way forward; However, the pattern of stone disease, patient volume and overall economy still mean that open surgery is the therapy of choice in many situations. Thus, the scope of open surgery will remain much wider for a large population of patients for a considerable time in developing countries. Although open surgery for treating urinary tract stones is rarely required at present, where most stone cases can be managed by minimally invasive therapy, it still has a role in patients with complex stone disease and those with anatomical and physiological anomalies.[10] Currently most borderline and partial staghorn stones are treated with percutaneous nephrolithotomy (PCNL). There is no consensus regarding treatment of staghorn stones. PCNL was not available in Bangladesh till January 2000. Recently this method is being practiced in some centers of the country. So the aim of my study is to evaluate the outcomes of PCNL and open surgery for the management of staghorn calculi in this hospital context.

Materials and Methods

A hospital based observational study was conducted in the department of Urology, Dhaka Medical college hospital, Dhaka from July 2014 to June, 2016 to evaluate the results of PCNL and open surgery for the management of staghorn calculi to determine the better option between the two. Patients of staghorn calculi who were admitted in the Urology department were evaluated by age, sex, location of the stones, pelvicalyceal dilatation, history, clinical examination and all required investigations. Those who meet the inclusion criteria were purposively included in the study. After a decision for operation the whole procedure of study was explained to each patient and

then asked for consent. Those patients who gave consent were considered as case of this study and those who did not give consent excluded from the study. By this way, 50 patients were selected as cases. All the odd numbered cases were allocated for Group - A for PCNL and the even numbered cases were allocated for open surgery for Group - B. The first case entering into the operation theater was allocated to Group - A for PCNL and the next patient was allocated to Group - B for open surgery. All patients were counseled and requested to attend for follow up at OPD clinic on the day of discharge, after 1st month and after 3 months. In both operations double - J stents were removed on 2nd follow up. Outcome of this study was evaluated on the basis of stone clearance after operation, required adjuvant procedures e.g: ESWL, presence or absence of infection, colon injury, pleural injury, urinary fistula, septicemia and success was defined as clearance of renal stone with no complications. Data was analyzed by using SSPS version 22. Statistical analysis of the means of continuous variables was performed with the unpaired Student's t test. Analysis of the significance of categorical variables was performed using the chi-square test with differences resulting in $p<0.05$ considered statistically significant.

Result

Total 50 cases were selected according to selection criteria from the patients admitted in urology department of DMCH with staghorn renal stone. Among them 25 patients were placed in Group A for PCNL (experimental group) & 25 patients were placed in Group-B for Open surgery (controlled group). Distribution of respondents in terms of different parameters is shown in tabulated form and statistical analysis was done in both groups to see statistical significance, p value < 0.05 was considered as significant

Age distribution between groups

Majority of the renal stones were found in the age range 36-45years. The mean age of group-A and group-B were 44.44 ± 14.13 and 45.00 ± 13.15 years respectively. There was equal number of patients 2(8%) in both groups between 16-25 years of age and above > 65 years 1(4%). There was no significant difference of mean age between the two groups (p value>0.05).

Table I: Distribution of patients according to age in groups

Age(year)	Group		Pvalue
	Group A	Group B	
16-25	2 (8.0)	2 (8.0)	
26–35	5 (20.0)	4 (16.0)	
36–45	6 (24.0)	8 (32.0)	
46–55	6 (24.0)	6 (24.0)	
56–65	5 (20.0)	4 (16.0)	
>65	1 (4.0)	1 (4.0)	
Total	**25 (100.0)**	**25 (100.0)**	
Mean ± SD	44.44 ± 14.13	45.00 ± 13.15	0.885

Gender distribution of the patients

Gender distribution of the study population shows in Group- A, 16(64%) were male and 9 (36%) were female. In Group- B, 19(76%) were male and 6 (24%) were female. There was no significant difference of sex distribution between the two groups (p value>0.05). (Figure R-1)

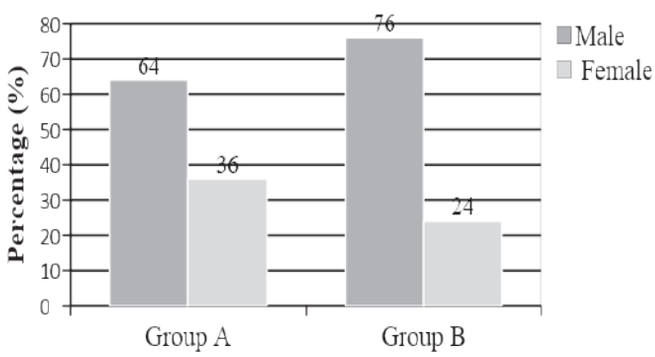

Figure 1: Bar diagram showing distribution of patients by gender

Comparison of per operative complications between groups

Only per operative complications in terms of bleeding requiring blood transfusion and were recorded in 6(24%) patients in group A and 7 (28%) patients in group B. Intraoperative pleural injury occured in none patients in group A and in 1(04%) patients in group B. The test result was insignificant (p>0.05) between two groups.

Table II: Comparison of per operative complications between the groups

Per operative complications	Group		p value
	Group A	Group B	
None	19 (76.0)	17 (68.0)	0.552
Bleeding	6 (24.0)	7 (28.0)	
Pleural injury	0 (0.0)	1 (4.0)	
Total	**25 (100.0)**	**25 (100.0)**	

Comparison of narcotic analgesic requirement between groups

15(60%) patients in group A and 8 (32%) patients in group B required single dose of narcotic analgesic while 10(40%) and 17 (68%) patients required multiple doses in group A and group B, respectively. There was significant difference between analgesic requirements in both groups. ($p<0.05$)

Table III: Comparison of analgesic requirement between the groups

Analgesic	**Group**		**p value**
	Group A	**Group B**	
Single	15(60.0)	8 (32.0)	0.016
Multiple	10 (40.0)	17 (68.0)	
Total	**25 (100.0)**	**25 (100.0)**	

Comparison of postoperative complications between groups

Major postoperative complications including haematuria requiring blood transfusion, urine leakage, wound infection was observed in 6(24%) patients in group A and 11(44%) patients in group B. In group A 4(16%) and in group B 6 (24%) patients had suffered postoperative haematuria. The rate of urine leakage in group A were 2(8%) and in none group B. The rate of wound in fection were none in group A & 5(20%) in group B. There was significant difference in postoperative complications between two groups. ($p<0.05$)

Table IV: Comparison of post-operative complications between the groups

Postoperative complications	**Group**		**p value**
	Group A	**Group B**	
None	19 (76.0)	14 (56.0)	0.023
Haematuria	4 (16.0)	6 (24.0)	
Urine leakage	2 (8.0)	0 (0.0)	
Wound infection	0 (0.0)	5 (20.0)	
Total	**25 (100.0)**	**25 (100.0)**	

Comparison of hospital stay between groups

Mean hospital stay in postoperative period in group A and group B were 4.44 ± 1.66 and 8.56 ± 2.29 days, respectively. There was significant difference in hospital stay during postoperative period between two groups. ($p<0.05$)

Table V: Comparison of hospital stay between groups

Post-operative hospital stays (Day)	**Group**		**p value**
	Group A	**Group B**	
3–5	20 (80.0)	2 (8.0)	<0.001
6–8	5 (20.0)	10 (40.0)	
9–11	0 (0.0)	11 (44.0)	
12-14	0 (0.0)	2 (8.0)	
Total	**25 (100.0)**	**25 (100.0)**	
Mean ± SD	4.44 ± 1.66	8.56 ± 2.29	

Comparison of post-operative stone clearance between groups at discharge

An overall stone clearance rates was 13 (52%) in group-A & 18 (72%) in group-B. Insignificant residual stones (<4mm) were present in 7 (28%) patients in group A and 5(20%) patients in group B. Significant residual stones (>4mm) were found in 5 (20%) patients in group A and 2 (8%) patients in group B. No significant difference was found in stone clearance, significant residue and insignificant residue of two groups ($p>0.05$).

Table VI: Comparison of post-operative stone clearance between groups at discharge

Stone clearance	Group		p value
	Group A	Group B	
Cleared	13 (52.0)	18 (72.0)	0.344
Insignificant residue	7 (28.0)	5 (20.0)	
Significant residue	5 (20.0)	2 (8.0)	
Total	**25 (100.0)**	**25 (100.0)**	

Discussion

Staghorn calculi are branched stones that occupy a large portion of collecting system. An untreated staghorn calculus is likely to destroy the kidney and/or cause life threatening sepsis. Complete removal of the stone is an important goal in order to eradicate any causative organisms, relieve obstruction, prevent further stone growth and any associated infection, and preserve kidney function.[11]

In this study both PCNL group (group A) and open surgery group (group B) were comparable regarding age, sex, staghorn stone types, narcotic analgesic requirement, intra & postoperative complications, requirement of adjuvant procedures (ESWL), hospital stay, stone clearance at discharge home and at follow up. The mean age of patients in group A was 44.44 ± 14.13 and in group B was 45.00 ± 13.15 years which was statistically insignificant ($p>0.05$). The age range in the present study is more or less comparable with the study done by Al Kohlany et al. 2005[6] and Falahatkar et al[12]. 2009 where the range was 48.6±8.5 & 46.5±13.4 for PCNL and 48.7±10.9 & 46.04±13.6 for open surgery. In the study by Al Kohlany et al. the highest ages in PCNL & open surgery group were 65 & 75 and lowest ages were 27 & 26 respectively.

The percentage of male and female patients in group A was16(64%) &9(36%) and in group B 19 (76%) & 6 (24%) which were comparable to the study of Falahatkar et al. 2009,[12] 35 (48.6%) & 37 (51.4%) for PCNL and 19 (39.6%) & 29 (60.4%) for open surgery. In another study by Al Kohlany et al.[6] 2005 the number of male and female patients in PCNL were 17 (39.5%) & 26 (60.4%) and in open surgery group 23 (53.4%) & 22 (51.1%).

In the group A our target was to remove the maximum bulk of the stone burden with the minimum number of punctures rather than additional punctures. Using this policy, we achieved a stone free rate of 76%. Wetnfield et al. 1988 advocated liberal use of multiple punctures (up to 4) and multiple sessions (up to 5) to render the patient stone free before discharge home. With this approach they achieved a stone free rate of 86%. Khakaf et al[9] and Preminger et al[4] showed that stone free rate at the time of discharge was 76.2% and 78% respectively.

For improvement in the result of PCNL some authors reported that supracostal approach is more suitable for reaching most of the stone bulk. We found that it is difficult to suggest a fixed role regarding the puncture site. Being branching and complex each staghorn stone should be approached individually.

In the group B we extracted stones via the renal pelvis whenever possible. We tried to avoid nephrotomy as much as possible. When it was inevitable, we used the least possible ischaemic time to avoid extensive renal damage in the already compromised kidney. Intraoperative complications in terms of bleeding requiring blood transfusion and intraoperative bleeding occurred in 6 (24%) patients in group A and 7 (28%) patients in group B. Pleural injury recorded in 0(0%) patients in group A and in 01(4%) patients in group B. There was no significant difference between intraoperative complications of the two groups. Al Kohlany et al[6]. 2005 showed the rate of intraoperative complications for PCNL 16.3% and for open surgery 37.8% which was statistically significant. However, in another study Falahatkar et al.[12] 2009, showed complication rate 13.9% for PCNL and 18.8% for open surgery which was not statistically significant. In another study by Rassweiler et al, Netto jr, NR et al. Assimos, DG et[13] al, shows intraoperative complication for PCNL was 4%, 20%, 45% and for open surgery 39%, 50%, 50% respetively.

Major postoperative complications including haematuria requiring blood transfusion, urine leakage, wound infection was observed in 6 (24%) patients in group A and 11(44%) patients in group B which was statistically significant ($p<0.05$). In a study by Al Kohlany et at.[6] 2005 postoperative complications were higher following open surgery than following PCNL (18.6 % vs. 31.1%) which was not statistically

significant. In another study Falahatkar et al.[12] 2009 showed higher postoperative complications in PCNL group (12.5%) than in open surgery group (4.2%) which were also statistically insignificant.

Postoperative pain was compared in both groups of patients. In this series dose of narcotics required to relieve pain was significantly reduced in group A. The overall result shows 15(60%) in group A and 8(32%) in group B required single doses of narcotic analgesic whereas 10(40%) in group A and 17(68%) in group B required multiple doses of narcotic analgesic which was statistically significant ($p<0.05$) Postoperative hospital stay was significantly shorter in group A (4.44 ± 1.66) days than group B (8.56 ± 2.29) days which was statistically significant ($p<0.05$). Perminger et al 1985[4], Al Kohlany et al. 2005[6] and Falahatkar et al. 2009[12] reported mean hospital stay for PCNL 4, 5, 6.4±4.2 & 3.93±1.76 days and for open surgery 10, 8.8, 10±4.2 & 5.08±2.42 days respectively. The results obtained in this study are similar with the results of previous studies.

After PCNL our stone free rates in this study at discharge home was 52% and at follow up after 1 month 76%. In case of open surgery the figures were 72% & 88% which were not statistically significant and close to those reported in the literature, (Al Kohlany et al. 2005[6]; Khalaf et al. 2013[9]; Rassweiler et al. 2000[8]) On discharge home Al Kohlany et al. 2005[6] reported a stone free rate of arround 49% and 67% for PCNL and open surgery which increased to 74% & 82% on follow up. His results were not statistically significant. Khalaf et al. 2013[9] reported overall stone free rate at discharge was 76% and at follow up 89%. Rassweiler et al.2000[8] reported stone free rate of 31% for PCNL & 80% for open surgery on discharge home. After 3 months of follow up these figures turned to 72% & 60%. Falahatkar et al 2009[12] reported an overall stone free rate of 81.9% and 91.6% respectively which was not statistically significant. Segura et al.1997[5] reported overall stone free rate was 86% for PCNL and 100% for open surgery. Based on AUA guidelines, the overall estimated stone free rate is 78% following PCNL and 71% following open surgery (Preminger et al, 2005[4]). The limitation of this study was Sample size was small, so it might not reflect the actual result of the study, Sampling technique was purposive which may affect inclusion of subjects and study result. Although staghorn stones were categorized according to IVU results 3D CT scan was not performed in all cases to assess volume of these stones and heterogenicity of surgeons.

Conclusion

The present study was performed to find out the better option between PCNL and open surgery for the treatment of renal staghorn calculi. No significant difference was found in regards to age, sex, staghorn stone type, intraoperative complications and stone clearance rate between the two groups. However, significant difference was found in postoperative complications, narcotic analgesic requirement, and hospital stay. Based on the study findings inference could be drawn in favour of PCNL to be the better option than open surgery for treating renal staghorn stones.

References

1. Stroler ML. “Urinary stone disease” In: McAninch, JW & Lue TF (eds) , Smith's & Tanagho’s General urology 2008; Singapur: McGraw-Hill, 249-272.
2. El-Husseiny T & Buchholz N. The role of open stone surgery. Arab Journal of Urology 2012; 10 :284-288.
3. Pearle MS & Lotan Y. Urinary Lithiasis: Etiology, Epidemiology, and Pathogenesis. in: In Wein, AJ, Kavoussi LR, Novick AC, Partin AW & Peters CA(eds), CAMPBELL-WALSH urology, Philadelphia: Saunders. 2012:1258-1287.
4. Preminger GM, Clayman RV, Hardeman SW, Franklin J, Curry T & Peters PC. Percutaneous nephrostolithotomy vs open surgery for renal calculi. A comparative study. JAMA.1985;254 (8): 1054-8.
5. Segura JW, Preminger GM, Assimos DG, Dretler SP, Kahn RI, Lingeman JE et al. Nephrolithiasis Clinical Guidelines Panel summary report on the management of staghorn calculi. The American Urological Association Nephrolithiasis Clinical Guidelines Panel. JUrol 1994;15(6):1648-51.

6. Al-Kohlany KM, Shokeir AA, Mosbah A, Mohsen T, Shoma AM, Eraky I et al. Treatment of complete staghorn stones: A prospective randomized comparison of open surgery versus percutaneous nephroiithotomy. The Journal of Urology. 2005;173:469-473.

7. Matlaga BR & Lingeman JE. Surgical Management of Upper Urinary Tract Calculi, ' in: Wein, AJ, Kavoussi LR, Novick AC, Partin AW & Peters CA (eds). CAMPBELL-WALSH urology, Philadelphia: Saunders 2012:1358-1410

8. Rassweiler JJ, Renner C & Eisenberger F. The management of complex renal stones. BJU International. 2000;86: 919-928.

9. Khalaf I, Salih E, El-Mallah E, Farghal S & Abdel LRA. The outcome of open renal stone surgery calls for limitation of its use: A single institution experience. African Journal of Urology. 2013; 19:58-65.

10. El-Husseiny T & Buchholz N. The role of open stone surgery. Arab Journal of Urology. 2012;10: 284-288.

11. Preminger GM, Assimos DG, Lingeman, JE, Nakada SY, Pearle MS & Wolf JS. Chapter 1: AUA Guideline on Management of Staghorn Calculi: Diagnosis and Treatment Recommendations. The Journal of Urology. 2005;173:1991-2000.

12. Falahatkar S, Panahandeh Z, Souvati A, Akbarpour M, Khaki N & Allahkhah A. Percutaneous Nephrolithotomy versus Open Surgery for Patients with Renal Staghorn Stones. Urotoday International Journal. 2009;2(5):09-13.

13. Assimos DG, Wrenn JJ, Harrison LH, Mccullough DL, Boyce WH, Taylor CL et al. A comparison of an atrophic nephrolithotomy and percutaneous nephrolithotomy with and without extracorporeal shock wave lithotripsy for management of patients with staghorn calculi. JUrol. 1991;145(4):710.

Original Article

Pattern of skin and venereal diseases among patients attending in Out Patient Department (OPD) of Dermatology and Venereology department of Jahurul Islam Medical College Hospital

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Abstract

Objective: *The aim of the study is to identify the pattern of skin diseases in patients attending in a rural based tertiary care teaching hospital, Bajitpur, Bangladesh, which will help us to understand the scale of rising incidence and possible preventive measure that can be undertaken to curtail it.*

Methods: *An observational study was conducted on all newly diagnosed patients who attended the Dermatology and Venereology department of Jahurul Islam Medical College Hospital, Bajitpur during a one-year span from 1st January 2019 to 31st December 2019. A thorough medical history with detailed cutaneous examination was carried out on every patient. Diagnosis was made on clinical basis. Laboratory investigation including skin biopsies were performed whenever required for confirmation of diagnosis.*

Results: *Study was conducted on 26,429 patients, comprising 12,375 (46.82%) male and 14,054 (53.18%) females. Male female ratio was 1:1.14. All disorders were grouped into Infective (52%) and non-infective (48%) dermatoses. Among infective dermatoses fungal infections were most common (25.12%), followed by bacterial infection (11.29%) and scabies (10.67%). Among non-infective dermatoses eczemas were most common (15.62%) followed by Acne (11.96%) and Urticaria (5.09%) in our OPD attendances.*

Conclusion: *Our study found a higher prevalence of infective dermatoses than non-infective dermatoses. Fungal infections and eczemas formed the largest group in their respective field.*

Keywords: *Skin diseases, Infective dermatoses, Non infective dermatoses, Fungal infection, Eczema.*

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Introduction

Skin diseases constitute a major health problem affecting a large proportion of the population causing distress and disability[1]. The pattern of skin diseases varies from one country to another country and across different parts within the same country[2]. Skin diseases can cause high morbidity but apparently less mortality[3,4,5]. The prevalence of skin diseases in any region or country depends on various factors, such as economy, literacy, racial and social customs, nutritional status and climatic conditions[6,7,8]. Also overcrowding, poor standards of hygiene and environmental sanitation are important contributing factors of determining the distribution of skin diseases in developing countries[9]. As disease pattern varies in different parts of the country, we decided to undertake a retrospective analysis of skin and venereal disease pattern in patients visiting the Dermatology and Venereology Out Patient Department (OPD) of a rural based tertiary care

teaching hospital, which will highlights the magnitude of different dermatological disorders and possible preventive measure can be undertaken to curtail it.

Materials and Methods

This was an observational study carried out in the outpatient department of dermatology and venereology, Jahurul Islam Medical College Hospital (JIMCH), Bajitpur, Bangladesh. All newly diagnosed cases of all ages and both sexes attended in the OPD during a one-year span from 1st January 2019 to 31st December 2019 were included in the study. Patient repeatedly came to the hospital for a follow up visit related to their disease and cases with doubtful diagnosis were excluded from the study. Skin diseases were grouped into infective and non-infective dermatoses. A thorough medical history, physical examination and detailed cutaneous examination was performed in each patient. Diagnosis was made on clinical examination. Laboratory investigation including skin biopsies were performed whenever required for confirmation of diagnosis.

Results

A total of 40,139 patients attended in the outpatient Department of Dermatology and Venereology of JIMCH during a 1-year span from 1st January 2019 to 31st December 2019. Out of this sample 13,710 patients repeatedly came to the hospital for follow-up visit related to their disease, while 26,429 were enrolled as new cases; thus forming (65.84%) of total cases. Among 26,429 patients, male comprising 12,375 cases (46.82%) and female 14,054 cases (53.18%) [Fig-1]. Male Female ratio was 1:1.14. All dermatological disorders were grouped into infective dermatoses 13,727 cases (52%) [Table-1], and non-infective dermatoses 12,702 cases (48%) [Table-2]. Among the infective dermatoses, fungal infections were the most common ones (25.12%), followed by bacterial infections (11.29%) and scabies (10.67%) formed the top three most common dermatoses of this group. Dermatophytosis (Tinea infections) (17.50%) was the commonest fungal infection followed by pityriasis versicolor (5.72%) and candidiasis (1.90%); of the bacterial infections pyoderma (5.86%) was commonest followed by pitted keratolysis (3.81%) and STD's (1.62%); among Sexually transmitted disease, non gonococcal urethritis (1.21%) followed by chancroid (0.26%), gonorrhea (0.09%) and syphilis (0.06%). Viral infections formed (4.84%) of total cases of which viral warts was commonest (1.85%) followed by molluscum contagiosum (1.65%) and others. [Table-1]

Among non-infective dermatoses eczemas were most common, that included atopic dermatitis, seborrheic dermatitis, contact dermatitis, pompholyx, discoid dermatitis and formed (15.62%) of cases, followed by acne (11.96%) and urticaria (5.09%) constituted three major dermatoses of this group. Among papulosquamous disorders psoriasis formed (3.64%) followed by lichen planus (1.93%). Keratinization disorder mainly palmoplantar keratoderma was seen in (2.15%) and pigmentary disorder; vitiligo (1.70%) of cases in our study. Vesiculobullous disease formed (1.61%) and pemphigus vulgaris and bullous pemphigoid were common. We also recorded few other dermatoses of small numbers that included acrodermatitis enteropathica (1.53%), erythema multiforme (1.51%), naevus (0.55%), alopecia (0.37%), keloid (0.19%), psychosexual disorder (0.17%) and basal cell carcinoma in only 7 cases (0.03%). [Table-2]

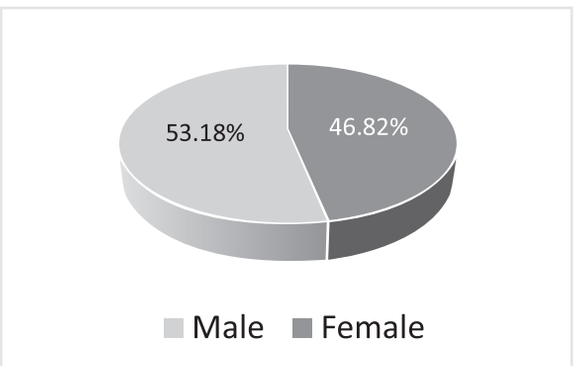

Fig-1: Sex Distribution of Patients

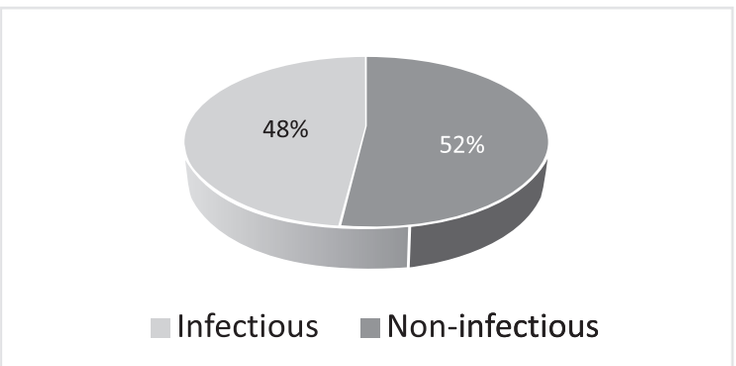

Fig-2: Infectious and Non-infectious diseases of Patients

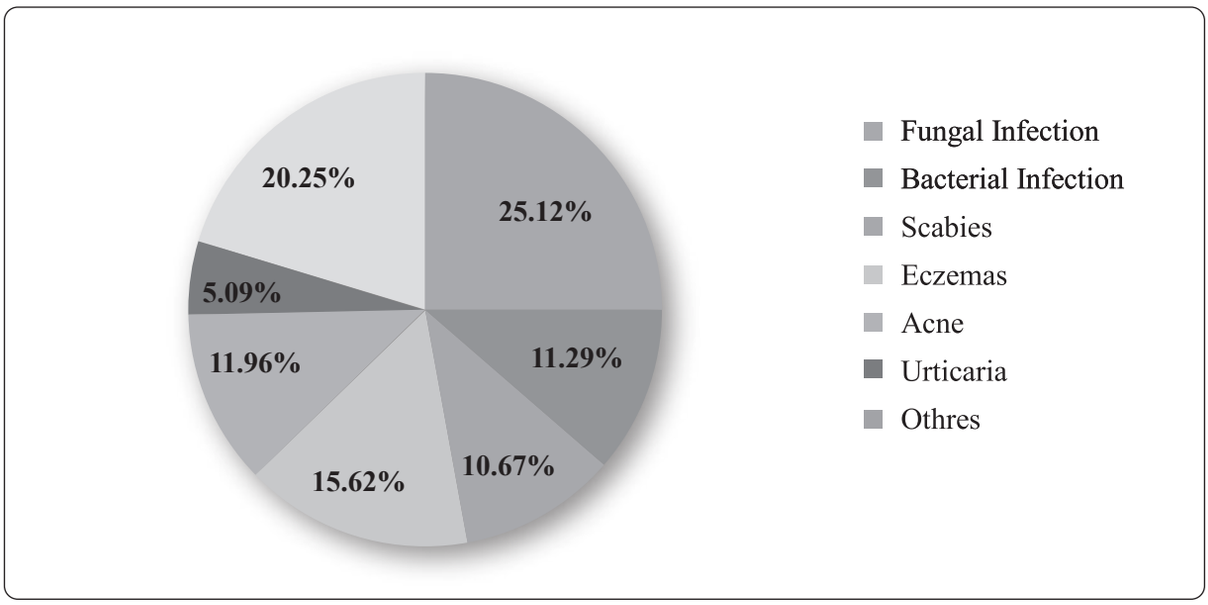

Figure 3 : Pie chart showing percentage of major dermatoses of both groups

Table 1: Infective Dermatoses

Diseases	No of Patients			Percentage	Average
	Male	Female	Total		
Fungal Infection (Dermatophytosis)					
Tinea Infection	2,250	2,375	4,625	17.50%	25.12%
Pityriasis Versicolor	643	869	1,512	5.72%	
Candidiasis	134	369	503	1.90%	
Bacterial Infection					
Pyoderma	660	890	1,550	5.86%	
Pitted Keratolysis	586	421	1,007	3.81%	
Non gonococcal Urethritis	268	52	320	1.21%	11.29%
Gonorrhoea	25	0	25	0.09%	
Chancroid	68	0	68	0.26%	
Syphilis	10	06	16	0.06%	
Parasitic Infection					
Scabies	1,832	987	2,819	10.67%	10.67%
Viral Infection					
Viral warts	269	221	490	1.85%	
Molluscumcontagiosum	327	109	436	1.65%	
Herpes Zoster	115	70	185	0.70%	4.48%
Varicella (Chicken Pox)	76	49	125	0.47%	
Herpes Genitalis	37	09	46	0.17%	
Total	**7,300**	**6,427**	**13,727**	**52%**	**52%**

Table 2: Non-Infective Dermatoses

Diseases	No of Patients			Percentage
	Male	Female	Total	
Eczema	1,646	2,481	4,127	15.62%
Acne	854	2,306	3,160	11.96%
Urticaria	552	793	1,345	5.09%
Psoriasis	510	456	966	3.64%
PalmoplanterKeratoderma	378	190	568	2.15%
Lichen Planus	236	273	509	1.93%
Vitiligo	181	269	450	1.70%
Vesiculobullous Disease	186	240	426	1.61%
Acrodermatitis enteropathica	198	207	405	1.53%
Erythema Multiforme	150	250	400	1.51%
Naevus	70	75	145	0.55%
Alopecia	40	58	98	0.37%
Keloid	23	27	50	0.19%
Psychosexual disorder	46	0	46	0.17%
Basalcell Carcinoma	05	02	07	0.03%
Total	**5,075**	**7,627**	**12,702**	**48%**

Discussion

In this study the prevalence of infective disorders (52%) has outstripped that of non-infective disorders (48%), this trend was noticed in other previous studies varying from 42.68% to 89.72% [10,11,12,13]. However, some studies have reported higher prevalence of non-infective disorders varying from 53.17% to 58.07%[14,15,16]. This variance could possibly be due to differing susceptibilities in different population groups in diverse geographical regions[10]. Among the infective condition's fungal infections (25.12%) were most common disorder, of which dermatophytosis constituted (17.50%), the largest number of cases among fungal infections in our study. Similar findings were found in studies conducted by Grover et al.[10] Kuruvilla et al.[12] Rao et al.[15] Higher prevalence of fungal infection is attributed to poor environmental hygiene, overcrowding and presence of very hot and humid climatic conditions in some geographical regions [10].

Bacterial infection (11.29%) was a close second infective condition, of this pyoderma (5.86%) was common followed by pitted keratolysis (3.81%), comparable with studies done in Mangalore [12] where pyoderma (4.49%) and pitted keratolysis (4.82%). On the contrary higher incidence of pyodermas were noted in Dakshina Kannada (7.25%) [11], Imphal (9.10%) [14] and Guwahati (14.29%) [13]. The high incidence of bacterial infections may be due to low socioeconomic condition, hot humid climate and unhygienic working environment[16]. Farmers, agricultural laborer and fisherman were common victims of pitted keratolysis in our observation.

The low incidence of STD's (1.62%) may be because of patient's awareness. Use of protective measures and more over such patient prefer to attend private clinics due to the social stigma associated with the disease[3,14].

Scabies was a common parasitic infection and formed (10.67%) of cases and became the third common

disorder in this group. Prevalence of scabies in previous studies varying from 8.50% to 16.0%[12,14,15,16] comparable to our findings. The high prevalence of scabies may be due to the low socioeconomic status, poor personal hygiene, overcrowding and close contact[17].

Viral infection was relatively low (4.84%) in our study comparable to similar studies done in Kashmir (14%) [18], Trivandrum (5.10%) [19] and Pune (7.1%) [20]. Viral warts were the common viral infection.

Among the non-infective dermatoses' eczemas were most common skin disorder comprised (15.62%) of cases. Our findings were relatively lower but statistically insignificant from other previous studies varying from 16.17% to 33.93% [11, 13,14,15]. Acne constituted (11.96%) and was the second top dermatoses of this group; our findings were similar to other studies conducted by Aman S et al. [21] (11.03%) in Lahore and Yousof AK et al.[22] (11.9%) in Dhaka; but in contrast some studies showed lower prevalence[3,14]. Higher prevalence may be due to excessive use of cosmetics, steroid preparations, skin whitening cream, hot humid weather, and also psychological aspects and emotional stress are other contributing factors.

Urticaria was found in (5.09%) of cases and constituted third common disorder of non-infective conditions. Our findings were comparable to studies done in Imphal[14] (5.68%) and Lahore[21] (4.06%). Among papulosquamous disorders psoriasis was found in (3.64%) and lichen planus in (1.93%) of cases. Aman S in Lahore[21] and Das S in Bankura[23] have found psoriasis (3.80%) and (4%) respectively, comparable to our findings but percentage of psoriasis reported in majority of studies in general population are around 1 to 2 % [23]. Lichen planus (1.93%) was comparable to Das S et al [23] (1.72%) in Bankura. Keratinization disorder mainly palmoplantar keratoderma was present in (2.15%) of cases comparable with (2.58%) seen in Bankura[23]. Pigmentary disorder, vitiligo was found in (1.7%), similar frequency (1.2%) seen by Alam MN in Dhaka[24]. Vesiculobullous disease found in our OPD was (1.61%) similar to Aman S in Lahore[21] (1.66%) close to our study. Interestingly we also found Acrodermatitis enteropathica in (1.53%) of cases, an autosomal recessive disorder in our study group. We have not found any comparative study about this. Besides, we also came across few other cases of non-infective dermatoses of smaller percentage in our study.

Conclusion

Our study found a higher prevalence of infective dermatoses than non-infective dermatoses, fungal infections and eczemas formed the largest group in their respective field. Pattern of skin disorders is an index of community development and the quality of available health care. From this study we can conclude that better health education, maintaining personal hygiene, improvement in the standard of living, environmental sanitation, proper case diagnosis and proper treatment will help in prevention and control of such common cutaneous disorders.

References

1. Abolfotouch MA, Bahamadan K. Skin diseases among blind and deaf male students in southwestern Saudi Arabia. Ann Saudi Med. 2000;20 (2): 161-169.

2. Williams HC. Epidemiology of skin diseases. In: Burns T, Breathnach S,Cox N, Griffiths C, editors. Rooks Text book of Dermatology. 7th ed. Oxford: Blackwell science. 2004:6.1-6.21

3. Sarker SK, Islam AKMS, Sen KG, Ahmed ARS. Pattern of Skin diseases in patients attending OPD of dermatology department at Faridpur Medical college Hospital, Bangladesh. Faridpur Med Coll J. 2010; 5(1): 14-16.

4. Najdawi F, Fa'ouri M. Frequency and types of Skin disorders and associated diabetes mellitus in elderly Jordanians. La Rev St Mediterr Orient. 2002; 8: 574-578.

5. Symvoulakis Ek, Krasagakis K, Komninos ID, Kastrinakis I, Lyronis I, Philalithis A, et al. Primary care and pattern of skin diseases in a Mediterranean island. BMC Fam Pract. 2006; 7:6.

6. Rook A, Savin JA and Wilkinson DS. The prevalence, incidence and ecology of diseases of skin. In: Rook A, Willkinson DS, Ebling FJ, champion RH, Burton JL. Text book of Dermatology. Oxford university press: Mumbai. 1987:39-53

7. Bahamdan KA, Egeno JU, Khare AK, Tallab T, Ibrahim K and Mured M. The pattern of skin diseases in the Asir region, Saudia Arabia: A 12 month prospective study in a referral hospital. Ann Saudi Med. 1995;15: 455-7.

8. Dayal SG, and Gupta GD. A cross section of skin diseases in Bundelkhand region, UP. Ind J Derm Ven Leprol. 1972; 43: 258-61.

9. Dorga S, and Kumar B. Epidemiology of skin diseases in school children; A study from Northern India pediater Dermatol. 2003; 20(6): 470-3.

10. Grover S, Ranyal RK, Bedi MK. A cross section of skin diseases in rural Allahabad. Indian J Dermatol venereol Leprol. 2008;53:179-181.

11. Kuruvilla M, Sridhar KS, Kumar P, Rao G. pattern of skin diseases in Bantwal Taluk, Dakshina Kannada.Indian J Dermatol venereol Leprol. 2000; 66: 247-8.

12. Kuruvilla M, Dubey S, Gahalaut P. pattern of skin diseases among migrant construction workers in Mangalore. Indian J Dermatol venereol Leprol. 2006;72:129-32.

13. Das KK, pattern of dermatological diseases in Guwahati Medical College and Hospital Guwahati. Indian J Dermatol venereol Leprol. 2003;69:16-18.

14. Devi T,Zamzachin G, pattern of skin diseases in Imphal. Indian J Dermatol 2006;51:149-50.

15. Rao GS, Kumar SS, Sandhya. Pattern of skin diseases in an Indian village. Indian J Med Sci. 2003;57:108-10.

16. Ramni TV, Jayaka PA, Bacteriological study of 100 cases of pyoderma with special reference to staphylococci, their antibiotic sensitivity and phage pattern. Indian J Dermatol venereol Leprol. 1980;46:282.

17. Nair BKH, Joseph A, Epidemiology of scabies. Indian J Dermatol venereol Leprol 1973;39:101-5.

18. Jaiswal AK, Singh Gurmail. Pattern of skin diseases in Kashmir region of India. Indian J Dermatol Venerol Leprol. 1999;65:258-60.

19. Nair S Pradeep, Nair TV, Gopala Krishnan. pattern of dermatological diseases in Trivandrum. Indian J Dermatol Venereol Leprol. 1999;65:261-63.

20. Sayal SK, Das AL, Gupta CM, Pattern of skin diseases among civil population and Armed forces personel at pune. Indian J Dermatol Venereol Leprol. 1997;63:29-32.

21. Aman S, Nadeem M, Mahmood K, Ghafoor MB. Pattern of skin diseases among patients attending a tertiary care hospital in Lahore, Pakistan. J Taibah univ Med Sc. 20017;12(5):392-396.

22. Yousof AK, Joarder Y, Akter A et al. Pattern of skin diseases in patients attended OPD of dermatology & Venereology in a tertiary care teaching hospital Bangladesh. Bangladesh J physiol pharmacol. 2013;(1&2):8-11.

23. Das S, Chatterjee T, pattern of skin diseases in a peripheral hospital's skin OPD: A study of 2550 patients. Indian J Dermatol. 2007;52:93-95.

24. Alam MN, Hussain A, Quarashi SA, The pattern of skin and venereal disorders among patients attending in the OPD of dermatology & Venereology department of a tertiary care private Hospital, Dhaka, Bangladesh. Journal of Pakistan Association of Dermatologists. 2007;27(1):10-14.

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Original Article

A study on Pattern of Electrolyte Disturbance in Acute Stroke Patients in a tertiary care Hospital in Bangladesh

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**For correspondence*

Abstract

Background: *Stroke is defined as a clinical syndrome characterized by rapidly developing clinical symptoms and/or signs of focal or global loss of brain functions, lasting more than 24 hours or leading to earlier death, with no apparent causes other than of vascular origin. It is a common medical emergency. It is the second most common cause of death in the developed world. There are different types of stroke; the most common is ischemic type.*

Objectives: *This observational study was designed to identify the pattern of electrolyte imbalance in acute stroke patient.*

Methods: *It was done in medicine department of President Abdul Hamid Medical College Hospital, Karimganj, Kishoreganj from March to December 2018. Patient having stroke admitted in medicine wards were selected. The patients were selected at random and irrespective of age and sex. Serum electrolyte and CT scan of brain were done in all patients. Random blood sugar level was also done to see whether the patient is diabetic or not.*

Results: *Total 60 patients are enrolled in our study. Out of which 41(57.6%) are ischemic stroke while 19(42.4%) are hemorrhagic stroke. Among 60 patients 36(60%) are male and 24(40%) are female. Age group of stroke patients included in this study are 40 years and above. In ischemic group 23(56.1%) are male and 18(43.9%) are female. In hemorrhagic group 11(57.9%) are male and 8(42.1%) are female. This study reveals out of 60 patients 34 having electrolyte imbalance 32, 22 and 06 patients having normal Serum Na^+ level, hyponatremia and hypernatremia respectively. On the other hand, 43, 16 and 01 patients having normal serum K^+ level, hypokalemia and hyperkalemia. Along with these 54 having normal serum chloride level whereas rest 06 has chloride imbalance.*

Conclusion: *It is evident that electrolyte disturbances are quite common in acute stroke and is seen in all types of acute stroke. The frequency electrolyte disturbances, hyponatremia and hypokalemia were most common abnormalities.*

Key words: *Acute stroke, Electrolyte disturbances, Hyponatremia, Hypokalemia*

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Introduction

Stroke is defined as a clinical syndrome characterized by rapidly developing clinical symptoms and/or signs of focal or global loss of brain functions, lasting more than 24 hours or leading to earlier death, with no apparent causes other than of vascular origin. It is a common medical emergency. It is the second most common cause of death in the developed world[1]. Transient Ischemic Attacks (TIAs) are episodes of stroke symptoms that last only briefly the standard definition of duration is <24 hours, but most TIAs last <1 hour[2].

Permeance of stroke in Bangladesh population is 1.7% and constitute 8.9 % of hospital admission among those aged 30 and above[3]. Stroke risk increases with age but one quarter of all strokes occur before the age of 65. Approximately two-thirds of the global burden of stroke is in the middle- and low-income countries. It is rising in association with less healthy life styles. Patient often has history of Hypertension, Diabetes Mellitus, Mitral or Aortic stenosis or Atherosclerosis[4].

Hyponatremia (plasma Na^+ < 135 mmol/L) is a common electrolyte abnormality which is often asymptomatic. The likelihood of symptoms occurring is related more to the speed at which electrolyte abnormalities develop rather than their severity. When plasma osmolarity falls rapidly, water flows into cerebral cells which become swollen and ischemic. The causes of hyponatremia are best categorized according to any associated changes in the ECF volume. Artefactual causes of hyponatremia should also be considered. These can occur in the presence of severe hyperlipidemia or hyperproteinemia, when aqueous fraction of the plasma specimen is reduced because of the volume occupied by the macromolecules. Transient hyponatremia may also occur due to osmotic shifts of water out of cells during hyperosmolar states caused by acute hyperglycemia or by mannitol infusion. Volume status and serum osmolarity are essential to determine etiology. Hyponatremia usually requires excess water retention relative to sodium rather than sodium deficiency. The sodium concentration is not a measure of total body sodium. Hypotonic fluids commonly cause hyponatremia in hospitalized patients. Cerebral salt wasting is a distinct and rare subset of hypovolemic hyponatremia seen in patient with intracranial disease (e.g. infections, cerebrovascular accidents, tumors and neuro-surgery). Clinical features include refractory hypovolemia and hypotension often requiring continuous infusion of isotonic or hypertonic saline & ICU monitoring. The exact pathophysiology is unclear and includes renal sodium wasting possibly through B-type natriuretic peptide, ADH release and decreased aldosterone secretion[5,6,7].

Method

The study was done in medicine department of President Abdul Hamid Medical College Hospital, Karimganj, Kishoreganj from June to December 2018. Patient having stroke admitted in medicine wards were selected. The patients were selected at random and irrespective of age and sex. Sample size was 60 patients, to find out the electrolyte disturbance in acute stroke patients.

Inclusion criteria

1. Patient age-40 years and above
2. Non-diabetic
3. Acute stroke (Ischemic or hemorrhagic) evidence by CT scan
4. Serum electrolyte

Exclusion criteria

1. Previous History of Stroke
2. Transient Ischemic Attack (TIA)
3. Space-occupying lesion (SOL)
4. CNS infections
5. Diabetes Mellitus (DM)

Informed consent has taken before including the patient in the study. Consent has taken from the patient as well as from their relatives and care-givers. Demographic profiles including age, gender, blood pressure and family history of diabetes mellitus are recorded for each patient serum electrolyte, serum creatinine & random blood glucose are measured.

Results

Total 60 patients are enrolled in our study. Out of which 41(57.6%) are ischemic stroke while 19(42.4%) are hemorrhagic stroke (Table I). Among 60 patients 36(60%) are male and 24(40%) are female. Age group of stroke patients included in this study are 40 years and above. In ischemic group 23(56.1%) are male and 18(43.9%) are female. In hemorrhagic group 11(57.9%) are male and 8(42.1%) are female (Table II).

After admission into hospital according to blood pressure measurement findings are 26(43.3%), 31(51.7%) and 3(5%) normotensive, hypertensive and hypotensive

respectively. Our study shows in case of ischemic stroke number of normotensive patients 17(41.5%), hypertensive patient 20(48.8%) and hypotensive patient 4(9.7%). On the other hand, in case of hemorrhagic stroke number of normotensive patients is 09 (47.4%) and hypertensive patient is 10(52.6%) (Table III).

In this study among 60 patients 26 (43.33%) patients has normal electrolyte level & 34 (56:67%) patients has electrolyte imbalance (Table IV). In 41 patients of ischemic stroke 16 (39.02%) has normal electrolyte level & 25(60.98%) has electrolyte imbalance. Among the 19 hemorrhagic stroke patients 10 (52.63%) has normal electrolyte level & 09 (47.37%) has electrolyte imbalance.

In case of serum Na level out of 60 patients 32 (53.33%) has normal Na level, 22 (36.67%) has hyponatremia & 06 (10.00%) has hypernatremia. In 41 patients of ischemic stroke 21(51.22%) has normal Na level, 16(39.02%) has hyponatremia & 04(09.76%) has hypernatremia. Among the 19 hemorrhagic stroke patient 11(57.89%) has normal Na level, 06(31.58%) has hyponatremia & 02(10.53%) has hypernatremia (Table V).

Measurement of serum K^+ level reveals that out of 60 patients 43(71.67%) has normal K^+ level, 16(26.67%) has hypokalemia & 01(1.66%) has hyperkalemia. In 41 patients of ischemic stroke 28(68.29%) has normal K^+ level, 12(29.27%) has hypokalemia & 01(2.44%) has hyperkalemia. Among the 19 hemorrhagic stroke 15(78.95%) has normal K^+ level, 04(21.05%) has hypokalemia & no patient found with hyperkalemia (Table VI).

Out of 60 patients 54(90.00%) has normal chloride level, 03(05.00%) has hypochloremia& 03(05.00%) has hyperchloremia. Among the 41 patients of ischemic stroke 37(90.24%) has normal chloride level, 01(02.44%) has hypochloremia& 03(7.32%) has hyperchloremia. Among the 19 hemorrhagic stroke 17(89.47%) has normal chloride level, 02(10.53%) has hypochloremia& no patient found with hyperchloremia (Table VII).

Table I: Age distribution

Age	Ischemic stroke	Hemorrhagic stroke	Total number
40-50	03	01	04
51-60	19	06	25
61-70	13	06	19
>70	6	06	12
Total	**41**	**19**	**60**

Table II: Gender variation

Gender	Ischemic stroke	Hemorrhagic stroke
Male 34	23(26.1%)	11(57.9%)
Female 26	18(43.9%)	8(42.1%)

Table III: Status of blood pressure

Status	Ischemic stroke	Hemorrhagic stroke	Total number
Normal blood pressure	17	9	26
Hypertension	20	10	30
Hypotension	4	0	0
Total	**41**	**19**	**60**

Table IV: Electrolyte imbalance

Status	Normal Electrolyte level	Electrolyte Imbalance	Total
Ischemic stroke	16 (39.02%)	25 (60.98%)	41
Hemorrhagic stroke	10(52.63%)	09 (47.37%)	19
Total	**26 (43.33)**	**34 (56.67%)**	**60**

Table V: Serum Na^+ level

Status	Normal Na^+	Hyponatremia	Hypernatremia	Total
Ischemic stroke	21 (51.22%)	16 (39.02%)	04. (09.76%)	41
Hemorrhagic stroke	11 (57.89%)	06 (31.58%)	02 (10.3%)	19
Total	**32 (53.33%)**	**22 (36.67%)**	**06 (10.00%)**	**60**

Table VI: Serum K^+ level

Status	Normal K^+	Hypokalemia	Hyperkalemia	Total
Ischemic stroke	28 (68.29%)	12 (29.27%)	01 (2.44%)	41
Hemorrhagic stroke	15 (78.95%)	04 (21.05%)	00 (0.00%)	19
Total	**43 (71.67%)**	**16 (26.67%)**	**01 (1.66%)**	**60**

Table VII: Serum Cl^- level

Status	Normal Cl^-	Hypochloremia	Hyperchloremia	Total
Ischemic stroke	37 (90.24%)	01(02.44%)	03(7.32%)	41
Hemorrhagic stroke	17 (89.47%)	02(10.53%)	00(0.00%)	19
Total	**54(90.00%)**	**03(05.00%)**	**03(5.00%)**	**60**

Discussion

According to World Health Organization about 15 million suffer stroke worldwide every year. Of these 5 million dice and 5 million are permanently disabled. Stroke is dominantly occurred at the middle age group or above and is commonly found in male than female.' The current study also revealed that most of the patients are male (56.67%) in comparison to Female (43.33%). And majority of the patients belongs to age group 51-60 years which similar to other studies[8,9,10].

Among 60 patients 43.33% has Normal blood pressure whereas 50% and 6.67% having hypertension and hypotension respectively. Higher rates of hemorrhagic stroke in our country may be due to inadequate treatment or no treatment of hypertension by many of our patients due to poverty and lack of health awareness and poor drug compliance[8]

In this study 56.67% of all stroke patients had electrolyte imbalance. Among 41 of ischemic stroke almost 61% has electrolyte imbalance and in case 19 hemorrhagic stroke patients 47.37% has electrolyte imbalance which is very much near to other studies[7,9].

Sodium being the chief cation of extracellular fluid, maintains the osmotic pressure, fluid balance and cell permeability. Potassium being the chief cation of intracellular fluid, also participates in regulation of water electrolyte balance and osmotic pressure. During permanent ischemia, blood sodium rapidly enters the extracellular fluid of the brain, leading to consequences

of brain edema, therefore we hypothesized that higher serum sodium levels are associated with higher risk and exacerbation of events following brain ischemia[10.11]. Hyponatremia is the most common abnormality seen in hospitalized patients and is also the most common electrolyte imbalance seen in critically ill neurologic patients. SIADH (Syndrome of Inappropriate ADH secretion) if is a sub clinically volume expander state due to inappropriate anti-diuresis. This causes excessive volume overload over the body sodium content leading on to euvolemic hyponatremia[12]. SIADH is considered an important reason for hyponatremia in stroke patients. These Patients continue to secrete hyperosmolar urine in the face of serum hypoosmolarity[13].

In our study 36.67% of all stroke patients had hyponatremia. Among 41 ischemic stroke 39.02% has hyponatremia and in case of hemorrhagic stroke 31.58% has hyponatremia. Only 10% of total patients have hypernatremia. Among 41 of ischemic stroke 09.76% has hypernatremia and among 19 hemorrhagic stroke 10.53% has hypernatremia. These findings are similar to other studies[8,9].

In case of serum K^+ level 26.67 % has hypokalemia. Among the patients of ischemic stroke 29.27% and 2.44% having hypokalemia and hyperkalemia respectively. Among hemorrhagic stroke patients 21.05% having hypokalemia with no patient found with hyperkalemia. Total 10% patients having chloride imbalance distributed equally as hypochloremia and hyperchloremia. This finding is similar to other study[8]. However, both hyponatremia and hypokalemia were more common in ischemic stroke which is similar to the study of Hasan MK at el[7] but differ from the study of Kusuda K et al[14] and Siddique MR et al[15]. who found these to be more common with hemorrhagic stroke.

Conclusion

This study reveals that electrolyte disturbances are quiet common problem in acute stroke. Hyponatremia and hypokalemia are most common electrolyte abnormalities in both ischemic & hemorrhagic stroke. Electrolyte imbalance may adversely affect outcome of stroke. So, serum electrolyte should be determined in every patient with stroke. Early detection & management can improve the overall outcome of stroke patient. Patients who had no electrolyte imbalance had good outcome and it was statistically significant. The study also showed that there was strong association between hyponatremia or hypokalemia and outcome of stroke.

References

1. Wide S, Sonith, S. Claiborne J & Claude H. Cerebrovascular Diseases. Harrison's Principles of Internal Medicine. 19th edition. Kasper, Fauci, Hauser, Longo, Jameson, Loscalzo. Mc GrawHillEducation, New York. 2015; 2:2568.
2. Paul J. Neurological disease. Kumar and Clark Clinical Medicine 10th edition. Parveen Kumar and Michacel Clark. Elsever, London. 2018:829.
3. Kerry C. Cho. Electrolyte & Acid- BaseDisorders. Current Medical Diagnosis and Treatment. Maxihe A. Papadakis, Stephen J. Mcphee. Mc Grow Hill, New York. 55th edition. 2018.870-871..
4. Field MJ, Burnett L, Sullivan DR, Stewart P. Clinical Biochemistry and Metabolism. Davidson's Principles and Practice of Medicine. 22nd edition. Brian R. Walker, Niciki R Colledge, Stuart H. Relston, lan D Penman. Churchil Livingstone Elsever, London. 2014:437.
5. Bandyopadhyay M, Jatua KS, Adhikari M, Bhandari A. Study of Electrolyte Abnormality in Acute Stroke. Annals of InternationalMedical and Dental research. 2017; 3(5): 4-8
6. Mieke AHN, Kembuan, Sekplin AS. Sekeon. Electrolyte disturbances among acute stroke patients in Monado, Indonesia, Global Journalof Medicine and Public Health. 2014; 3(1):3-5
7. Hasan MK, Hasan AB, Rubaiyat KA. Electrolyte Disturbance in Acute Phase of Stroke Patients, Dinajpur Med Col J. 2013; 6(1):14-15.
8. Siddiqui MR, Islam QT, Haque MA, Iqbal MJ, Hossain A, Rahman YU, Mahbub MS, Sazzad AA. Dyselectrolytaemia in Acute Stroke Patients, An Observational Study, Bangladesh J Medicine. 2011; 22:30-34:33.
9. Hasan HM, Idriss HM and Sarah MES. Risk factors, electrolyte disturbance and lipid profiles in Sudanese patients with stroke, Journal of Public Health and Epidemiology. 2015;7(10): 328.

10. Nemade TS, Patil SM, Chaudhari AR and Vankudre JA. Serum Electrolyte Levels (Sodium and Potassium) in Cerebrovascular Accidents at a tertiary Care Hospital. A Case Control Study, MVP Journal of MedicalSciences. 2015; 2(1):2.

11. Chakraborty S, Ghosh K, Hazra R, Biswas NR,Ghosh S, Bhattacharya A et al. Serum and urinary electrolyte levels in Cerebro-Vascular Accident patients: A cross sectional study, American Journal of Internal Medicine. 2013;1(4):38.

12. Kumar N & Mithra P. Hyponatremia in stroke: Cerebral Salt Wasting Versus Syndrome of Inappropiate Anti-Diuresis, IOSR Journal ofDental and Medical Sciences. 2016; 15(7):1-6.

13. Roy SK, Bandyopadhay R, Paul R, Chakraborty S, Ray D, Mitra S et al. Study on serum and electrolyte changesin cerebrovascular accident, Journal, Indian Academy of Clinical Medicine. 2014;15 (2):93-94.

14. Kusuda K, Saku Y, Sadoshima S. Disturbances of fluid and electrolyte balance in patients with acute stroke; Nihon Ronen IgakkaiZasshi. 1989; 26(3): 223-7.

15. Siddique NAM, Nahar Z, Mahbub SM, Alam BM, Miah TM. Clinical Presentation and Epidemiology of Stroke – A Study of 100 Cases. J Medicine. 2009; 10: 88-89.

Original Article

Assessment of Frontal Air Sinus index to determine sexual dimorphism among Bangladeshi Adult

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Abstract

Background: *The frontal air sinus study can be used by anatomist, radiologist, and anthropologist and also by clinicians for diagnosis of diseases. The frontal air sinus value is important for sex differentiation, age determination and personal identification because individual's frontal sinus characteristics makes the frontal bone unique for every individual.*

Objective: *The aim of this study were done to determine and compare the gender differences of frontal air sinus index among the Bangladeshi adult.*

Methods: *The cross sectional analytical study was conducted in the Department of Anatomy, Dhaka Medical College, Dhaka, from January 2016 to December 2016. The study was performed on 100 radiographs of Caldwell view of skull of adult Bangladeshis. Out of 100 radiograph, 50 were of male and 50 were of female. The Caldwell radiograph of the frontal air sinus of selected individual were collected and viewed on the x-ray view box, traced on transparent graph paper sheet placed on the each radiograph film and height and width of the frontal air sinus was measured and frontal sinus index was calculated by dividing the height by width of the frontal air sinus. Unpaired Student's t-test, paired Student's t-test were done for statistical analysis of the results.*

Results: *Mean of right frontal air sinus index was observed significantly higher (p=0.003) in male than female. Mean of left frontal air sinus index was also observed significantly higher (p=0.001) in male than female. In both male (P=0.370) and female (P=0.427), the right frontal sinus index was not significantly higher than left frontal air sinus index.*

Conclusion: *The result of the present study demonstrates that the height and width of left frontal air sinus was significantly higher than right frontal air sinus both in male and female. The frontal air sinus height and width was higherin male than female which were highly significant.*

Keywords: *Frontal air sinus index.*

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Introduction

The frontal sinus is an air filled cavity located within the frontal bone among the paranasal sinuses[1]. It contains two chambers which are typically asymmetrical, due to the independent development of each sinus and which are separated by a bone septum[2] and septum usually deviates from midline. Occasionally one or both sinuses may be absent[3]. It develops during the fourth week of intrauterine life and continues to grow after birth until early adulthood by antero superior pneumatisation of the frontal recess into the bone[4]. Though the frontal sinus bud is present at birth in the ethmoid region radiologically evident after sixth year[5] when it project above the orbital rim[1]. The frontal sinus development showed a growth rhythm similar to body height development and the development is peak at the puberty[2]. Pneumatisation of the skull is strictly connected with the morphology and degree of development of paranasal sinuses[5]. The frontal sinus area, size, shape differs from person to person and race to race[6]. Directional bilateral asymmetries in human gross morphology are largely attributable to differential mechanical loading from handedness from endochondral bone growth. Asymmetry of frontal sinus inside the cranium is a consequences of cerebral laterility[7]. Individual differences in the growth and desorption processes of the mucosa, the quality of the frontal bone which is to be pneumatized, the pressure of growing brain on the internal lamina of the frontal sinus area, the various pressure and hydrodynamic conditions of the end cranium of affects the blood supply of the frontal sinus area and hereditary factor also affects frontal sinus area pneumatization[5]. The frontal sinus is a cavity present inside the frontal bone, it is of significance in forensic identification due to its irregular shape and because of individual characteristics which make frontal bone unique for every individual[8]. Even in monozygotic twin the frontal sinuses provide a unique morphological value very much similar to the role of fingerprint[9] and DNA test[10]. The human skull has been extensively studied ante and post mortem for identification purposes both in anatomical and radiological assessments[10]. As morphologically cranium differs between male and female, frontal sinus is smaller in female than male[11]. Thus frontal sinus plays important role for sex determination[10]and the determination of gender of unknown person is of vital importance in forensic investigations, such especially in cases where only fragments of the skull remain and there is no possibility of identification. Radiographic comparison of osteological structures like frontal air sinus has been commonly used to confirm identification of human remains that are highly decomposed, burnt or disfigured[10]. Moreover, the plain radiograph analyzed by the clinicians are important to know the anatomy, size and variants of the frontal sinus for specific populations. It is important for surgeons to be aware of the variations that may predisposed patients to increase the risk of intra operative complications and help to avoid possible complications[12]. Aim of this study is to analyze and compare the sexual variation of the frontal air sinus index among the adult Bangladeshi people.

Materials & Methods

The cross sectional analytical study was carried out in the Department of Anatomy**,** Dhaka Medical College, Dhaka, from January 2016 to December 2016. The study was performed on 100 radiographs of Caldwell view of skull of adult Bangladeshis. Out of 100 radiograph, 50 were of male and 50 were of female age ranging from 20 to 50 years. Individual with history or X-ray showing any feature of sinusitis, repeated common cold, chronic headache, trauma or surgery of the skull or face including eye, ear and nose, any clinical characteristics of endocrine disturbances or systemic disorder or any sort of cranial asymmetry or facial asymmetry were excluded from the study. X-ray machine was used for doing skull radiograph Caldwell view. The study subject was in erect posture in posterior - Anterior position in front of a part of the x-ray machine facing stand greed. Cassette of stand greed machine had imaging plate which was kept towards head position. Vertical axis was in the parallel to the film in Caldwell projection and no space between frontal bone and cassette. Center of the forehead and nose was adjusted in a position so that the mid sagittal plane is perpendicular to the plane of film and the orbitomeatal line forms an angle 15 degrees from the plane of the film. Then head was immobilized in that position and shoulder was adjusted in the same horizontal plane. The subject was advised to suspend the respiration for the exposure. Using a well

collimated beam the horizontal central ray is centered in the midline to the occipital region at the level of the lower orbital margin. Radiation was projected on imaging plate and it was transformed in the monitor for editing, zooming of the radiograph. It was zoomed at 100%. AGFA printer was used for printing the x-ray film. The radiographs collected from every selected individual and viewed on the x-ray view box and transparent graph paper sheet was placed on the view box containing radiograph and frontal air sinus was traced on transparent graph paper sheet placed on the each radiograph film and thendifferent dimension of the frontal air sinus was measured. All the measurement of frontal sinus was taken by drawing a tangential line above the superior border of the two orbits because the inferior limit of the frontal air sinus is not so clear [6].
The measurement was done according to sequence below by Camargo et al. [13]

- At first the radiography was placed on a view box and the transparent graph paper sheet was placed on the radiograph.
- The baseline (A) was drawn directly on the transparent graph paper at the level of superior border or upper limit of two orbit (inferior border of frontal sinus) as illustrated in figure.
- The separation between the right and left frontal sinus was based on the frontal inter-sinus septum in order to permit quantifying one width on each side.
- The height of each side (B and C) was determined by marking and drawing a straight line between baseline and upper limit of the frontal sinus.
- The largest width (D and E) of the frontal sinus was determined by marking and drawing a straight lines from the maximum distance between the medial and lateral lines of the right and left side of the frontal sinus.
- Linear measurements of height and width of frontal air sinus was obtained from the each radiograph by counting the boxes of graphpaper, height and width were expressed in centimeters(cm).
- Square box was counted within the sinus and area covering more than 50% of the square was considered.

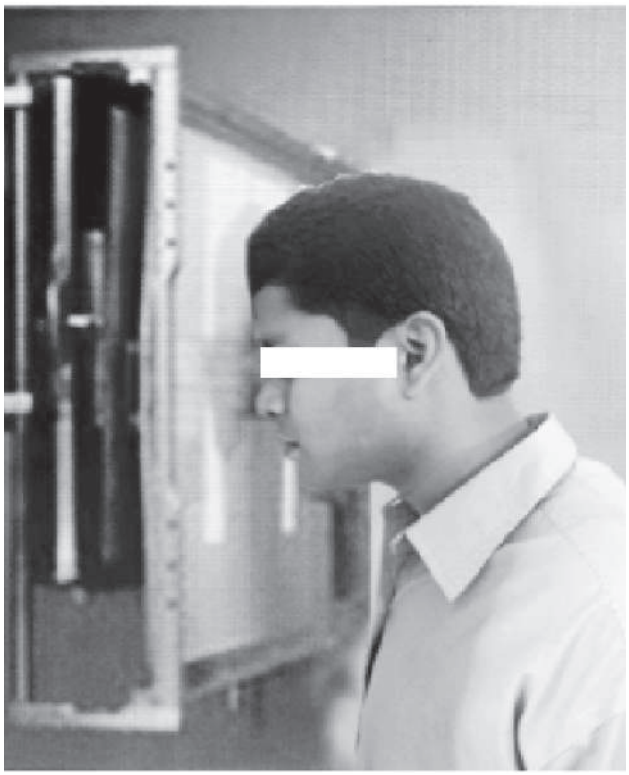

Figure 1 : procedure of taking caldwell view radiograph of skull

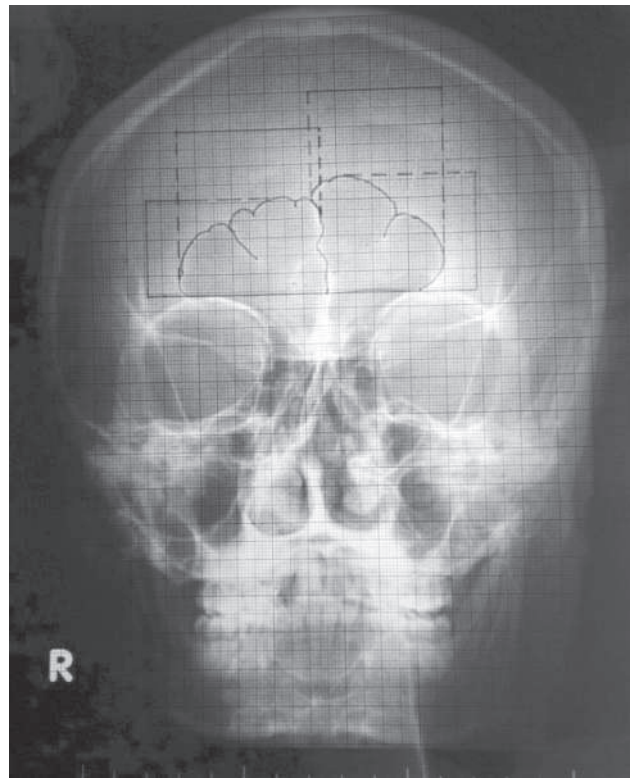

Figure 2 (i) : procedure of tracing caldwell view radiograph.

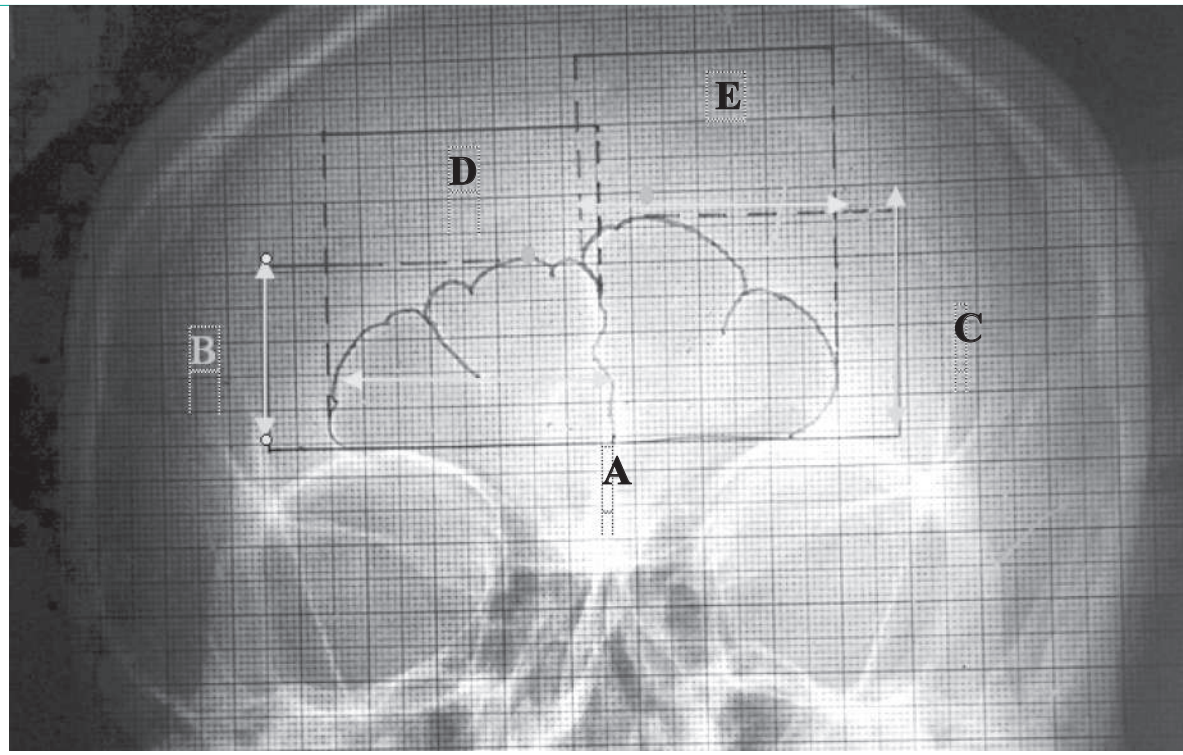

Figure 2 (ii) : procedure of estimating of height, width of right and left frontal sinus.

- Red dot indicate highest point of right and left frontal air sinus.
- Arrow indicate height of right (line B) and left (line C)frontal air sinus
- Green dot indicate widest point of right and left frontal air sinus.
- Arrow indicate width of the right (line D) and left (line E) frontal air sinus.

- All these measurements were obtained by the portion projecting above the baseline .The separation of the right and left side of the frontal sinus was based on the inter-sinus septum which denotes the margin between the two main sinus cavities.
- frontal sinus index was calculated by dividing the height by width of the frontal air sinus[12]

Paired Student's t-test were done to compare the differences between height of the right and left frontal air sinus and width of the right and left frontal air sinus. Unpaired Student's t-test were done to analyze the differences between right and left frontal air sinus dimension between male and female. Statistical significance was accepted at ($p<0.05$). Procedure measurement from radiograph of frontal air sinus height and width is shown in figure 1, 2 (i), 2 (ii)

Result

The height of right & left frontal air sinus in male are 1.66 ± 0.69 cm & 1.93 ± 0.94 cm respectively. The width of right & left frontal air sinus in male are 3.22 ± 0.93cm &3.55 ± 1.07 cm respectively.In Female the height & width of right frontal air sinus are 1.15 ±0.73 cm & 2.60 ± 0.97 cm. The height & width of left frontal air sinus are 1.38 ± 0.95cm & 3.04 ± 1.37cm in female. Mean of right frontal air sinus index was observed significantly higher ($p=0.003$) in male than female. Mean of left frontal air sinus index was also observed significantly higher ($p=0.001$) in male than female. In both male ($P=0.370$) and female ($P=0.427$), the right frontal air sinus index was not significantly higher than left frontal air sinus index.

Table I: Value of Height and width of right and left frontal air sinus in male and female

Group	Height in cm		Width in cm	
	Right (Mean ±SD)	Left (Mean ±SD)	Right (Mean ±SD)	Left (Mean ±SD)
Male (n=50)	1.66 ± 0.69	1.93 ± 0.94	3.22 ± 0.93	3.55 ± 1.07
Female (n=50)	1.15 ±0.73	1.38 ± 0.95	2.60 ± 0.97	3.04 ± 1.37

Comparison between male and female was done by Unpaired Student's't' test. Comparison between values of right and left frontal air sinus of same group was done by Paired Student's't' test. ns= not significant, *= significant, SD= Standard Deviation.

Table II: Comparison of right and left frontal air sinus index in male and female

Group	Frontal Air sinus index (Ratio between height / width)		
	Right (Mean±SD)	Left (Mean±SD)	*P value*
Male (n=50)	2.13 ± 0.75	2.02 ± 0.56	0.370 ns
Female (n=50)	2.86 ± 1.51	2.55 ± 0.72	0.427 ns
P value	0.003*	0.001*	

Comparison between male and female was done by Unpaired Student's't' test. Comparison between values of right and left frontal air sinus of same group was done by Paired Student's't' test. ns= not significant, *= significant, SD= Standard Deviation.

Discussion

In the present study mean right and left frontal index in male are 2.13 ± 0.75 & 2.02 ± 0.56. In female the mean right and left frontal index are 2.86 ± 1.51 & 2.55 ± 0.72. The mean of right frontal air sinus index was observed not significantly higher than the left frontal air sinus index in both male (p=0.370) and female (p=0.427). Both right frontal air sinus index (p=0.003) and left frontal air sinus index (p=0.001) was significantly higher in female than male. Similar kind of study was conducted by Patil and Revankar[12] where they have found mean frontal index in male and female are 2.59 ± 0.43 & 2.79 ± 0.32 respectively. Bengiac, Thiel and Haba[14] have found mean frontal index in male and female were 2.00 ± 0.64 & 2.57 ± 0.65 respectively. Patil and Revankar[12] they observed not significantly (p=0.2619) higher value of the frontal sinus index in female than male and our result correlate with the study of researcher Bengiac, Thiel and Haba[14], where they found significantly (p=0.0001) higher value of the frontal air sinus index in female than male.

Conclusion

The result of the present study demonstrates that the right frontal air sinus index was higher than left frontal air sinus both in male and female. This study not only help as a guideline for the anatomist, clinicians but also help in the medico-legal aspects of medical science.

References

1. Mathur H. Conventional Frontal Sinus Imaging in Identification of Sex Original Study in Population of Udaypur City, India. Journal of Medical Science and Clinical Research. 2013; 1(1):33-37.
2. Al-SheakliII, Mohammed SA and Taha SS. The frontal sinus dimensions in mouth and nasal breathers in Iraqi adult subjests. Journal of Baghdad College Dentistry.2013; 25(2):155-163.
3. Ponde MJ. Anatomical Variation of Frontal Sinus. International Journal of Morphology.2008;26(4):803-808.
4. Karadas S and Kavakli A. Morphological examination of the paranasal sinuses and mastoid air cells using computed tomography. Ann Saudi Med. 2005; 25(1): 41-45.
5. Silva RFD et al. Identification of charred body through the radiographic morphology of the frontal sinus. Annals of forensic Research and Analysis. 2014; 2(1): 18-23.
6. Yoshino M . Classification system of frontal sinus patterns by radiography. Its application to identification of unknown skeletal remains. Forensic Science International. 1987; 34: 289-299.
7. Kanat A. Frontal sinus asymmetry: Is it an effect of cranial asymmetry? x-ray analysis of 496 normal adult human frontal sinus. Journal of Neurosciences in Rural Practice. 2015;6:.511-14.
8. Verma S, Mahima VG and Patil K. Radio morphometric analysis of frontal air sinus for sex determination. Journal of Forensic Dental Sciences. 2014;6(3):177-82.
9. Neha et al. Morphometric evaluation of frontal sinus in relation to gender-a forensic study. Journal of Dental Science. 2015; 1(2):7-11.
10. Belaldavar C. Assessment of frontal sinus dimension to determine sexual dimorphism among indian adults. Journal of Forensic Dental Sciences. 2014;6(1):1-8.
11. Soman BA, Sujata GP and Lingappa A. Morphometric evaluation of frontal sinus in relation to age and gender in subjects residing in Davagere, Karnataka. Journal of forensic Dental Sciences. 2016; 8(1):1-8.
12. Patil AA and Revankar AV. Reliability of the frontal sinus index as a maturity indicator. India. Indian Journal of Dental Research. 2013;24:523.
13. Camargo R. The frontal sinus morphology in radiograph of Brazilian subjects: its forensic importance. Brazilian journal of morphological science.2007; 24(4): 239-43.
14. Bengiac AG, Thiel BA and Haba D. Reliability of the frontal sinus index for sex determination using CBCT. Romanian society of legal medicine.2015;6(1):275-78.

Original Article

Risk factors of mortality in patients with acute cholangitis

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Abstract

Background: *Acute cholangitis, when severe can be lethal. Early identification of risk factors associated with adverse clinical outcomes plays a key role in the management of acute cholangitis.*

Objective: *This study aims at identifying risk factors associated with mortality in patients with acute cholangitis.*

Methods: *This prospective, observational study was done in Square Hospital (Bangladesh) from August, 2017 to August, 2019. 113 consecutive cases of acute cholangitis who met the diagnostic criteria were included in the study. Acute cholangitis & its severity was defined by TG18 criteria. Multivariate analysis was performed to identify risk factors associated with mortality.*

Result: *Among 113 patients, 71(62.8%) were male and 42 (37.2%) were female & the median age was 51 years. The underlying biliary diseases were choledocholithiasis in 68(60.2%) patients, and malignant and benign strictures in 24(21.2%) and 10(8.8%) patients, respectively. Severe cholangitis occurred in 17(15%) cases. 81(71.7%) cases developed cholangitis in community setting & 32(28.3%) cases had nosocomial infection. History of prior biliary intervention was found in 33(29.2%) cases, while an indwelling biliary device was found in 25(22.1%) cases. Multidrug resistant bacteria comprised 30.91% of blood isolates. Risk factors associated with mortality were severe cholangitis (OR:6.9), malignant biliary obstruction (OR:8.4), nosocomial infection (OR:7.5) and isolation of multidrug resistant organisms in blood (OR:6.9).*

Conclusion: *Severe cholangitis, malignant biliary obstruction, nosocomial infection and isolation of multidrug resistant organisms from blood in patients with acute cholangitis were independently associated with increased risk of mortality.*

Keywords: Risk factors, Mortality, Acute Cholangitis.

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Introduction

Acute cholangitis is a clinical entity caused by bacterial infection of the biliary system, most commonly secondary to partial or complete obstruction of the bile duct or hepatic ducts. The diagnosis is established by the characteristic clinical symptoms and signs of infection, abnormal laboratory studies suggestive of infection and biliary obstruction, and abnormal imaging studies suggestive of biliary obstruction[1]. The main importance of this condition is that it is a very treatable condition if treated appropriately, but the mortality can be high if there is delay in treatment.

In approximately 85% of cases, cholangitis is caused by a stone embedded in the bile duct, with resulting bile

stasis.[2] Other causes of bile duct obstruction that may result in cholangitis are neoplasms, biliary strictures, parasitic infections, and congenital abnormalities of the bile ducts.[3] The bacterial species most commonly cultured from the bile are E. coli, Klebsiella, Pseudomonas, Proteus, and enterococci. Anaerobic species such as Bacteroides fragilis and Clostridium perfringens are found in about 15% of appropriately cultured bile specimens.[4] Diagnosis and severity assessment of acute cholangitis is made using the TG18 diagnostic criteria for acute cholangitis.[5-7] Several factors have been thought to be associated with mortality of acute cholangitis. Several studies tried to find out these risk factors associated with mortality in acute cholangitis. But no such study has been conducted in our country till now. This study tries to figure out various risk factors which significantly affect the clinical outcome of acute cholangitis.

Methods

Study population: This prospective and observational study was done in the department of Gastrointestinal, Hepatobiliary and Pancreatic Disorders (GHPD), Square Hospital (Dhaka, Bangladesh) from January, 2018 to August, 2019. 113 consecutive cases of acute cholangitis who met the diagnostic criteria were excluded in the study. Patients unwilling to give voluntary consent to participate in the study were also excluded. Consecutive type of non-probability sampling technique was applied to enroll the patients. Prior to the commencement of this study, the research protocol was approved by the Ethical Review Committee (ERC) of the institution. The aims and objective of the study along with its procedure, risk and benefits were explained to the patients in easily understandable local language and then informed consent was taken from each patient. A predesigned structured questionnaire was used for recording all the data.

Assessment of predictors for mortality: Acute cholangitis was diagnosed using the TG18 criteria[5-7]. Severity assessment of cholangitis was done using the TG18 criteria as well. Demographic data like age, sex, clinical data like presence of abdominal pain, jaundice, fever, GCS score, vital parameters were recorded. Laboratory data like hemoglobin, white blood cell count, CRP, platelet count, blood C/S results, FBS, HbA1c, BUN, serum creatinine, serum bilirubin, AST, ALT, alkaline phosphatase, gamma-GT, USG of whole abdomen & ERCP findings were recorded. Severity of acute cholangitis was defined by TG 18 criteria. Blood culture was obtained from every patient. Multivariate analysis was performed to identify risk factors which could affect mortality.

Statistics: All statistical analyses were performed using a statistical software package (SPSS version 22.0 for Windows; SPSS Inc., Chicago, IL, USA). Continuous variables were expressed as medians, and categorical variables as frequencies and percentages. Statistical analysis was performed using Pearson's chi-square test. Odds ratio was calculated for each of the risk factors under evaluation. Statistical significance was defined as a p-value of <0.05 (two-tailed).

Result

A prospective observational study was carried out to find out the risk factors associated with mortality in patients with acute cholangitis. Total 113 patients with acute cholangitis, who fulfilled the inclusion criteria, were included in this study. The result of the study is presented in following tables.

In this study, the median age of patients was 51 years & 71 (62.8%) of them were male and 42 (37.2%) were female. The underlying biliary diseases were choledocholithiasis in 68 (60.2%) patients, and malignant and benign strictures in 24 (21.2%) and 10 (8.8%) patients, respectively. Severe cholangitis occurred in 17 (15%) cases. 81 (71.7%) cases developed cholangitis in community setting & 32 (28.3%) cases had nosocomial infection. History of prior biliary intervention was found in 33 (29.2%) cases, while an indwelling biliary device was found in 25 (22.1%) cases. Blood culture was positive in 55(48.7%) cases. Single organism was isolated from 49(89.09%) blood samples. Multiple organisms were isolated in 6 (10.91%) specimens. Anaerobic bacteria (Bacteroides fragilis & Clostridium perfringens) were isolated from only 5 (9.09%) blood specimens. Multidrug resistant strains were isolated from 17(30.91%) blood specimens. (Table I)

Table I: Demographic, clinical and microbiological characteristics of patients (n=113).

Parameters	**Result**
Male	71(62.8)
Female	42(37.2)
Etiology:	
Choledocholithiasis	68(60.2)
Malignant biliary obstruction	24(21.2)
Biliary stricture	10(8.8)
Parasite	3(2.7)
Infection of retained stent	5(4.4)
Severe cholangitis	17(15)
Positive blood culture	55(48.7)
Indwelling biliary device	25(22.1)
Prior biliary intervention done	33(29.2)
Source of infection:	
Community acquired	81(71.7)
Hospital acquired	32(28.3)
Number of organisms detected:	
Monomicrobial	49(89.09)
Polymicrobial	6(10.91)
Anaerobes	5(9.09)
Multidrug resistant strains on blood culture	17(30.91)
Death/Mortality	13(11.5)
Median (95% CI) age (years)	51(25-94)

Table II: Organisms isolated from blood in patients with acute cholangitis.

Organisms	N (%)
Escherichia coli	20(36.36)
Klebsiella	13(23.64)
Pseudomonas	4(7.27)
Enterobacter	2(3.64)
Acinetobacter	1(1.82)
Bacteroides	2(3.64)
Enterococcus	4(7.27)
Coagulase negative Staphylococcus	2(3.64)
Streptococcus viridans	1(1.82)
Streptococcus pneumoniae	2(3.64)
Clostridium perfringens	3(5.45)
Candida	1(1.82)
Total	**55(100)**

In this study, causative organisms were isolated from 55 of 113 (48.7%) blood cultures. Escherichia coli was the most common bacterium isolated and was present in 36.36% of blood. The four most common bacterial species isolated from blood were E. coli (36.36%), Klebsiella pneumoniae (23.64%), Pseudomonas aeruginosa (7.27%) & Enterococcus (7.27%). (Table II)

Table III: Association of severity of cholangitis with mortality in patients with acute cholangitis. (n=113)

Severity of cholangitis	Death		Total	p-value
	Yes	No		
Severe	6	11	17	<0.001
Mild or moderate severe	7	89	96	
Total	13	100	113	

Patients having severe disease were more likely to die (p<0.001), in comparison to those who had mild or moderate severe acute cholangitis. (Table III)

Table IV: Association of malignant biliary obstruction with mortality in patients with acute cholangitis. (n=113)

Malignant biliary obstruction	Death		Total	p-value
	Yes	No		
Present	8	16	24	<0.001
Absent	5	84	89	
Total	**13**	**100**	**113**	

Malignant biliary obstruction was associated with more mortality (p<0.001), in comparison to those who had benign etiology. (Table IV)

Table V: Association of source of infection with mortality in patients with acute cholangitis. (n=113)

Source of infection	Death		Total	p-value
	Yes	No		
Hospital acquired	9	23	32	<0.001
Community acquired	4	77	81	
Total	**13**	**100**	**113**	

Nosocomial source of infection was associated with increased mortality (p<0.001). (Table V)

Table VI: Association of infection with multidrug resistant organisms & mortality in patients with acute cholangitis. (n=113)

MDR organisms	Death		Total	p-value
	Yes	No		
Present	6	11	17	<0.001
Absent	7	89	96	
Total	**13**	**100**	**113**	

Patients who were infected with multidrug resistant strains were more likely to die (p<0.001). (Table VI)

Table VII: Multivariate analysis of risk factors associated with mortality in patients with acute cholangitis.

Variable	P value	Odds ratio (OR)	95% CI
Severe cholangitis	0.001	6.935	(1.97-24.39)
Malignant biliary obstruction	0.001	8.4	(2.43-28.99)
Hospital acquired infection	0.001	7.5	(2.12-27.03)
Infection with multidrug resistant organisms	0.001	6.9	(1.97-24.39)

Risk factors associated with mortality were severe cholangitis (OR: 6.9), malignant biliary obstruction (OR:8.4), nosocomial infection (OR:7.5) and isolation of multidrug resistant organisms in blood (OR:6.9). (Table VII)

In present study, a total of 13 (11.5%) out of 113 patients died during admission with acute cholangitis. 08 patients with biliary malignancy, 04 with choledocholithiasis & 01 from infection of a retained stent expired during their hospital admission with acute cholangitis.

Discussion

In this study, the median age of patients was 51 years & 71 (62.8%) of them were male and 42 (37.2%) were female. The underlying biliary diseases were choledocholithiasis in 68 (60.2%) patients, and malignant and benign strictures in 24 (21.2%) and 10 (8.8%) patients, respectively. Severe cholangitis occurred in 17 (15%) cases. 81 (71.7%) cases developed cholangitis in community setting & 32 (28.3%) cases had nosocomial infection. History of prior biliary intervention was found in 33 (29.2%) cases, while an indwelling biliary device was found in 25 (22.1%) cases. Goo JC et al.[8] in their study found that the underlying biliary diseases were choledocholithiasis in 187 (54.0%) patients, and malignant and benign strictures in 146 (42.2%) and 13 (3.8%) patients, respectively. They also found that severe cholangitis occurred in 107 (24.7%) cases & 367 (84.8%) cases developed cholangitis in community setting. Choledocholithiasis was the most common etiology in both the studies.

In this study, causative organisms were isolated from 55 of 113 (48.7%) blood cultures. Escherichia coli was the most common bacterium isolated and was present in 36.36% of blood. The four most common bacterial species isolated from blood were E. coli (36.36%), Klebsiella pneumoniae (23.64%), Pseudomonas aeruginosa (7.27%) and Enterococcus (7.27%). Anaerobic bacteria (Bacteroides fragilis & Clostridium perfringens) were isolated from only 5 (9.09%) blood specimens. Multiple organisms were isolated in 6 (10.91%) specimens. Goo JC et al.[8] in their study found that causative organisms were isolated from 266 of 419 (63.4%) blood samples. Among them E. coli was isolated from 130(39.9%) blood samples, whereas Klebsiella and Pseudomonas was isolated from 56(17.2%) and 23 (7.1%) blood specimens. In both the studies E. coli was the most common organism isolated from blood samples.

In this study, a total of 13 (11.5%) out of 113 patients died during admission with acute cholangitis. Eight patients with biliary malignancy, four with choledocholithiasis and one from infection of a retained stent expired during their hospital admission with acute cholangitis. Risk factors associated with mortality were severe cholangitis (OR:6.9), malignant biliary obstruction (OR:8.4), nosocomial infection (OR:7.5) and isolation of multidrug resistant organisms in blood (OR:6.9). Goo JC et al.[8] , in their study found that a total of 33 (9.54%) out of 346 patients died during acute cholangitis cases. Mortality percentage is a little bit less than present study. Goo JC et al.[8] concluded that risk factors associated with mortality were malignant biliary obstruction, severe cholangitis, nosocomial infection, and isolation of antibiotics-resistant bacteria in bile or blood, which is similar to this study.

Conclusion

Risk factors associated with mortality were severe cholangitis (OR:6.9), malignant biliary obstruction (OR:8.4), nosocomial infection (OR:7.5) and isolation of multidrug resistant organisms in blood (OR:6.9). So, patients with these risk factors should ideally be managed in a high dependency unit or in ICU if situation deteriorates. Measures should be taken to prevent nosocomial infection and emergence of multidrug resistant virulent organisms. Wherever possible, the most potent antibiotic with more tissue penetration and less chance of resistance should be prescribed once the diagnosis is confirmed and blood/bile has been sent for culture and sensitivity.

References

1. Wada K, Takada T, Kawarada Y, Nimura Y, Miura F, Yoshida M, Mayumi T, Strasberg S, Pitt HA, Gadacz TR, Büchler MW, Belghiti J, de Santibanes E, Gouma DJ, Neuhaus H, Dervenis C, Fan ST, Chen MF, Ker CG, Bornman PC, Hilvano SC, Kim SW, Liau KH, Kim MH. Diagnostic criteria and severity assessment of acute cholangitis: Tokyo Guidelines. J Hepatobiliary Pancreat Surg 2007; 14: 52-58.

2. Lillemoe K. Surgical treatment of biliary tract infections. Am Surg 2000; 66:138-44.

3. Tenner S and Steinbergh WM 2016, 'Gallstone Disease', in Feldman, M, Friedman, LS and Brandt, LJ (eds), *Sleisenger and Fordtran's Gastrointestinal and Liver Disease,* pp. 297-305, Elsevier, Philadelphia.

4. Pitt H, Cameron J. Acute cholangitis. Philadelphia: WB Saunders; 1987.

5. Kiriyama S, Takada T, Strasberg SM, Solomkin JS, Mayumi T, Pitt HA, et al. New diagnostic criteria and severity assessment of acute cholangitis in revised Tokyo Guidelines. J Hepatobiliary Pancreat Sci. 2012; 19:548–56.

6. Kiriyama S, Takada T, Strasberg SM, Solomkin JS, Mayumi T, Pitt HA, et al. TG13 guidelines for diagnosis and severity grading of acute cholangitis (with videos). J Hepatobiliary Pancreat Sci. 2013; 20:24–34.

7. Kiriyama S, Kozaka K, Takada T, Strasberg SM, Pitt HA, Gabata T, et al. Tokyo Guidelines 2018: diagnostic criteria and severity grading of acute cholangitis (with videos). J Hepatobiliary Pancreat Sci. 2018; 25:17–30.

8. Goo JC, Seong MH, Shim YK, et al. Extended Spectrum-β-Lactamase or Carbapenemase Producing Bacteria Isolated from Patients with Acute Cholangitis. Clin Endosc 2012; 45:155-160.

Original Article

Accidental death among the post- mortem cases studied in the Sir Salimullah Medical College Morgue

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Abstract

Objective: *To determine the modes, motives, methods of accidental death in the southern part of Dhaka city.*

Methods and Materials: *This was a prevalence study. A total number of 436 post- mortem cases were done during the period of July- 2010 to June – 2011 in Sir Salimullah Medical College, Mitford, Dhaka, of which 116 post-mortem cases were accidental-death. All the inquest reports and the chalan were read through along with those post-mortem reports during the study period. The data were collected during the autopsy as well as from the registration books (Govt. records.) in the Department of Forensic- Medicine, Sir Salimullah Medical College, Mitford, Dhaka.*

Results: *A total of 436 post-mortem cases were done during the period of July, 2010 to June, 2011. in the above-mentioned medical college morgue, of which 116 cases were accidental death. Out of 116 accidental death, 68 cases were in between the age group of 18 - 35 years (58.61 % of the total cases), 67 cases were male (57.76%) and 49 were female (42.24 %). According to the types of nature of accident, 49 cases were Road Traffic Accident, 21 cases were Fall from Height, 17 cases were Drowning, 13 cases were chemical explosion, 07 cases were Poisoning (OPC), 06 cases were Electrocution & 03 cases were Collapse of Buildings.*

Conclusion: *The majority of deceased resulting from Road Traffic Accident, those were in between 18 - 35 years of age group.*

Key words: *Accident, Unexpectedly, Inquest, Occurrence, Explosion.*

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Introduction

It is understood by everybody that accident means anything happened without prior notice, unexpectedly and unintentionally[1,2]. A lot of accidental death cases were brought in the morgue of SSMC during the period of study. All of them are not included but the important and informative available cases were studied and included in this publication. In general consideration the history and findings were so measurable and painful to collect the data from post mortem examination. All types of scientific arrangement for the individual cases were preferably arranged and the opinion of the cases were established strictly in favor of accidental death[2].

Methods and Materials

This was a prevalence study, a total number of 436 post- mortem cases were done during the period of July, 2010 to June, 2011 in Sir Salimullah Medical College, Mitford, Dhaka, of which 116 post- mortem cases were accidental death. All the inquest reports and the chalan were read through along with those post-mortem reports during the study period. The data were collected during the autopsy as well as from the registration books (Govt. records). in the Department of Forensic Medicine, Sir Salimullah Medical College, Mitford, Dhaka. During the period of study, the accidental cases were selected according to inquest, challan and post mortem opinion time to time and they were arranged serially according to the date and time and all the data shown in the tables properly collected during post mortem examination and recorded in this publication. It is very important to note that for many of the cases, the establishment of identification of the victims was a difficult task[3]. Even DNA studied of the deceased was done in the DMC laboratory and findings along with other data were collected from there and placed for matching. It was also difficult to give opinion in favor of few accidental death but they were included after considering highly specialized knowledge of forensic expert[4].

Many of the cases discovered and brought from dangerous and accidental occurrences from near locality of old Dhaka city, were mass disaster occurred in several times [5]. The chemical and dry heat injuries, RTA, launch wrack (Drowning), buildings collapsed, accidental fall from height and explosions injuries were the main ante mortem findings on the dead bodies. A few cases, some parts of the body were missed, the available body parts were examined with great care to give opinion in the post mortem report and included to study for this publication[6].

Results

A total of 436 post-mortem cases were done during the period of July, 2010 to June, 2011. In the above-mentioned medical college morgue, of which 116 cases were accidental death. Out of 116 accidental deaths, among those post –mortem cases are documented below:

Table I: Distribution of post –mortem cases of Accidental death according to the duration of study

Duration.	Post mortem cases(n)	%	Accidental death.	%
July, 2010 – Sept, 2010	105	24.08	47	40.51
Oct, 2010 – Dec, 2010	118	27.06	23	19.83
Jan, 2011 - March,2011	110	25.22	21	18.10
April, 2011 - June, 2011	103	23.62	25	21.56
Total	**436**	**100**	**116**	**100**

The incidence of accidental deaths is more in the duration of July-2010 to September-2010 that is 47 cases & the percentage is 40.51%. The study shows it is the peak time period for accidental deaths occurred and other information could be assessed easily like above from the table I.

Table II: Distribution of post –mortem cases of Accidental death according to the age of the deceased

Age (in years.)	Accidental death.	%
01 - 17	19	16.39
18 - 35	68	58.61
35 and above	29	25.00
Total.	**116**	**100**

According to the Table II, from age group 18 to 35 years, it was 58.61% (which is the maximum, 68 cases of accidental death) &from age group 01 to 17 years, it was 16.39% (which is the minimum, 19 cases of accidental death)

Table III: Distribution of post –mortem cases of Accidental death according to the sex of the deceased

Sex	Accidental death.	%
Male	67	57.76
Female	49	42.24
Total	**116**	**100**

The incidence of accidental death is more in male that is 67 (57.76%) , whereas 49 (42.24%) were female.

Table IV: Distribution of post –mortem cases of Accidental death according to the method of accident

Method.	Number of cases	%
Road Traffic Accident	49	42.24
Fall from Height	21	18.11
Drowning	17	14.66
Chemical Explosion	13	11.21
Poisoning (OPC)	07	6.03
Electrocution	06	5.16
Building Collapse	03	2.59
Total	**116**	**100**

According to the methods of accidents, more were occurred by RTA that is about 49 cases and percentage of which is 42.24%, Collapse of buildings are less common method for accidental death and it is 03 cases which is 2.59% in the above table.

Discussion

The most common age group involved was between 18–35 years & the commonest methods of accident were RTA, Fall from height & poisoning. Similar results were found in studies conducted in Delhi by Mehta and in Nepal by Jha.[7,8] This may be attributed to the fact that this is the age group which ventures out most due to studies or employment and also has a tendency to over speed. According to National Crime Records Bureau, Delhi, maximum numbers of cases were between the age group 15–44 years[4,5].

Falling is the action of a person or animal losing their footing and ending up in a lower position often on the ground. It is the second leading cause of accidental death worldwide and a major cause of personal injury, especially for the elderly. Falls in older adults are a major cause of preventable injuries, construction workers, electricians, miners and high building painters are occupations with high rates of fall from height causing serious injuries[9]. Death due to accidental poisoning which consists almost entirely of prescription and illegal drug overdose has sharply increased in recent years. An alternative hypothesis is that the increase in accidental poisoning mortality since 2000 is the result of a historical period effect that affects all age group. Now a day the addicted person is creating accidental death due to over dose of substances of addiction[10].

Conclusion

In every occurrence let a good lesson for awareness in future that should be controlled to minimize every type of accident.

References

1. Parikh CK. Parikh"s Text book of Medical Jurisprudence Forensic Medicine & Toxicology. 6th Edition. DaryaGon, New Delhi: CBS publishers & Distributors, Reprint. 2007;4:55.
2. Shepherd R . Simpson"s Forensic Medicine. 12th Edition. 338, Euston road , London : Arnold , a member of the Hodder- Head line group. 2003: 59
3. Mallik CC. A short text book of Medical Jurisprudence. 3rd Edition. 5/1 Ramanath Mazumdar street, Calcutta : Mohendranath Paul, The new books stall. 1993: 290.
4. Reddy KSN. The essentials of Forensic Medicine and Toxicology. 34rd Edition. Hyderabad : K. Suguma Devi. 2009: 246.
5. Nandy A. Principles of Forensic Medcine. 2nd Edition. 8/1 chintamoni Das lane, Kolkata: New central Book Agency (Private) Ltd.,Reprint. 2007:320, 331.
6. Biswas G. Review of Forensic Medicine and Toxicology. Second Edition. Newdelhi. Panama city. London; Jaypee Brothers Medical publishers (Private) Ltd. 2012: 189.
7. Mehta SP. An epidemiological study of road traffic accident cases admitted in Safdarjang hospital, New Delhi. Indian J Med Res. 1968;56(4):456–466.
8. Jha N, Agrawal CS. Epidemiological study of road traffic accident cases: a study from Eastern Nepal. Road safety. Reg Health Forum. 2008;1:15–22.
9. Tsur A and Segal Z. Falls in stroke patients: risk factors & risk management. IMAJ-Israel Medical Association Journal. 2010;12(4):216.
10. National Bureau of Economic Research. Note on validity of 1959-1967. Mortality Data. 2010.

Original Article

Tuberculosis of the breast with erythema nodosum: a case report

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Abstract

There have been an increasing number of tuberculosis cases worldwide, but tuberculosis of the breast remains rare. In rare cases, this is seen with a cutaneous manifestation of erythema nodosum. We report the case of a 33-year-old woman with tuberculosis of the left breast accompanied by erythema nodosum on the anterior aspect of both lower legs and dorsum of feet. Due to her poor clinical response to conventional therapy, and the histopathological findings of fine needle aspiration cytology with epithelioid granuloma with caseation, there were strong indications of tuberculosis. She received anti tuberculous therapy for 6 months. During her follow-up examination after 6 months, no evidence of either residual or recurrent disease was present. Histopathological features and a high index of clinical suspicion is necessary to confirm a diagnosis of tuberculosis of the breast. Anti-tuberculous therapy (ATT) with or without simple surgical intervention is the core treatment.

Keywords: *Tuberculosis, erythema nodosum, caseation, granuloma, anti-tuberculous therapy*.

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Introduction

Tuberculosis (TB) is one of the leading infectious diseases worldwide. Extra pulmonary TB involving the breast is extremely rare. It often mimics breast carcinoma and pyogenic breast abscess clinically and radiologically; may both co-exist. Vulnerability to breast TB is increased in women who are young, married, multiparous and who breast-feed[1]. Histopathological examination using fine needle aspiration cytology (FNAC) may reveal caseating epithelioid cell granulomas and acid-fast bacilli (AFB). Although the presence of an acid-fast stain or culture is essential to confirm diagnosis, it does not give a positive result in most patients[2,3]. Molecular detection of *Mycobacterium tuberculosis* by polymerase chain reaction can be particularly useful in the validation of a diagnosis of tuberculosis in clinical settings where the diagnosis is uncertain[3,4]. Diagnosis is usually based on high index of suspicion, findings of granulomatous lesion with Langhans giant cells, tuberculosis culture and response to antitubercular therapy (ATT). We report a case of TB of the breast associated with a cutaneous manifestation of erythema nodosum.

Case report

A 33-year-old married, recently detected diabetic (on metformin), HIV negative housewife presented at

medicine outpatient, Ad-din Women's Medical College & Hospital, Dhaka with fever, painful swelling over both shin and dorsum of the feet, bilateral knee and ankle pain for 8 days. She also gave history of gradually growing painful discharging lump over her left breast for last 1 month with on and off undocumented low-grade fever. For the last 8 days fever became high grade, intermittent (maximum recorded 103^0F) associated with chills and rigor and subsided temporarily after taking anti pyretic. She did not have any personal medical history of TB or diabetes mellitus. She also neither had family history of breast cancer nor had any contact history with a patient with active tuberculosis. She also denied any cough, weight loss, night sweat, anorexia, bloody diarrhea. She was immunized as per EPI schedule. With these complaints she visited a local physician and got 7 days 2^{nd} generation oral cephalosporin without any improvement. She had a three-year-old child.

Upon admission she had a body temperature of 102°F, blood pressure of 126/68 mmHg, a pulse rate of 89/minute, and a respiratory rate of 19/minute. On physical examination, there was a firm, erythematous, mass of 5 × 6 cm with brownish discharge over the upper outer quadrant of her left breast accompanied by retraction of adjacent skin. Mass was not fixed to underlying structure or overlying skin. Nipple, areola was normal. There was also a firm, non-tender mobile lymph node over left medial axilla. Dark reddish plaque skin lesions were found over both lower legs and the dorsal aspect of her feet. Both ankle and knee joints were also red, swollen. There was also painful restriction of both active and passive movement in these joints. No other joints or axial skeleton was involved. Her blood test results showed the following: Hb% 9.3 gm/dl, MCV- 81, MCH 29,white blood cells at 15.20 × 10^3/µl, neutrophils at 77.3%, lymphocytes at 12.7%, platelets at 418 × 10^3/µL, C-reactive protein at 86.8 mg/dL (normal range ≤ 5), and an erythrocyte sedimentation rate (ESR) during the first hour of 70 mm/hour (normal ≤ 12). Peripheral blood film revealed normocytic normochromic anemia with neutrophilic leukocytosis. Her blood culture revealed no growth, while her chest radiography was unremarkable. MT was positive with induration 14 mm after 72 hours. ALT 29 U/L, serum calcium 8.4 mg/dl, random blood sugar was 13.8 mmol/L.

An ultrasonography of our patient's left breast showed a lump measuring about 5 × 5 cm, which was conglomerated, with an irregular margin with hypoechoic heterogeneous echogenicity, and with a left axillary lymph node. A core needle aspiration biopsy of her left breast was also performed. Under the microscope, this section of her left breast showed chronic mastitis mixed with granulation tissue and numerous foreign body giant cells but with no evidence of malignancy (Figure -1). Background consisted of necrotic material and fibrinous exudate. A culture of the wound tissues failed to grow any organisms. Stains for AFB were negative. Discharge for Genexpert TB was not sent due to unavoidable logistic support. A dermatologist was consulted regarding the dark reddish plaque skin lesions and treated conservatively with NSAIDs.

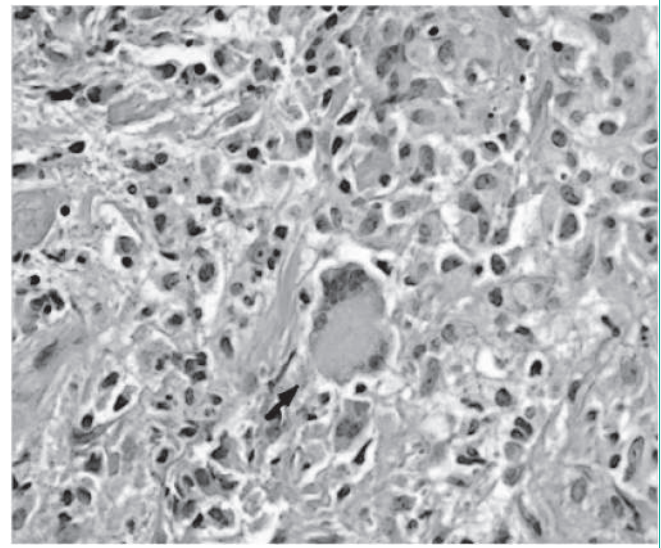

Figure 1: Hematoxylin and eosin stain of our patients' breast tissue, showing giant cell (arrow) and inflammatory cells

Our final diagnosis tubercular mastitis was relied on clinical suspicion, histopathological tissue findings and failure to respond to conventional antibiotic therapy. She was put on a 6-month course of anti-tubercular therapy with a 2-month intensive phase of rifampicin, isoniazid, ethambutol, and pyrazinamide without steroid followed by a consolidation phase of rifampicin and isoniazid for another 4 months. After undergoing four months of anti-tuberculous treatment, her left breast mass and axillary node was gradually reduced.

Although acid-fast stain showed no tubercle bacilli, her anti-tuberculous therapy was continued. Her left breast mass gradually became smaller and then regressed. She was treated for 6 months without any further complication. She was regularly followed up for another 6 months and no evidence of the recurrence of her disease was noted.

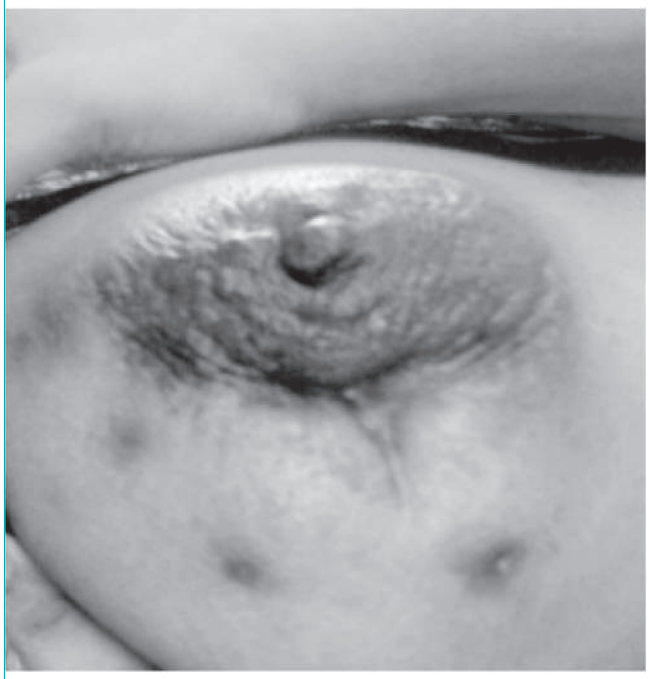

Figure 2: Healed ulcer with sinuses after 2 months

Figure 3: After 6 months of completion of ATT therapy

Discussion

Tuberculosis remains one of the leading causes of death from infectious diseases worldwide. Despite the fact that it can affect any organ or site of the body, the breasts, skeletal muscles and spleen are the most resistant to TB[5,6]. Tuberculosis comprises approximately 0.025% to 0.1% of all surgically treated diseases of the breast, but this ratio is higher in under developed countries[7]. The first description of mammary tuberculosis was given by Sir Astley Cooper in 1829[5]. He described mastitis as "scrofulous swelling" in the bosom of young women. Although breast TB is primarily considered a disease of the developing world, a steady increase in the incidence of the disease has also been seen in developed countries. This is probably because of the migration of the infected population from endemic zones, and an increasing number of patients who are immunocompromised[7,8].Tuberculous mastitis is more commonly seen in females of reproductive age group, however, especially during the lactation period, when they are more susceptible since the lactating breast is more vascular and predisposed to trauma[4,5]. Both breasts are reported to be involved with equal frequency. Bilateral disease is rare, occurring in 3% of patients[5].

The duration of symptoms varies from a few months to several years, but in most instances, it is less than a year. Constitutional symptoms such as fever, weight loss, night sweats, or a failing of general health are infrequently encountered[2] and is present is less than 20% of cases. Our patient presented only a month history of breast lump without much constitutional symptoms. Its clinical manifestations are variable. Patients usually have a positive tuberculin skin test[9] so as our patient had.

The common presentation of breast TB is a lump in the breast with or without ulceration, may associate with the sinus. Other presentations are diffuse nodularity and multiple sinuses. Multiple lumps are less common. Pain in the lump is present more frequently in breast TB cases than in breast carcinomas but our patient had painful breast lump. The involvement of the nipple and the areola is rare in TB. Fixation of the skin, which

resembles a neoplastic lesion, may also be present but nipple discharge is uncommon[10]. Associated axillary lymphadenopathy is found in some patients[1,3,10] as our patient had. Other uncommon presentations include; a typical undermined tuberculous ulcer, purulent discharge from the nipple or with a fluctuant swelling which, if inadvertently incised, produces a discharging ulcer[5,11]. Both breasts can be affected equally but bilateral involvement is very uncommon. Although the upper outer quadrant seems to be the most frequently involved site due to its proximity to the axillary nodes, any area of the breast can be affected[9]. Lung lesions (active or healed) on radiographic examination are rare now. Mammography is of limited use since the findings are often indistinguishable from a malignancy[11] and young patients have highly dense breast tissue. Co-existing tuberculosis and carcinoma of the breast was reported by Alzaraaet al[12].

Tuberculosis of the breast is mainly classified according to its primary and secondary forms. Although it was initially believed that as much as 60% of breast tuberculosis was primary, it is now accepted that mammary tuberculosis is almost invariably secondary to a lesion elsewhere in the body. Primary infection of the breast however, through abrasions in the skin or through the duct openings on the nipple is a possibility. The most common mode of infection is thought to be retrograde lymphatic spread from the pulmonary focus through the para- tracheal and internal mammary lymph nodes. Hematogenous spread and direct extension from contiguous structures are other modes of infection[5].

Breast tuberculosis was originally classified by McKeon et al[13] into the following categories: (a) acute miliary type – rare, due to blood borne infection in miliary tuberculosis; (b) nodular type – the most common type, which presents as a localized lump with or without sinuses in one quadrant of the breast; (c) disseminated type – involving the entire breast with multiple sinuses; (d) sclerosing type – minimal caseation and extensive hyalinization of the stroma, shrinkage of the breast tissue with early skin retraction and late sinus formation; clinically this type is indistinguishable from carcinoma; and (e) tuberculous mastitis obliterans – a rare form due to intra ductal infection with fibrosis and obliteration of the ductal system; sinus formation is infrequent[3,5,13]. Mantoux testing does not offer definitive diagnosis, but confirms exposure of the patient to tubercle bacilli.

Radiological imaging modalities like mammography and ultrasonography are unreliable in distinguishing breast TB from breast carcinoma. Similarly, computed tomography (CT) scan and MRI do not give a conclusive diagnosis without histopathological confirmation. CT scan is useful in differentiating between the primary and secondary forms. It is also helpful in evaluating the relationship between deeply located lesions with the chest wall and pleura and in detecting parenchymal lesions of the lung. As such it provides valuable guides to surgery and in defining the extent of the disease, including the involvement of the chest wall[10,14].

The demonstration of acid-fast *bacilli* (AFB) from the lesions is usually difficult[15]. In tuberculous mastitis, AFB are identified only in 12% of the patients. Our patient also did not show any AFB in the lesion. Therefore, clinical suspicion and demonstration of caseating granulomas with Langhans giant cells from the breast tissue and involved lymph nodes may be sufficient for the diagnosis. In tuberculosis-endemic countries, the finding of granuloma in FNAC warrants empirical treatment for tuberculosis even in the absence of positive AFB and without culture results[15,16]. Detailed histological evaluation is, however, mandatory to rule out a co-existing carcinoma. Core needle aspiration biopsy from our patient's left breast revealed caseation, epithelioid giant cells without any evidence of malignancy. FNAC is very useful and it is a promising technique in expert hands[16]. A biopsy is mandatory for confirmation of diagnosis.

Anti-tuberculous chemotherapy is still the main treatment for breast TB, and no specific guidelines are available for this kind of treatment. The disease

should be treated as any other form of extra pulmonary TB. Anti-tuberculous therapy comprises rifampicin, isoniazid, pyrazinamide and ethambutol for the initial two months, which is then followed by rifampicin and isoniazid for another four months. The extension of anti-tuberculous therapy from 12 to 18 months is required in patients with slow clinical response, and complete resolution is obtained in most patients. Our patient showed response in 6 months so further extension of therapy was not given. FNAC should be repeated to confirm that the residual mass is fibrotic. In refractory cases that lead to breast destruction, a simple mastectomy may be performed[1,3,9,10]. Radical mastectomy is best avoided unless there is a co-existing malignancy[5,11]. The duration of follow-up after therapy is variable. In a study by Shinde et al, all patients were followed up for a minimum of two years to determine that they were free of the disease after therapy[1].After complete ATT, residual lumps localized to a quadrant should be excised via segmental or sector mastectomy. Aspiration or surgical drainage may be required in some cases.

The cutaneous involvement of TB is rare. Underlying systemic involvement of TB is often seen in cutaneous TB, especially in children. Cutaneous TB is classified as true TB or tuberculids. True cutaneous TB is composed of tuberculous chancre, miliary TB, lupus vulgaris, scrofuloderma, TB verrucosa cutis, tuberculous metastatic abscess and orificial TB. Tuberculids are delayed sensitivity reactions to M. tuberculosis in patients with a strong immune response. Tuberculids include lichen scrofulosorum and papulonecrotictuberculid. Facultative tuberculids consist of erythema induratum and erythema nodosum. Erythema induratum is a recurrent, painful subcutaneous nodule usually on the posterior aspect of the leg. Biopsy shows lobular panniculitis with vasculitis and granulomatous inflammation. Eythemanodosum is a painful subcutaneous nodule, mostly found on the anterior aspect of the leg. Biopsy shows septalpanniculitis with an absence of vasculitis and usually without granuloma. Erythema nodosum often occurs in association with a granulomatous disease, including sarcoidosis, TB and granulomatous colitis. TB remains an important cause of erythema nodosum in endemic countries[17,18].

Conclusion

In endemic TB regions, a painful breast mass with cutaneous manifestation of erythema nodosum is clinically relevant to determine a diagnosis of breast TB. To conclude, diagnosis of tuberculous mastitis is usually based on high index of suspicion, finding of granulomatous lesion with Langhans' giant cells and response to ATT. FNAC and biopsy may also be inconclusive. AFB is not seen in most cases. Prompt diagnosis and adequate treatment can avoid unnecessary operation in these patients.

References

1. Shinde SR, Chandawarkar RY, Deshmukh SP. Tuberculosis of the breast masquerading as carcinoma: a study of 100 patients. World J Surg. 1995;19:379–381.

2. Akçay MN, Sağlam L, Polat P, Erdoğan F, Albayrak Y, Povoskı SP. Mammary tuberculosis -importance of recognition and differentiation from that of a breast malignancy: report of three cases and review of the literature. World J SurgOncol. 2007;5:67.

3. Tewari M, Shukla HS. Breast tuberculosis: diagnosis, clinical features and management. Indian J Med Res. 2005;122:103–110.

4. Marchetti G, Gori A, Catozzi L, Vago L, Nebuloni M, Rossi MC, Esposti AD, Bandera A, Franzetti F. Evaluation of PCR in detection of Mycobacterium tuberculosis from formalin-fixed, paraffin-embedded tissues: comparison of four amplification assays. J ClinMicrobiol. 1998;36:1512–1517.

5. Bannerjee SN, Ananthakrishran N, Mehta RB. Tuberculous mastitis: a continuing problem. World J Surg. 1987;11:105–109.

6. Madhusudhan KS, Gamanagatti S. Primary breast tuberculosis masquerading as carcinoma. Singapore Med J. 2008;49(1):3.

7. Kalac N, Ozkan B, Bayiz H, Dursun AB, Demirag F. Breast tuberculosis. Breast. 2002;11:346–349.

8. Zandrino F, Monetti F, GanDolfo N. Primary tuberculosis of the breast: a case report. ActaRadiol. 2000;41:61–63.

9. Wilson JP, Chapman SW. Tuberculous mastitis. Chest. 1990;98:1505–1509.

10. Khanna R, Prasanna GV, Gupta P, Kumar M, Khanna S, Khanna AK. Mammary tuberculosis: report on 52 cases. Postgrad Med J. 2002;78:422–424.

11. Al Soub H, Chacko K. Tuberculous mastitis: a rare disease. Br J ClinPract. Jan-Feb 1996.;50(1):50-51.

12. Alzaraa A, Dalal N. Coexistence of carcinoma and tuberculosis in one breast. World J Surg Oncol. 2008;6:29 10.1186/1477-7819-6-29.

13. McKEOWN KC, Wilkinson KW. Tuberculous disease of the breast. Br J Surg Mar 1952.;39(157):420-429.

14. Kervancioğlu S, Kervancioğlu R, Özkur A, Şirikçi A. Primary tuberculosis of the breast. DiagnIntervRadiol. 2005;11:210–212.

15. Kakkar S, Kapila K, Singh MK, Verma K. Tuberculosis of the breast. A cytomorphologic study. ActaCytol. May-Jun 2000;44(3):292-296.

16. Mehrotra R. Fine needle aspiration diagnosis of tuberculous mastitis. Indian J PatholMicrobiol. Jul 200.;47(3):377-380.

17. Sethuraman G, Ramesh V, Raman M, Sharma VK. Skin tuberculosis in children: learning from India. DermatolClin. 2008;26:285–294.

18. Fadaei-Araghi M., Geranpayeh L., Irani S., Matloob R., Kuraki S. Breast tuberculosis: report of eight cases. Archives of Iranian Medicine. 2008;11:463–465.

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6. **Books and other monographs**

a. **Personal author(s):** Walker SJ. Diseases of the small intestine in childhood. 2nd ed. Kent: Pitman Medical. 1979:171-249.

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7. **Published proceedings paper:** Sack DA. Bacteriological and clinical variation of acute diarrheal disease. In: Mazurrider DNG, Chakraborty AK, De S, Kumer AK, editors. Proceedings of the 8th National Conference on Communicable Diseases. Calcutta: All India Institute of Hygiene and Public Heath. 1980:89-93.
8. **Dissertation & Thesis:** Rahman ASMM. Village practitioners of Bangladesh: their characteristics and role in an oral rehydration programme. London: London School of Hygiene & Tropical Medicine. 1980: 84. (Dissertation).
9. **Newspaper article:** Azad AS. Water pollution and health hazards. Bangladesh Observer. Dec 1982; 11:5(col 3).
10. **Magazine article:** Roueche B. Annals of medicine; the Santa Claus culture. The New Yorker. Sept 1971; 4:66-81.

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