

ISSN 1815-3100 (Print)

2408-8625 (online)

# JOURNAL OF DHAKA NATIONAL MEDICAL COLLEGE & HOSPITAL



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j.Dhaka Natl. Med. Coll. Hosp. Volume-23, Number 2, September 2017



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## Magnesium and Health

Magnesium is an element and mineral found throughout the nature. In the body it is the fourth abundant mineral.

Magnesium was first isolated by English scientist Sir Humphrey Davy in 1808. It is named after magnesia, a district in Thessaly, Greece and is closely related to the minerals magnetite and manganese.

In human an adult body contains approximately 25gm magnesium, with 50-60% present in the bones and most of the rest in soft tissues.<sup>1</sup> Less than 1% of total magnesium is in blood serum and these levels are kept under tight control. The concentration of magnesium in ECF is only 1.2-2.5 meq/L.<sup>2</sup> Magnesium homeostasis is largely controlled by the kidney which typically excretes about 120 mg magnesium into the urine each day.<sup>3</sup> Urinary excretion is reduced when magnesium status is low.<sup>4</sup>

The daily requirements of magnesium for the children (9-13 years) is about 240 mg, for the adult male is about 420 mg and for the adult female is about 320 mg. However, the daily requirement of magnesium during pregnancy is about 360 mg. Therefore, to get adequate amount of magnesium in the diet it is necessary to know the foods which are rich sources of magnesium. The foods which contain high concentration of magnesium are nuts, whole grain, spinach, almonds, pumpkin seed, black beans, avocado, figs, banana and yogurts etc.

The mineral magnesium is required by virtually many processes in the body. It is an essential mineral that performs many vital functions which includes activating more than 300 enzymes which acts as catalyst for many intracellular enzymatic reactions, DNA synthesis, muscle contraction, blood pressure regulation, protein synthesis, insulin metabolism, nerve transmission and reproduction.<sup>3,4,5</sup>

It has been found that there are lots of benefits observed in those who are taking magnesium rich food.

Some studies have shown that magnesium may be able to help effectively reduces the symptoms of premenstrual syndrome (eg. mood swings, weight gain, food cravings, water retention, fatigue, irritability, sore breast and digestive issues).<sup>6</sup>

A study in Mexico revealed that taking magnesium supplement reduces both systolic and diastolic blood pressure.<sup>7</sup>

Physical performance of elderly women and athletes were found improved after supplementation of magnesium oxide.<sup>8</sup>

It is reported that low levels of magnesium have been linked to inflammation. Studies published in Archives of Medical research showed that taking magnesium chloride, it was possible to reduce levels of inflammation in 62 adult prediabetics.<sup>9</sup>

It has been also observed that low levels of magnesium contribute to migraine and some studies have found that magnesium supplementation could even reduce migraine frequency.<sup>10</sup>

In a study of more than 9500 men and women, the highest or lowest levels of magnesium appeared to increase the chances for dementia by as much 30 percent. Alzheimer's disease has been also linked with high/low levels of magnesium.<sup>11</sup>

A study published in the journal of Diabetes Care revealed that taking magnesium supplementation prevent insulin resistance thus helps to control blood sugar level.<sup>12</sup> Moreover it was observed that magnesium supplementation reduced insomnia severity thereby increases sleep time and decrease the amount of time to fall asleep.<sup>13</sup> Magnesium supplementation also prevent osteoporosis as magnesium is involved in bone formation and influencing the activities of osteoblast and osteoclast.<sup>14</sup>

Another beneficial effect of magnesium is that magnesium has potent mood boosting properties and can help to fight against depression.<sup>15</sup>

It should be remembered that a group of peoples are at risk of magnesium deficiency which may result from habitual low intake of magnesium or excessive loss of magnesium due to certain health condition like GI diseases, type 2 diabetes mellitus, hyperparathyroidism, chronic alcoholism, older adult and prolong diuretic therapy.<sup>16</sup>

Early signs of magnesium deficiency include loss of appetite, nausea, vomiting, fatigue and weakness. As magnesium deficiency worsen numbness, tingling, muscle cramps, seizures, personality changes, abnormal heart rhythms and coronary spasms can occur. Severe magnesium deficiency can result in hypocalcaemia or hypokalemia because mineral homeostasis is disrupted.<sup>3</sup> On the other hand magnesium excess occur along with K<sup>+</sup> excess in acute and chronic renal failure as presumably contributed to the neurological manifestation.<sup>16</sup>

Considering the beneficial effects of magnesium in the body we must be aware to take adequate quantity of magnesium in our diet to prevent many diseases and enjoy a healthy life.

#### **Professor Dr. Jalal Uddin Chowdhury**

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## Journal of Dhaka National Medical College & Hospital

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Each of the following section should begin on separate page-

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Original Article

## Effects of Sodium Bicarbonate supplementation on Renal function and Nutritional status in Chronic Kidney Disease patients

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### Abstract

**Background:** Metabolic acidosis is commonly associated with chronic kidney disease which causes progressive loss of kidney function. The diminishing ability of the kidneys to maintain acid-base homeostasis results in acid accumulation, leading to various complications such as impairment in nutritional status, worsened uremic bone disease and an association with increased mortality. Recent clinical trials have suggested that correction or prevention of metabolic acidosis by alkali administration is able to attenuate kidney damage and to slow progression of chronic kidney disease and improve nutritional status.

**Methods:** It was a prospective study. Out of a total of 66 CKD patients (eGFR < 60 ml/min/1.73m<sup>2</sup> serum HCO<sub>3</sub><sup>-</sup> 16-22 mmol/l); 33 were in treatment group and 33 in control group were included in the study. Treatment group of the study was CKD patients who received sodium bicarbonate for 6 months to correct acidosis. Control group for the study was CKD patients who did not receive any NaHCO<sub>3</sub> supplementation; attending SSMC, Mitford Hospital for the same duration. Baseline renal function and nutritional status parameters were similar in both groups. Rate of progression of CKD was measured by calculation of eGFR (4 variable MDRD- equation) at the beginning of the study and then after 3 and 6 months. Similar dietary advice was given to both groups. Purposive sampling was done. The primary end point was denoted as rate of eGFR decline. Secondary end points were serum albumin (<3.5gm/dl) and mid-arm circumference (<24 cm) and body mass index. Nutritional status was determined by measuring mid-arm circumference, serum albumin and body mass index at the starting of the study, after 3 and 6 months.

**Results:** Mean age (years) was 56 ± 15 & 49 ± 15; p=0.074 in treatment and control group respectively. Mean haemoglobin concentration (gm/dl) was 9.8 ± 1.5 and 9.6 ± 0.9; p=0.477 in treatment & control group respectively. At baseline mean BMI (kg/m<sup>2</sup>) was 21.3±5 and 23±4; p=0.138 in control and treatment group respectively. In the present study, mean systolic blood pressure was 129.6±3.8 and 131.4±5.1; p= 0.184 in control and treatment group respectively at six months of study period. . In the present study, mean diastolic blood pressure was 79.1±4.6 and 80.8±3.2; p= 0.202 in control and treatment group respectively at six months of study period. Serum bicarbonate was raised significantly in treatment group than control group at six months of study period (26.3 ± 1.6 and 21.2 ± 1.1; p<0.001). Serum potassium was reduced significantly in treatment group than control group at six months of study period (4.5 ± 0.6 and 5 ± 0.5; p=0.001). Mid-arm circumference was increased significantly in treatment group than control group at six months of study period (24.4 and 22.4 cm; p<0.001). Serum albumin (gm/dl) was increased significantly in treatment group than control group at six months of study period (3.4 and 2.8; p<0.001). Body mass index was similar in treatment group and control group at six months of study period (23.1 and 21.2; p=0.090). After six months eGFR (ml/min/m<sup>2</sup>) was declined significantly in control group than treatment group (3.02± 2.25 and 1.13± 2.31; p=0.001).

**Conclusion:** Oral sodium bicarbonate supplementation in patients with metabolic acidosis slows the rate of decline of renal function in patients with advanced stages of CKD. This easily affordable and simple strategy also improved the nutritional status of advanced stages of CKD patients with metabolic acidosis.

**Keywords:** Bicarbonate, CKD, Metabolic acidosis Nutritional status.

### Introduction

In the 21<sup>st</sup> century chronic kidney disease (CKD) is emerging as a global public health problem. About 5-10% of world populations are suffering from CKD. Approximately 1.8 million people, worldwide, are currently treated with renal replacement therapy (RRT), which consists primarily of kidney transplantation and dialysis. The vast majority of these patients cannot afford renal replacement therapy on reaching ESRD. Hence the secondary prevention of ESRD remains the primary focus of the efforts of physicians involved in care of CKD patients.

Hasan et al 2012 found that overall prevalence of CKD among Bangladeshi population was 19% (Cock-Croft Gault equation) and 19.5% (MDRD equation) respectively.<sup>1</sup>

Metabolic acidosis is a common complication associated with progressive loss of kidney function which diminishes the ability of the kidneys to maintain acid-base homeostasis resulting acid accumulation, leading to various complications such as impairment in nutritional status, worsening uremic bone disease and an association with increased mortality. In addition to these adverse effects which are related to acid retention, metabolic acidosis may also cause kidney damage, possibly through the stimulation of adaptive mechanisms aimed at maintaining acid-base homeostasis in the face of decreasing kidney function. Recent clinical trials have suggested that correction of metabolic acidosis by alkali administration is able to attenuate kidney damage and slow progression of CKD, and may hence offer an effective, safe and affordable renoprotective strategy (Kovesdy 2012).<sup>2</sup> Metabolic acidosis is noted in the majority of patients with chronic renal disease (CKD) when glomerular filtration rate (GFR) decreases to less than 20% to 25% of normal, although as many as 20% of individuals can have acid-base parameters close to or within the normal range. Acidosis is generally mild to moderate in degree, with plasma bicarbonate concentrations ranging from 12-22 Meq/L (mmol/l), and it is rare to see values less than 12 mmol/l in the absence of an increased acid load. Degree of acidosis is approximately correlated with severity of renal failure and usually is more severe at lower GFR.

Metabolic acidosis can develop as a result of one or more of the following patho-physiologic processes (Goodman et al 1965): increased production of nonvolatile acids, increased loss of bicarbonate and decreased renal excretion of acid.<sup>3</sup>

As a result, CKD leads to retention of hydrogen ions. In addition to the fall in ammonium excretion, diminished

excretion of titratable acid (primarily as phosphoric acid) also may play a role in the pathogenesis of metabolic acidosis in patients with advanced kidney disease.

Chronic metabolic acidosis in patients with chronic kidney disease (CKD) may produce a variety of pathophysiologic changes: bone resorption and osteopenia, increased muscle protein catabolism, aggravation of secondary hyperparathyroidism, and exhaustion of body, endocrine disorders such as resistance to growth hormone and insulin, and hypertriglyceridemia, systemic inflammation and hypotension and malaise (www.update.com/content/pathogenesis).<sup>4</sup>

Another potential mechanism involves activation of the renin-angiotensin system, which is important for urinary acidification but which can also result in proteinuria, renal damage, and progressive CKD (Ng et al 2011).<sup>5</sup>

Uremic acidosis can increase skeletal muscle breakdown and diminish albumin synthesis, leading to muscle wasting and muscle weakness (Williams et al 1991).<sup>6</sup> The degree of muscle breakdown may be exacerbated by institution of a low-protein diet, which is occasionally used in an attempt to minimize progressive renal injury.

### Materials and Methodology

It was a prospective study. This study was carried out from July 2013 to June 2014 among CKD patients attending to the department of nephrology of SSMC & Mitford Hospital, Dhaka fulfilling selection criteria of the study. Purposive sampling was adopted for collecting data. A written consent was taken from each patient.

Treatment group of the study was CKD patients (eGFR < 60 ml/1min/1.73m<sup>2</sup>) who received sodium bicarbonate for 6 months to correct acidosis. Control group for the study was CKD patients (eGFR < 60 ml/1min/ 1.73 m<sup>2</sup>) who did not receive any NaHCO<sub>3</sub> supplementation; attending for the same duration. Rate of progression of CKD was measured by calculation of eGFR (using MDRD equation) at the beginning of the study and then after 3 and 6 months. Patients of both groups had taken protein 0.8-1gm/kg/day during the study period; fruits were restricted and no added salt in their diets. Patients of treatment group received NaHCO<sub>3</sub> (600 mg tablets 3 to 4 times a day, upto 2.4 gm maximum as needed) during the study period to maintain HCO<sub>3</sub><sup>-</sup> > 22 mmol/l. The primary end-point was decline in renal function by assessing changes in eGFR from baseline to the end of the study period. The secondary end-point was measurements of changes in nutritional status parameters. Nutritional status was determined by changes in body mass index, mid-arm circumference and serum albumin concentration.

The primary end point was denoted as rate of eGFR decline, the proportion of patients with rapid decline of eGFR (>3ml/min/1.73m<sup>2</sup>/year). Secondary end points were serum albumin (<3.5gm/dl) and mid-arm circumference(<24 cm) and body mass index. Nutritional status was determined by measuring mid-arm circumference, serum albumin and body mass index at the starting of the study and after 3 and 6 months. All the data were checked and edited after collection. Then the data were entered into computer and statistical analysis of the result obtained by using windows based computer software devise with Statistical Packages for Social Sciences (SPSS.v-14.0; SPSS inc, Chicago, IL USA).

**Results**

Total 70 patients were enrolled in this study; but during data collection 4 patients (2 in each group) were excluded from the study because of their death. So in this study total 66 patients (33 patients in treatment group and 33 patients in control group) were included. Mean age (years) was 56 ± 15 & 49 ± 15 in treatment and control group respectively. They were matched for haemoglobin, BMI(kg/m<sup>2</sup>), MAC(cm), s.albumin (gm/dl) and systolic and diastolic blood pressure. In the present study causes of CKD were as follows: glomerulonephritis (37%), diabetes mellitus (25%), hypertension (10%), undetermined cause (9%), obstructive uropathy (9%), systemic lupus erythematosus (4%) and autosomal dominant polycystic kidney disease (3%). In the present study co-disease was as follows: hypertension (87%), ischemic heart disease (10%) and cerebrovascular disease (2%).

**Table I: Baseline characteristics of study population.**

| Variables                           | Group                  |                           | P value |
|-------------------------------------|------------------------|---------------------------|---------|
|                                     | Group I (Control) n=33 | Group II (Treatment) n=33 |         |
| Age (Years)                         | 1649 ± 15              | 56 ± 15                   | 0.074   |
| Systolic BP                         | 129±4                  | 131±5                     | 0.210   |
| Diastolic BP                        | 79±4                   | 80±3                      | 0.353   |
| BMI(kg/m <sup>2</sup> )             | 21±5                   | 23±4                      | 0.137   |
| MAC(cm)                             | 23.7±2.2               | 23.7±1.7                  | 0.927   |
| Hb%( gm/dl)                         | 9 ± 0.9                | 9 ± 1                     | 0.477   |
| Serum albumin (gm/dl)               | 3±0.4                  | 2.9±0.49                  | 0.666   |
| Serum HCO <sub>3</sub> <sup>-</sup> | 20.6±0.7               | 20.3±1                    | 0.334   |
| Serum K <sup>+</sup>                | 4.8±0.5                | 4.7±0.5                   | 0.619   |
| Serum Creatinine(mg/dl)             | 2.4±0.9                | 2.4±0.75                  | 0.975   |
| eGFR(ml/min/1.73m <sup>2</sup> )    | 27±10                  | 25±9                      | 0.290   |

**Note:** Hb% - haemoglobin%; BP-blood pressure; BMI-body mass index; MAC-mid-arm circumference; HCO<sub>3</sub><sup>-</sup> - bicarbonate; K<sup>+</sup>-potassium; eGFR - estimated glomerular filtration rate.

**Table II: Serum HCO<sub>3</sub><sup>-</sup> - of the study subjects at different time interval**

| Time           | Group                          |                                  | P value |
|----------------|--------------------------------|----------------------------------|---------|
|                | Control group (Mean ± SD) n=33 | Treatment group (Mean ± SD) n=33 |         |
| Baseline       | 20.6 ± 0.70                    | 20.3 ± 1.06                      | 0.334   |
| After 3 months | 21.3 ± 1.1                     | 24.4 ± 1.3                       | 0.001   |
| After 6 months | 21.2 ± 1.1                     | 26.3 ± 1.6                       | 0.001   |

Serum bicarbonate (HCO<sub>3</sub><sup>-</sup>) of study subject at baseline in treatment and control group was similar.

Serum HCO<sub>3</sub><sup>-</sup> of study subjects increased in treatment group at 3 months than control group (P<0.001) and also at 6 months (P<0.001).

**Table III: Serum K<sup>+</sup> of the study subjects.**

| Time           | Group                    |                            | P value |
|----------------|--------------------------|----------------------------|---------|
|                | Group 1 (Control) (n=33) | Group 2 (Treatment) (n=33) |         |
| Baseline       | 4.8 ± 0.5                | 4.7 ± 0.5                  | 0.619   |
| After 3 months | 4.9 ± 0.4                | 4.5 ± 0.5                  | 0.002   |
| After 6 months | 5.0 ± 0.5                | 4.5 ± 0.6                  | 0.001   |

At baseline serum potassium (K<sup>+</sup>) level was similar in control and treatment group. After 3 and 6 months serum K<sup>+</sup> level was reduced significantly in the treatment group than control group.

**Table IV: Nutritional status at 0,3months in control group (n=33)**

| Variables                | Baseline   | After 3 months | P value |
|--------------------------|------------|----------------|---------|
| BMI (Kg/m <sup>2</sup> ) | 21.3 ± 5.0 | 21.2 ± 5.0     | 0.320   |
| MAC (cm)                 | 23.7 ± 2.2 | 23.0 ± 2.2     | 0.001   |
| S.albumin (gm/dl)        | 3.00 ± 0.4 | 2.8 ± 0.4      | 0.001   |

In control group body mass index (BMI) of study subject of was similar at baseline and after 3 months.

In the same group mid- arm circumference (MAC) of study population decreased after 3 months (P<0.001).

In the control group serum albumin (s.albumin) decreased from baseline to 3 months (P<0.001).

**Table V: Nutritional status at 0, 6 months in control group (n=33)**

| Variables                | Baseline   | After 6 months | P value |
|--------------------------|------------|----------------|---------|
| BMI (Kg/m <sup>2</sup> ) | 21.3 ± 5.0 | 21.2 ± 5.1     | 0.145   |
| MAC (cm)                 | 23.7 ± 2.2 | 22.4 ± 2.3     | 0.001   |
| S. albumin (gm/dl)       | 3.0 ± 0.4  | 2.8 ± 0.5      | 0.005   |



In control group body mass index (BMI) of study subject was similar at baseline and after from 6 months (P=0.145)

In the above group mid-arm circumference (MAC) of study population was higher at baseline than after 6 months (P<0.001).

In control group serum albumin (s.albumin) was higher at baseline than after 6 months (P<0.005).

**Table VI: Nutritional status at 0, 3 months in treatment group (n=33)**

| Variables                | Baseline     | After 3 months | P value |
|--------------------------|--------------|----------------|---------|
| BMI (Kg/m <sup>2</sup> ) | 23.01 ± 4.04 | 23.03 ± 4.02   | 0.487   |
| MAC (cm)                 | 23.7 ± 1.7   | 24.0 ± 1.7     | 0.007   |
| S. albumin (gm/dl)       | 2.9 ± 0.4    | 3.1 ± 0.4      | 0.001   |

In the treatment group body mass index (BMI) of study subject was similar at baseline and after 3 months (P=0.487).

In the same group mid-arm circumference (MAC) of study population was higher after 3 months than that of baseline (P<0.007). In the treatment group serum albumin (s.albumin) was higher after 3 months than from baseline (P<0.001).

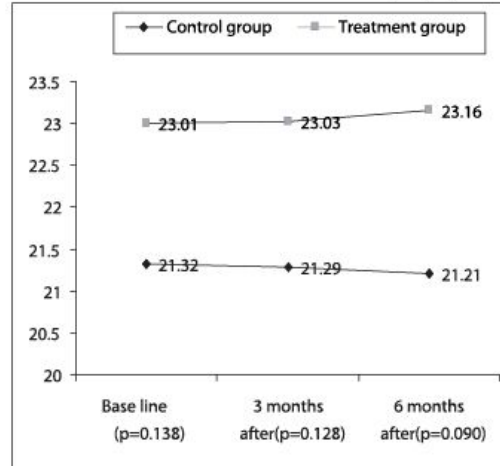
**Table VII: Nutritional status at 0, 6 months in treatment group (n=33)**

| Variables                | Baseline     | After 6 months | P value |
|--------------------------|--------------|----------------|---------|
| BMI (Kg/m <sup>2</sup> ) | 23.01 ± 4.04 | 23.16 ± 4.07   | 0.044   |
| MAC (cm)                 | 23.7 ± 1.7   | 24.4 ± 1.9     | 0.001   |
| S. albumin (gm/dl)       | 2.9 ± 0.4    | 3.4 ± 0.4      | 0.001   |

In the treatment group body mass index (BMI) of study subject of was higher after 6 months than baseline (P=0.044).

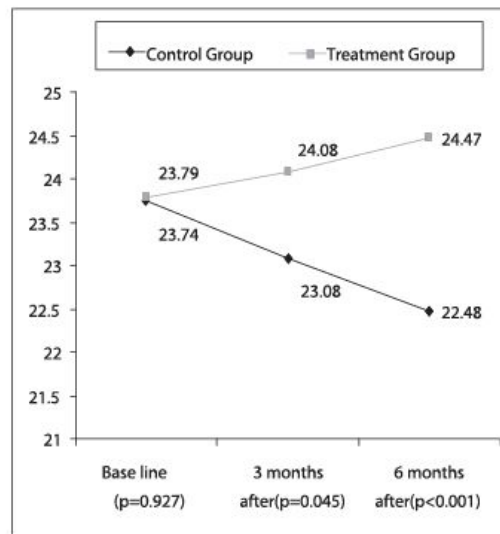
In the same group mid-arm circumference (MAC) of study population was raised after 6 months from baseline (P<0.001).

In the treatment group serum albumin (s.albumin) increased after 6 months (P<0.001).



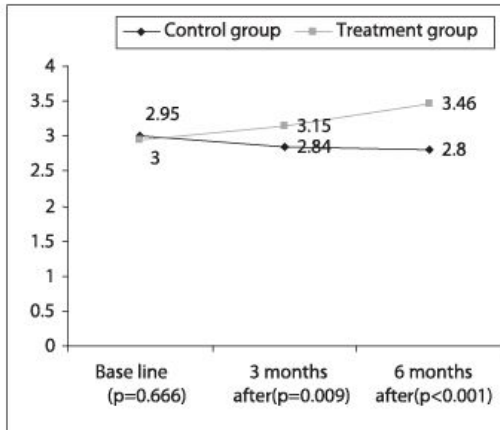
**Fig 1: Body mass index (BMI) of the study subjects at 0,3,6 months**

There was no difference of BMI between treatment group and control group at 0, 3 and 6 months.



**Fig 2: Mid-arm circumference (MAC) of the study subjects at 0,3,6 months.**

In the above figure the values of MAC were similar at baseline in two groups. Improvement of MAC in treatment group than control group was significant at 3 and 6 months.



**Fig 3: Serum albumin status of the study subjects at 0,3,6 months.**

In the above figure baseline serum albumin was similar in two groups; there was significant improvement of serum albumin at 3 and 6 months in treatment group than the control group.

**Table VIII: Status of eGFR in control group at 0,3,6 months.**

| Variables                      | Baseline  | Time interval                | P value |
|--------------------------------|-----------|------------------------------|---------|
| eGFR ml/min/1.73m <sup>2</sup> | 27.9 ± 10 | After 3 months<br>26 ± 8     | 0.003   |
| eGFR ml/min/1.73m <sup>2</sup> | 27.9 ± 10 | After 6 months<br>24.9 ± 8.9 | 0.001   |

Estimated glomerular filtration rate (eGFR) reduced at 3 and 6 months from baseline.

**Table IX: Status of eGFR in treatment group at 0,3,6 months.**

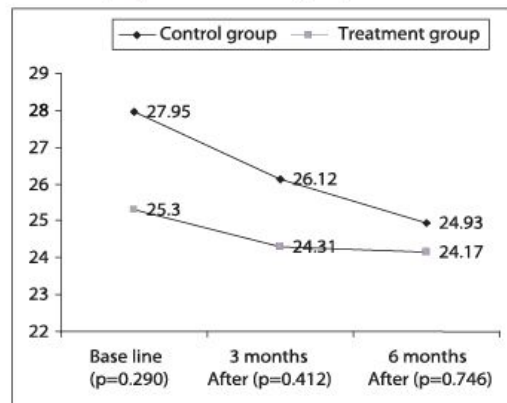
| Variables                      | Baseline   | Time interval                 | P value |
|--------------------------------|------------|-------------------------------|---------|
| eGFR ml/min/1.73m <sup>2</sup> | 25.3 ± 9.9 | After 3 months<br>24.3 ± 9.3  | 0.061   |
| eGFR ml/min/1.73m <sup>2</sup> | 25.3 ± 9.9 | After 6 months<br>24.1 ± 10.1 | 0.008   |

Estimated glomerular filtration rate (eGFR) reduced at 6 months from baseline.

**Table X: Changes in eGFR between control and treatment group at 6 months.**

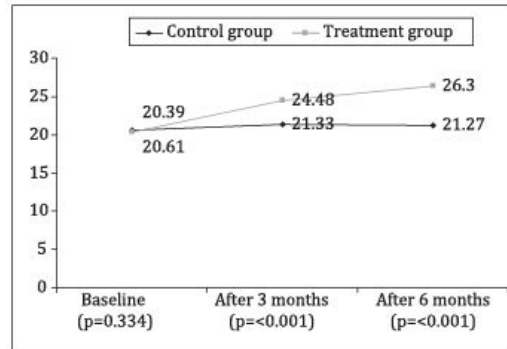
| Variables                  | Group                                 |                                          | P value |
|----------------------------|---------------------------------------|------------------------------------------|---------|
|                            | Group I (Control)<br>(Mean ± SD) n=33 | Group II (Treatment)<br>(Mean ± SD) n=33 |         |
| Change of eGFR at 6 months | 3.02 ± 2.25                           | 1.13 ± 2.31                              | 0.001   |

Changes in reduction of estimated glomerular filtration rate (eGFR) was significantly low at 6 months in treatment group than the control group.



**Fig 4: Estimated glomerular filtration rate ( eGFR) status of the study subjects at 0,3,6 months.**

In the above figure there was similar reduction of eGFR at 3 and 6 months in both treatment group and control group.



**Fig 5: Serum bicarbonate (HCO<sub>3</sub><sup>-</sup>) of study subjects at different time interval**

At baseline serum HCO<sub>3</sub><sup>-</sup> was similar in treatment and control group. There was significant improvement in serum HCO<sub>3</sub><sup>-</sup> level at 3 and 6 months from baseline between treatment and control group.



Table XI: Serum creatinine of the study subjects.

| Time           | Group                                 |                                          | P value |
|----------------|---------------------------------------|------------------------------------------|---------|
|                | Group I (Control)<br>(Mean ± SD) n=33 | Group II (Treatment)<br>(Mean ± SD) n=33 |         |
| Baseline       | 2.44 ± 0.96                           | 2.45 ± 0.75                              | 0.975   |
| After 3 months | 2.51 ± 0.83                           | 2.54 ± 0.79                              | 0.881   |
| After 6 months | 2.67 ± 0.99                           | 2.57 ± 0.81                              | 0.660   |

There was no difference in serum creatinine level between treatment and control group at baseline and at 3 and 6 months interval.

### Discussion

Metabolic acidosis is a common complication associated with progressive loss of kidney function. In this prospective trial oral sodium bicarbonate supplementation was associated with positive effects in both primary and secondary end points in patients with CKD. Sodium bicarbonate supplementation slowed decline of renal function in treatment group as assessed by eGFR (ml/min/1.73m<sup>2</sup>) to 1.13 in treatment group and 3.02 in control group in six months. This finding is similar to the study of Mahajan et al 2010<sup>7</sup> which was carried out for 5 years, the decline was 1.4 in the treatment group versus 2.1 in placebo group. They used oral NaHCO<sub>3</sub> supplementation of 0.5mEq/kg. In another study the rate of decline of Kidney function in sodium bicarbonate treated group was similar to the normal age-related decline (Bankhead 2009).<sup>8</sup> In the study of De Brito-Ashurat et al 2009, that was conducted over two years, eGFR reduced to 1.88 ml/min/1.73m<sup>2</sup> in treatment group who received NaHCO<sub>3</sub> and 5.93ml/min in control group without supplementation.<sup>9</sup> The present study had shown a higher decline in eGFR in both control and treatment group over 6 months period. Many factors might influence it: poor nutritional status, poor socio-economic condition and poor drug compliance.

Lim et al 1998 had revealed that acidotic milieu in CKD was associated with muscle wasting and impaired albumin synthesis; which was consistent with present study where treatment group showed higher serum albumin level following sodium bicarbonate supplementation than control.<sup>10</sup> This has been shown in other studies (Movilli et al 1998,<sup>11</sup> Ballmer et al 1995).<sup>12</sup> De Brito-Ashurat et al 2009 also found significantly higher albumin levels in the treatment group than control group at 12 and 24 months interval of study period. In the present study decreased serum albumin level at baseline was found in both case and control group which also seen in study of Eustace et al 2004.<sup>13</sup>

Uremic acidosis can increase skeletal muscle breakdown and diminished albumin synthesis, leading to muscle

wasting and muscle weakness. The presenting study has shown that mid-arm circumference was below cut-off point for determination of chronic energy deficiency (Chokraborty et al 2011).<sup>14</sup> The mid-arm circumference improved significantly in treatment group than the control group after six months. A similar result was also found in a previous study (De Brito Ashurst et al 2009).<sup>9</sup> The decreased level of mid-arm circumference in control group of presenting study could be explained by the studies done earlier Bailey et al 1996<sup>15</sup> and Boirle et al 2000;<sup>16</sup> but contrary to the study of Garibotto et al 1994 which concluded that change in protein synthesis and degradation were well balanced and net proteolysis was not augmented in patients with chronic renal failure.<sup>17</sup>

There was higher increase in HCO<sub>3</sub><sup>-</sup> in the treatment group than the control group after six months in this study; similar result was also found in a previous study of Goraya et al 2013.<sup>18</sup> In the present study serum K<sup>+</sup> level was reduced significantly in treatment group than control group. Possible reason could be due to correction of acidosis resulted in influx of extracellular excess k<sup>+</sup> to intracellular and thereby reduction its serum level. In the study of De Brito Ashurst et al 2009, a significant reduction of serum potassium was also found in the treatment group than the control group following NaHCO<sub>3</sub> supplementation.<sup>9</sup>

### Summary

The present prospective trial was conducted in the department of nephrology, Sir Salimullah Medical College and Mitford Hospital, Dhaka, during July 2013 to June 2014. The CKD patients (eGFR<60/ml/min/1.73m<sup>2</sup>) were included in the study. A total of 66 such subjects were included in the study and were given sodium bicarbonate in treatment group (n=33) but control group (n=33) did not receive any sodium bicarbonate supplementation. There were no significant difference in age, sex, serum bicarbonate, blood pressure and nutritional parameters between treatment and control group at the beginning of study.

There was significant increase in HCO<sub>3</sub><sup>-</sup> in the treatment group than the control group (26.3±1.6 and 21.2±1, mmol/L; p <0.001) after six months of study period. Serum potassium levels decreased more (4.5 ± 0.6 and 5.0 ± 0.5, mmol/L; p<0.001) in treatment than control group respectively after six months. In control group at 0, 3 and 6 months mid-arm circumference was and 23.7 ± 2.2 to 23.0±2.2, (p<0.001), then 22.4 ± 2.3,cm,(p<0.001); serum albumin was 3.0 ± 0.4 to 2.8 ± 0.4,(p< 0.001) then to 2.8 ± 0.5,gm/dl,(p<0.005) and estimated glomerular filtration rate was 27±10 to

26±8,(p<0.003) then to 24±8.9,ml/min/1.73m<sup>2</sup>, (p<0.001) respectively showing significant decrease. But at 0, 3 and 6 months BMI was similar 21.3 ± 5.0 to 21.2 ± 5.0, (p=0.320), then to 21.2 ± 5.1, kg/m<sup>2</sup>,(p=0.145).

In treatment group at 0, 3, and 6 months there was progressive increase of mid-arm circumference from baseline 23.7±1.7 to 24.0±1.7, (p<0.007) then 24.4±1.9, cm(p<0.001) and serum albumin 2.9 ± 0.4 to 3.1 ± 0.4, (p<0.001) then 3.4±0.4 gm/dl,(p<0.001) respectively. But body mass index and estimated glomerular filtration rate was similar at 0 and 3 months 23.01 ± 4.04 to 23.03 ± 4.02kg/m<sup>2</sup>,(p=0.487) and 25.3 ± 9.9 to 24.3 ± 9.3, ml/min/1.73m<sup>2</sup>, p=0.061) respectively. At six months there was some decrease in estimated glomerular filtration rate (ml/min/1.73m<sup>2</sup>) from baseline 25.3 ± 9.9 to 24.1 ± 10.1, (p< 0.008).

Estimated glomerular filtration rate (ml/min/1.73m<sup>2</sup>) declined 3.02 and 1.13 in control and treatment group respectively (p<0.001) after 6 months. There was no significant difference in serum creatinine concentration between control and treatment group after six months of study period (2.6±.9 and 2.5±.8 mg/dl; p =0.660).

#### Conclusion & Recommendation

Supplementation of oral sodium bicarbonate had increased serum bicarbonate level significantly and was associated with slower deterioration of renal function and improvement of nutritional status in the treatment group than that of control group without sodium bicarbonate. Oral sodium bicarbonate should be prescribed in CKD patients with low serum bicarbonate level.

Further study should be conducted with long term follow up period to see the sustained effect.

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Original Article

## Clinical Profile of Influenza viral illness – A Recent Observation in Bangladesh

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### Abstract

**Background:** Influenza pandemic is the most serious illness human civilization ever faced regarding morbidity & mortality. The recent outbreak of influenza pandemic (June, 2009) worldwide lead to influenza surveillance study in different countries sponsored by WHO with a view to control any further epidemic or pandemic outbreak of the disease. As a part of nationwide influenza surveillance study we are studying the clinical profile of influenza viral illness among persons seeking care at Dhaka National Medical College Hospital.

**Methodology:** It was a prospective study form June 2007 to March 2015 in 1527 patients who were hospitalized with cough & difficult breathing and those who seeked out-patient department care for fever with sore throat or cough were included as case in our study.

**Result:** Between June 2007 to March 2015 we collected specimen from 1527 cases and tested for influenza virus in the microbiology laboratory of ICDDR,B Dhaka. 224 cases were positive for influenza virus (15%), Influenza A and influenza B viral illness was 134 (60%) & 90 (40%) respectively. Fever was the most common complaint in all influenza cases; cough, runny nose and difficulty in respiration were also frequently encountered. Headache, bodyache & sore throat were also presenting feature.

**Keyword:** Influenza, Surveillance, Clinical profile.

### Introduction

Influenza annually infect 5%-15% of the global population, resulting in an estimated 2,50,000 to 5,00,000 deaths per year.<sup>1,2</sup> Influenza is a contagious respiratory illness caused by influenza virus that infect the nose, throat & lungs. Unlike tropical countries prevalence & burden of influenza are well-described for temperate country.<sup>3</sup> People who have influenza or 'Flu' often feel some or all of the features like fever, chill, cough, sore throat, running or stuffy nose, muscle or bodyache, headache, fatigue & vomiting. Influenza virus mainly spreads by droplets made when people with flu cough, sneeze or talk. The recent outbreak of influenza pandemic (June, 2009) worldwide lead to influenza surveillance study in different countries sponsored by WHO with a view to control any further epidemic or pandemic outbreak of the disease. As a part of nationwide influenza surveillance study we are studying the clinical profile of influenza viral illness among persons seeking care at Dhaka National Medical College Hospital.

### Methodology

Patient who were hospitalized with cough & difficult breathing & those who seeks care for fever with sore throat or cough were included as case in our study. The

former group was studied among indoor patients with provisional diagnosis of severe acute respiratory illness (SARI) whose age is 0-5 year. The later group was studied among outpatient of paediatric & medicine OPD. After obtaining informed consent a throat swab & a nasal swab specimen are collected from each study case & also clinical & demographic informations are recorded. Samples are transported to ICDDR,B Mohakhali, Dhaka where those are tested for presence of influenza virus by real time rRT-PCR. Observational data are analyzed by statistical software SPSS.

### Result

Between June 2007 to March 2015 we collected specimen from 1527 cases & tested for influenza virus in the microbiology laboratory of ICDDR, B Dhaka. 224 cases were positive for influenza virus (14.67%) (Table I, II, III). Influenza A & influenza B viral illness were 134 (60%) & 90 (40%) respectively (Table IV). Fever was the most common (100%) complaint in all influenza cases. Cough & runny nose were the next common complaint in ILI cases whereas difficulty in respiration was the commonest feature of SARI cases. Headache, bodyache & sore throat were more common in ILI than SARI cases. These findings are depicted in Fig 1, 2 & 3.



**Table I: Influenza positive cases**

|                  | No.  | Percentage |
|------------------|------|------------|
| Sample collected | 1527 |            |
| Influenza (+)ve  | 224  | 14.67%     |

**Table II: Age distribution**

| Age group     | Influenza positive | Percentage    |
|---------------|--------------------|---------------|
| 0 – 15 years  | 121                | 54            |
| 16 – 40 years | 67                 | 30            |
| 41 – 60 years | 23                 | 10            |
| >60 years     | 13                 | 06            |
| <b>Total</b>  | <b>224</b>         | <b>14.67%</b> |

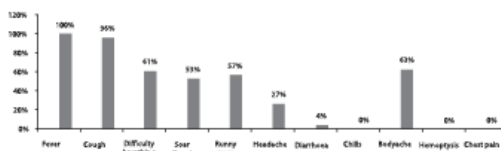
**Table III: Percentage positivity according to age**

| Age group     | Sample tested | Influenza positive | Percentage    |
|---------------|---------------|--------------------|---------------|
| 0 – 15 years  | 840           | 121                | 14.4%         |
| 16 – 40 years | 498           | 67                 | 13.5%         |
| 41 – 60 years | 144           | 23                 | 15.9%         |
| >60 years     | 45            | 13                 | 28%           |
| <b>Total</b>  | <b>1527</b>   | <b>224</b>         | <b>14.67%</b> |

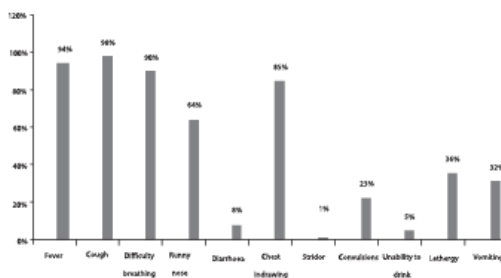
**Table IV: Influenza type**

| Description  | No.        | Percentage  |
|--------------|------------|-------------|
| Influenza A  | 134        | 60%         |
| Influenza B  | 90         | 40%         |
| <b>Total</b> | <b>224</b> | <b>100%</b> |

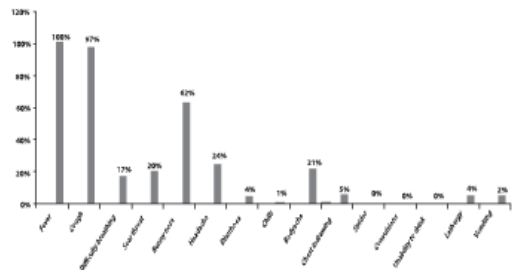
**Figure 1 Clinical features of influenza among Severe acute respiratory illness (SARI) patients in DNMCH**



**Figure 2 Clinical features of influenza among Severe pneumonia (SP) patients in DNMCH**



**Figure 3 Clinical features of influenza among Influenza like illness (ILI) patients in DNMCH**



**Discussion**

This study revealed that influenza virus is prevalent in our country as a causative agent of febrile illness & acute respiratory tract infection. Surveillance data from Pune and Chennai in India suggested that 5%-12% of the influenza like illness (ILI) cases were due to influenza virus.<sup>4</sup> Hospital surveillance in Kenya found 248 (38%) influenza positive out of 660 collected samples.<sup>5</sup> In our study the incidence was 14.67% which is similar to the result of study in India. A similar result was discovered in a prior study by ICDDR,B who found 14% influenza positive cases in under-5 children in Kamalapur, a low income Urban neighborhood of Dhaka City.<sup>6</sup> We found that all age groups were affected with influenza but the proportion is greatest among toddler & teenage (52%), nearly half of them less than 5 years of age. In this study it was found that both of the strains of the influenza virus, type A & type B, which are circulating in the Asian countries are present in Bangladesh.<sup>2</sup> Clinically fever was the most common complaint in all influenza cases because this was the inclusion criteria of our study. Cough & runny nose were the next common complaint in ILI cases whereas difficulty in respiration was the commonest feature in SARI cases. Headache, Bodyache & sore throat were more common in ILI than in SARI cases. As ARI contribute to 21% death of children less than 5 years of age in Bangladesh and influenza being a major aetiological causes of ARI in its peak season, its prevention by non-pharmacological intervention or, vaccination would contribute to mortality reduction under 5 years of age and achieving millennium development goal of reducing infant & children mortality (MDG – 4).<sup>7</sup>

**Conclusion**

In our study we revealed the spectrum of clinical features of influenza viral illness in a tertiary care hospital in Dhaka City. The recognition of clinical profile of influenza will help in early diagnosis, proper management & effective control of further spread of



influenza. Our study was done on only a small part of population of the country & further study targeting wide range of population is required for better understanding of the disease.

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Original Article

## Prophylactic administration of intravenous Ceftriaxone before incision or after cord clamping during Caesarean Section A comparative study

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### Abstract

**Background:** Prophylactic antibiotic is recommended to reduce infection-related complication following caesarean section. There is a current debate on the timing of administration of prophylactic antibiotic in caesarean delivery

**Objectives:** To assess the impact of timing of antibiotic prophylaxis at caesarean section before skin incision versus after cord clamping on clinically detectable maternal and neonatal infectious morbidity.

**Study design:** Prospective randomized trial.

**Methods:** One twenty pregnant women who underwent emergency and elective caesarean section were randomly assigned into 2 groups. Group A (n=60) patients received 1 gm ceftriaxone intravenously 30 minutes before skin incision and group B (n=60) received 1 gm ceftriaxone intravenously after umbilical cord clamping and delivery of the baby. Both groups received ceftriaxone 1 gm intravenously daily for 3 days followed by oral tablet cefuroxime 250 mg 12 hourly for next 2 days. Both groups were observed regarding maternal febrile morbidity, endometritis, wound infection, and urinary tract infection (UTI); the neonates were observed for low APGAR score, jaundice, clinically detectable neonatal sepsis and admission to neonatal ward.

**Results:** Both groups were comparable regarding maternal age, body weight, gestational age, parity and indications of caesarean section. The number of cases who had febrile morbidity, endometritis, wound infection, and UTI were almost similar between two groups and these differences were not statistically significant (p= 0.27, 0.21, 0.37 and 0.17 respectively).

No difference was found between both groups regarding low APGAR score, jaundice, clinically detectable neonatal sepsis and admission to neonatal ward (p= 0.17, 0.41, 0.21, 0.53 respectively).

**Conclusion:** There were no differences in maternal infectious morbidity and neonatal outcome after administration of prophylactic antibiotic ceftriaxone pre-incision or post-clamping of the umbilical cord for caesarean delivery.

**Key words:** Antibiotic prophylaxis, Caesarean section, Ceftriaxone.

### Introduction

There is an increase in the incidence of caesarean section and has risen steadily over the past two decades.<sup>1</sup> Now it is the most commonly performed major surgical procedure.<sup>2</sup> Infectious morbidity is the most common complication following caesarean section with reported rates ranging from 18%-83%.<sup>3-6</sup> Women undergoing caesarean delivery have significant incidence of many infectious complications; including fever, bacteraemia wound infection, endometritis, urinary tract infection and

pelvic abscess.<sup>7</sup> Antibiotic prophylaxis for caesarean section has been a general practice because it significantly reduces postoperative infections.<sup>8</sup> Generally prophylactic antibiotics is recommended to be administered prior to surgical incision.<sup>9</sup> Prophylactic antibiotic for caesarean section are commonly used worldwide in most institutions generally after clamping of the umbilical cord and it prevents unnecessary foetal antibiotic exposure, masking of foetal infections in neonatal septic word and emergence in resistant bacterial strains. Thus, there is a

debate on the time of prophylactic antibiotic in caesarean section whether giving antibiotic prophylaxis pre-incision or after delivery of the baby and clamping of the umbilical cord. Cephalosporin second or third generation has been evaluated as prophylactic antibiotic in caesarean section with emerging results.<sup>10</sup> Ceftriaxone, a third generation cephalosporine has shown an excellent profile against infecting organisms related to surgery.<sup>11</sup>

This current study was conducted to investigate the impact of timing of prophylactic antibiotic for caesarean section before skin incision versus cord clamping on maternal and neonatal infectious morbidity.

**Materials and Methods**

This comparative study was performed at Combined Military Hospital, Rangpur in one calendar year from July 2013 to June 2014. After departmental approval and obtaining informed written concepts from the patients, 120 patients who were scheduled for elective and emergency caesarean section were enrolled in the study. Women were excluded from the study if they had severe anaemia, diabetes mellitus, impaired glucose test, twin pregnancy, received antibiotics within two weeks prior to the operation, if any visible infection at any site, fever at the time of operation or unwilling to participate in the study.

Women were randomly distributed in two groups of 60 each. In group A patients received 1 gm of ceftriaxone intravenously 30 minutes pre-incision and group B received 1 gm of ceftriaxone intravenously after delivery of the baby and umbilical cord clamping. Both groups received inj ceftriaxone 1 gm intravenously daily for 3 days followed by oral tablet cefuroxime 250 mg 12 hourly for next 2 days.

All caesarean section were done by standard technique. Each patient was examined daily and post-operative infectious morbidity noted till the date of discharge from the hospital. A complete blood count and urine analysis were performed if necessary on third post-operative day.

**Febrile morbidity:** Oral temperature above 38°C on two or more occasions at four apart excluding first 24 hours after caesarean section.

**Endometritis:** Fever, uterine tenderness and purulent lochia.

**Wound infection:** Cellulitis, fever and exudates.

**Urinary tract infection (UTI):** Fever and positive urine analysis.

These infectious morbidities were treated according to their respective protocol.

The neonate was observed immediately postnatal and

during the 1st week to evaluate the neonatal outcome; the incidence of low APGAR score (<8) at 1 minute, jaundice, clinically detectable neonatal sepsis and admission to neonatal ward.

All results were expressed in mean + SD or percentage as applicable. Statistical analyses were carried out using Statistical Package for Social Science (SPSS) for Windows Version 17.0. Results were considered statistically significant if P value less than 0.05.

**Results**

**Table I: Demographic characteristics**

| Variables              | Group A (n=60) | Group B (n=60) | P value | Result                          |
|------------------------|----------------|----------------|---------|---------------------------------|
| Age (year)             | 27.53±5.21     | 26.43±5.21     | 0.13    | NS (student 't' test, unpaired) |
| Weight (kg)            | 64.41±6.21     | 65.17±5.91     | 0.41    | NS (student 't' test, unpaired) |
| Parity                 | 1.65±1.21      | 1.71±1.34      | 0.11    | NS (student 't' test, unpaired) |
| Gestational Age (week) | 38.11±0.92     | 37.87±1.13     | 0.78    | NS (student 't' test, unpaired) |

Values are expressed in Mean + SD and Percentage. NS– Not significant

Two groups were similar and fairly comparable with respect to age, body weight, parity and gestational age and differences were statistically not significant.

**Table II: Indications for caesarean section**

| Indication                 | Group A (n=60) | Group B (n=60) | P value | Result               |
|----------------------------|----------------|----------------|---------|----------------------|
| Previous caesarean section | 33(55%)        | 34(56.67%)     | 0.97    | NS (chi square test) |
| Breech presentation        | 8(13.33%)      | 7(11.67%)      | 0.47    | NS (chi square test) |
| Failure to progress labour | 5(8.34%)       | 6(10%)         | 0.31    | NS (chi square test) |
| Bad obstetric events       | 6(10%)         | 5(8.33%)       | 0.38    | NS (chi square test) |
| Foetal distress            | 3(5%)          | 4(6.66%)       | 0.52    | NS (chi square test) |
| Others                     | 5(8.33%)       | 4(6.67%)       | 0.41    | NS (chi square test) |

Values are expressed in Percentage. NS-Not significant

There were no significant differences of indications of caesarean section in both groups.

**Table III: Maternal infectious morbidity**

| Outcome           | Group A (n=60) | Group B (n=60) | P value | Result               |
|-------------------|----------------|----------------|---------|----------------------|
| Febrile morbidity | 3(5%)          | 4 (6.67%)      | 0.27    | NS (chi square test) |
| Endometritis      | 2 (3.33%)      | 1 (1.67%)      | 0.21    | NS (chi square test) |
| Wound infection   | 2 (3.33%)      | 3 (5%)         | 0.37    | NS (chi square test) |
| UTI               | 1 (1.67%)      | 2 (3.33%)      | 0.17    | NS (chi square test) |

Values are expressed in Percentage. NS-Not significant.

Incidences of febrile morbidity was 3(5%) in group A and 4(6.67%) in group B. Endometritis was found 2(3.33%) in group A and 1(1.67%) in group B and difference was statistically not significant. Wound infection was observed 2(3.33%) in group A and 3(5%) in group B. The incidence of UTI was 1(1.67%) in group A and 2(3.33%) in group B.

**Table IV: Neonatal outcome**

| Outcome                            | Group A (n=60) | Group B (n=60) | P value | Result               |
|------------------------------------|----------------|----------------|---------|----------------------|
| Low APGAR score (<8 in one minute) | 1 (1.67%)      | 2 (3.33%)      | 0.17    | NS (chi square test) |
| Jaundice                           | 5 (8.33%)      | 4 (6.67%)      | 0.41    | NS (chi square test) |
| Clinically detectable sepsis       | 2 (3.33%)      | 1 (1.67%)      | 0.21    | NS (chi square test) |
| Admission to neonatal ward         | 7 (11.67%)     | 6 (10%)        | 0.53    | NS (chi square test) |

Values are expressed in Percentage. NS-Not significant.

Neonatal outcomes in both groups were shown in table IV. Low APGAR score (<8 in one minute) was observed 1(1.67%) baby in group A and 2(3.33%) in group B. Jaundice was found 5(8.33%) babies in group A and 4(6.67%) babies in group B. Clinically detectable neonatal sepsis observed 2(3.33%) babies in group A and 1(1.67%) baby in group B. Seven (11.67%) babies of group A and 6(10%) babies of group B were admitted in neonatal ward due to jaundice, low birth weight, sepsis and routine check up.

**Discussion**

The present study shows no statistically significant difference as regards demographic characteristics, maternal characteristics in obstetrical history, and about indications of caesarean section. Concerning the indications of caesarean section, the present study findings revealed that, the previous caesarean section were found 33 (55%) in group A and 34 (56.67%) in group B. This findings were consistent with one study who showed that repeated caesarean section was the primary indication for caesarean section.<sup>12</sup>

In this study, the number of post-operative febrile morbidity, endometritis, clinically detectable wound infection and UTI were almost same in both pre-incision antibiotic versus after umbilical cord clamping antibiotic groups and differences were not statistically significant. These results were similar with a study on ninety laboring women who had caesarean section and found no differences in maternal infectious morbidity whether antibiotic prophylaxis was administered preoperatively or after cord clamping.<sup>13</sup> Another study on a change in

policy from post cord clamping administration of prophylactic antibiotics to pre-incision administration showed no differences in incidences of endometritis and wound infection in the two groups of women, who received cefazolin post cord clamping versus pre-incision.<sup>14</sup> On the contrary to these findings some other studies showed that the antibiotic prophylaxis before skin incision is better than after cord clamping in lowering the rates of both wound infection and endometritis.<sup>15,16,17</sup> The major infective morbidities associated with cesarean section are endometritis and surgical site infections; rates of incidence vary, depending on whether the surgery was scheduled or emergency, but there are also disparities in reporting of rates owing to variations in practice of post-discharge surveillance among institutions.<sup>8,17,18</sup>

The current debate of prophylactic antibiotics commonly used for caesarean section is that antibiotics rapidly transferred to the newborn and the foetal exposure to antibiotics might mask infection in the neonate and the possibility of emergence of resistant organisms.<sup>19</sup> Regarding neonatal outcomes in this study, there were no differences of statistical significance between pre-incision antibiotic group and cord clamping group in the occurrences of low APGAR score, jaundice, clinically detectable neonatal sepsis and admission to the neonatal ward. These findings were consistent with some recent studies regarding neonatal outcome.<sup>18,20,21</sup>

The limitations of the study were small sample size, cost was not investigated and there was no other type of antibiotic used as control.

**Conclusion**

There were no differences in maternal infectious morbidity and neonatal outcome after administration of prophylactic antibiotic ceftriaxone pre-incision or post-clamping of the umbilical cord for caesarean delivery. Both pre-incision and post umbilical cord clamping administration of ceftriaxone, were effective prophylactic for caesarean section.

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Original Article

## Prediction of stature from length of Ulna – An Anthropometric study on 100 Bangladeshi adult Muslim male of lower socioeconomic status group

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### Abstract

**Background:** Anthropometric study of bones conveys information about race, sex, age and height of a person as well as the effect of climatic, hereditary and nutritional status on stature and length of long bones which is very important for anatomist in the academic field. Stature of an individual can be estimated from measurements of long bones with the help of established formulae which plays an important role in medico-legal practice and thus length of long bones plays an important role in identifying unknown bodies.

**Objective:** The present study was undertaken to measure the stature as well as some length of ulna and to determine whether there is any correlation between stature and length of ulna and to estimate the stature using respective multiplication factor and to assess the effectiveness of the above estimations by comparing the 'estimated' values with the 'measured' values.

**Material and Methods:** It is descriptive type of study. Ulnar length with their stature were measured directly from the subjects by using Anthropometric spreading caliper, steel plate and measuring tape. The data were then statistically analyzed by computation to find out its normative value. Multiplication factors were estimated for estimating stature and comparisons were made between measured and estimated stature using paired "t" test.

**Place and period of study:** The study was carried out with a total number of 100 Bangladeshi adult Muslim males of age between 25 to 30 years of lower socio-economic status group. The analyses were conducted in The Department of Anatomy of BSMMU, Dhaka during the study period of January 2006 to December 2006.

**Result:** The mean measured values of the right and left ulnar length and the stature were 28.625 ( $\pm$  1.170) cm, 28.235 ( $\pm$  1.244) cm, and 163.70 ( $\pm$  5.986) cm respectively. The multiplication factors were estimated for the ulnar lengths with the stature. Significant positive correlations were found between the stature and the ulnar length and the differences between the measured statures and the estimated statures were not statistically significant.

**Conclusion:** This study will be helpful for the Anatomists, Anthropologists and also Forensic Medicine department of Bangladesh. For better result further study should be done on large samples of different socio-economic status groups, sexes and ethnic groups.

**Keywords:** Stature, ulnar length, adult Muslim male, lower socio-economic status group.

### Introduction

It is well known that anthropometric study of bones conveys information regarding race, sex, age and height of a person. This information is of interest to the anatomist in the academic field as well as medico-legal work. Climate, heredity and nutritional status of population are reported to have an effect on stature and length of long bones. In medico-legal practice Opinion on the stature of a person has to be calculated from skeleton

or isolated bone sent by police for expert opinion.<sup>1</sup>

The co-relational calculus into the field of work for the prediction of stature from the measurement of long bones<sup>2</sup> was first introduced by Pearson.

It was reported that world population is getting taller and therefore relationship between stature and length of long bones is changed and fresh formulae are needed for each generation.<sup>3</sup>

Estimation of stature from measurement of various long bones of the extremities has been attempted by many scientists with varying degree of accuracy. All such calculations depend on the fact that limbs exhibit consistent ratios relative to the total height of a person.<sup>4</sup>

Establishment of alternative methodologies for personal height estimation is important for a number of reasons.

Firstly in instances where height estimates needed to make from fragments of bones in archeological procedures or in forensic examinations after mass disasters or genocide.

Secondly estimation of pharmacokinetic parameters or evaluation of nutritional status rely on accurate measurement of not only body weight but also height of the bed ridden, old or frail patients or in patients who have limb or vertebral column deformity.<sup>5</sup>

Each racial group needs a separate formula for the estimation of stature.<sup>2</sup>

Siddique and shah stated opinion based on the study of residents of one state are not necessarily applicable to another state.

Workers in some countries have derived formulae for calculating stature from known lengths of long bones but no universally applicable formulae have been accepted. It is therefore agreed that different formulae will be required for calculating stature from long bones.<sup>6</sup>

It should be borne in mind that equations delivered from taller stature population (eg. Caucasians) may be less accurate when applied to the shorter stature population.<sup>7</sup>

The ulna has easily identifiable surface landmarks which make the measurements possible in compromised posture than any other bones. Therefore, it can be utilized to formulate the height indirectly.

Many of the previous workers have done this study on cadavers but cadavers can not represent a population and cadavers are largely of persons who are aged and have suffered from chronic debilitating diseases and likely to have been lying in an abnormal posture and may not be possible to straighten the body to get accurate stature measurement.

There is increase in height of 2.5 cm after death when measurement is taken in recumbent posture.<sup>8</sup>

The objective of this study is to estimate the height of an individual from the length of ulna using a derived equation from Bangladeshi adult Muslim male of lower socioeconomic status group, and to compare the results of our study with other studies done in different populations.

## Materials

In 1951 used 30 years as the age when stature decrease begins but in 1988 and 1989 reported that stature loss begins around 45 years of age<sup>9</sup>. Investigators have shown that mean stature loss is 1.2 cm (1/2 inch) in every 20 years after the age of 30.<sup>3</sup>

For aging it has been shown that the older the individual (after 30 years of age) the greater will have been his loss of stature. It was found that the average rate of decline is .06cm per year after 30 years of age.<sup>3</sup> Studies have shown that females lose more stature with aging than males.<sup>10</sup>

By Keeping in mind the above citation the age limit of the subjects in this study was determined from 25 to 30 years because this age limit is safe and there is no chance for change in the maximum stature and the study was carried out on 100 adult Muslim males of lower socio-economic status group of Bashaboo slum areas of Dhaka City.

All measurements were taken at fixed time from 7.30 Am to 2 Pm to prevent the discrepancies of diurnal variation. The duration was from July/ 2006 to October/2006. The analyses were conducted in the department of Anatomy of BSMMU, Dhaka during the study period of January 2006 to December 2006.

## Common exclusion criteria:

- # Subjects with bowing legs and bent knees.
- # Subjects with vertebral column curvature abnormality i.e. kyphosis, lordosis, scoliosis etc.
- # Persons who are suffering from chronic ailment.
- # Left handed subjects
- # Subjects with missing limb or part of limb.

## Methods

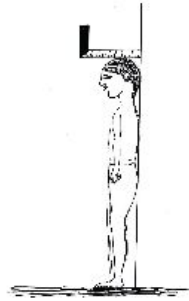
In this study each subject was measured twice and the mean value of the two measures was taken as true value of the subject as the mean value of the two measurements is considered the best estimate of the true value.<sup>10</sup>

Procedure of the measurement of the stature (Height of the body in a standing position)

The subject stood with heel together and back as straight as possible. The heels, buttocks, shoulders and head touched the wall. The arms were hung freely by the sides with the palm facing the thighs'.<sup>11</sup>

After taking a deep breath and holding it, a carpenter's square was placed against the head and the wall to determine maximum height on the wall and this was marked.

Participants were then told to breathe and to step away from the wall. Height was then measured from the floor to the mark on the wall with steel tape.<sup>12</sup>



**Fig-1: Procedure of the measurement of stature.**

**Procedure of the measurement of the length of the ulna:**

The ulnar length was measured by spreading caliper from the level of the tip of olecranon process to the styloid process and recorded in cm to the nearest 0.5 cm.<sup>13</sup> It was done with the help of surface anatomy of ulna.

Surface anatomy of ulna - When the elbow is extended, the apex of the olecranon can be felt and seen to lie in a line with the two epicondyles of the lower end of the humerus. When the elbow is flexed, the apex of the olecranon process of ulna descends. The posterior surface of the olecranon is subcutaneous and tapers from above downward and it can be felt with ease immediately below the apex.<sup>14</sup>



**Fig-2: Procedure of the measurement of the length of the ulna.**

**Calculation of multiplication factor**

The multiplication factor is the ratio of the stature to the length of ulna. The mean multiplication factor was then calculated. This mean multiplication factor would be used for estimating the stature from the length of the ulna.

Multiplication factor (M.F.) =

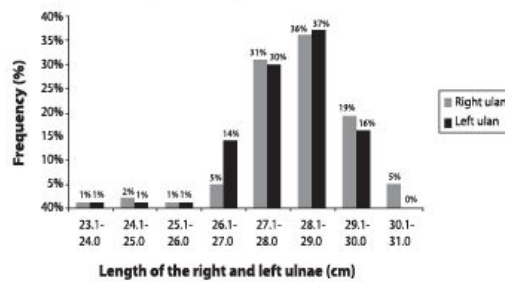
$$\frac{\text{Stature in cm}}{\text{Length of ulna in cm}} = 1$$

**Statistical analyses of data**

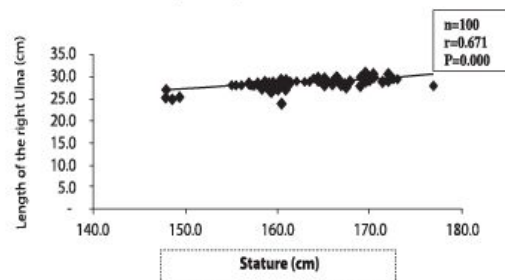
The collected data were calculated using a computer based programme (SPSS and MS Excel) to get mean values, correlation, frequency distribution and significant of the differences etc.

**Result**

The lowest value of both the right and the left ulna were similar and the highest value of the right side was greater than that of the left side. The mean value of the right ulna was greater than that of the left ulna. so, the multiplication factor for the length of left ulna is greater than that of the right ulna (Table-1.). More than four fifth subjects had the length within 26.1 cm to 30.0cm for both the right and the left sides. In both sides only one subject had the length within 22.1 cm to 24.0cm. In left side no subject had the value within 30.1cm to 32.0cm. (fig. 3). Highly positive correlations both for the stature with the length of the right ulna and the stature with the length of the left ulna were present (fig. 4 and fig. 5).

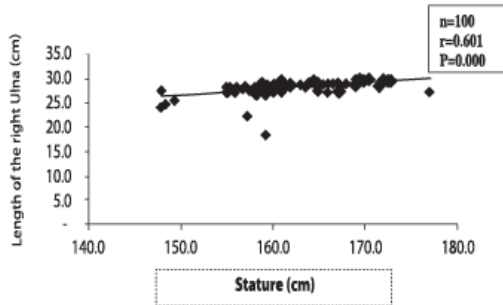


**Fig-3: Multiple bar diagram showing the frequency distribution of the length of the right and the left ulna of the individual (n=100).**



**Fig-4: Scatter diagram with regression analysis showing highly significant (P<0.001) positive correlation between the stature and the length of the right ulna of the individuals.**





**Fig-5: Scatter diagram with regression analysis showing highly significant ( $P < 0.001$ ) positive correlation between the stature and the length of the left ulna of the individuals.**

The measured values of the length of the ulna of both sides and the stature and also the multiplication factor for estimating stature are mentioned in table- I.

**Table I:**

| Variable             | Range (cm)    | Mean (cm) $\pm$ SD | Mean multiplication factor |
|----------------------|---------------|--------------------|----------------------------|
| Stature              | 148.00-177.00 | 163.70 $\pm$ 5.986 |                            |
| Length of right ulna | 24.00-31.00   | 28.625 $\pm$ 1.170 | 5.696 $\pm$ 0.232          |
| Length of left ulna  | 24.00-30.00   | 28.235 $\pm$ 1.244 | 5.775 $\pm$ 0.254          |

In this study each ulnar length of both sides was multiplied by mean multiplication factor and then estimated stature was obtained and after then calculating the mean for 100 estimated values and comparison between measured stature and estimated stature were done.

All are shown in table- II

**Table II:**

| Measurements from which the stature was estimated | Measured stature (cm) Mean $\pm$ SD | Estimated stature (cm) |                     | Significance of difference (P value) |
|---------------------------------------------------|-------------------------------------|------------------------|---------------------|--------------------------------------|
|                                                   |                                     | Range                  | Mean $\pm$ SD       |                                      |
| Length of right ulna                              | 163.70 $\pm$ 5.986                  | 136.70                 | 163.01 $\pm$ 6.776  | P = 0.923                            |
|                                                   |                                     | -176.57                |                     | Non-significant                      |
| Length of left ulna                               | 163.70 $\pm$ 5.986                  | 141.48                 | 163.245 $\pm$ 6.546 | P = 0.760                            |
|                                                   |                                     | -173.25                |                     | Non-Significant                      |

**Discussion**

In as study on 546 American white and Negro males and reported that the mean value of the length of the right and the left ulna of the American white and Negro males were 27.035 ( $\pm$  1.283) cm and 28.509 ( $\pm$  1.323) cm respectively and the ratio of the stature to the length of the ulna of the American white and Negro males were 6.432 and 6.037

respectively.<sup>3</sup> There was significant positive correlation between the stature and the length of ulna. The ulnar length of American white is lesser than that of the present study. The ulnar length of the American Negro is lesser than that of the right side but greater than that of the left side of the present study. The ratios of the stature to the length of the ulna of both the American White and the Negro are greater than that of the right and the left sides of the present study.

In Gujarat state of India the mean left ulnar length of 50 healthy Hindu male adults of medical students of 27.0 cm and the ratio between the stature and the length of left ulna was 6.177. There was significant positive correlation between the stature and the length of the left ulna.<sup>13</sup> The length of left ulna is lesser and the ratio between the stature and the length of the left ulna is greater that of the right and left sides of the present study.

In 1968 it was reported that the ratios between the stature and the ulnar length were 6.0, 6.3, 6.0, 5.92 and 6.018 respectively.<sup>1</sup> The above ratios are greater than that of right and left sides of the present study.

In North Bihar the ratio between the stature and the ulnar length was 6.196 which is greater than that of the right and the left sides of the present study.<sup>1</sup>

In 52 Spanish adult healthy males the mean value of the right ulnar length was 22.57 ( $\pm$  1.82) cm and the ratio of the stature to the length ulna was 7.452. There was significant positive correlation between the stature and the right ulnar length.<sup>15</sup> The mean value of the right ulnar length of the Spanish male is lesser and the ratio is greater than that of the right and left sides of the present study.

In a research work on 300 male subjects in Burdwan medical college, Burdwan, west Bengele it was found that the stature, the length of right and the left ulna and their multiplication factors were 164.315 cm, 27.13 cm, 27.01cm 6.05 and 6.08 respectively.<sup>2</sup> A study was done over the asymptomatic healthy 150 male medical students of Gujarat Medical Education and Research society Medical College and Hospital, Valsad and reported that the stature, the length of the right and the left ulna and their multiplication factors were 169.82 cm, 27.81 cm, 27.79 cm, 6.10 and 6.11 respectively.<sup>5</sup> In case of 150 male healthy students of Narayana medical college, Nellore, Andhra Pradesh the mean height, length of the right and the left ulna and their multiplication factors were 168.93 ( $\pm$  6.73) cm, 27.84 ( $\pm$  1.45) cm, 27.75 ( $\pm$  1.44) cm, 6.06, 6.08 respectively.<sup>16</sup> A study on male patients, attenders visiting the outpatient department of General Medicine of Sri Muthukumaran Medical college Hospital and Research Institute, Chennai, Tamil Nadu,



India showed that the mean height, length of the right and the left ulna and their multiplication factors were 164.4 ( $\pm$  6.4) cm, 27.7 ( $\pm$  1.3) cm, 27.6 ( $\pm$  1.4) cm, 5.93 and 5.95 respectively.<sup>17</sup>

In all these above cases, the stature was greater but the length of the both right and the left ulna were lesser and the multiplication factors were greater than that of the present study.

A work was done on 191 male medical students, students of other faculties, staff, patient relatives of Sir T. Hospital, Bhavnagar and other persons belonging to Gujarat and showed that the mean stature and the length of the right and the left ulna and the multiplication factors were 169.87 cm, 28.48 cm, 28.39 cm, 5.96 and 5.98 respectively.<sup>4</sup> The stature and the left ulnar length were greater and the right ulnar length was lesser and the multiplication factors were greater than that of the present study.

#### Conclusion

The aim of the present study was to make an independent formula for Bangladeshi people for the measurement of stature from the length of ulna as because there is no formula upon which the Bangladeshi can estimate their stature. This study will be helpful for anatomists, anthropologists and also forensic medicine department of Bangladesh. The present study is based on only 100 living Bangladeshi Muslim males of lower socio-economic status group. So, for better result further study should be done on large samples of different socio-economic status groups, sexes and ethnic groups.

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Original Article

## Prediction of Outcome in Acute Hemorrhagic Stroke from Initial Clinical Presentation and a Single CT Scan on Admission

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### Abstract

**Background:** Intracerebral hemorrhage (ICH) accounts for about 7-15% of all strokes and is the most devastating type of stroke with mortality rate of 34%-51%.

**Objective:** The study was done to determine the potential predictors for short-term mortality and neurological recovery in ICH patients by clinical and computed tomographic (CT) correlation.

**Methods:** This study was conducted over 100 admitted patients out of them fifty were diabetic, in the department of Medicine, Sher-E-Bangla Medical College Hospital, Barisal, Bangladesh for a duration of one year from 01.07.2010 to 30.06.2011. Data was collected in hospital directly from patient or attendance. Result was calculated using Chi-square test.

**Result:** In this study mean age of the ICH patients was  $60.26 \pm 11.22$  years. The clinical and CT scan findings were correlated with the outcome. GCS score was significantly higher among survivors. Poor outcome was associated with a hematoma volume of more than 30ml and presence of ventricular extension. Mortality of hemorrhagic stroke patients was 40% in first month. Most of the death occurred in first 7 days.

**Conclusion:** Though outcome and functional status at discharge were well correlated with the initial CT scan findings, age and GCS score, but larger study with greater matched variables, risk factors and long-term follow-up is needed to make a concrete comment.

**Keywords:** Hemorrhage, Outcome, Stroke, CT scan, GCS.

### Introduction:

Stroke is defined by the World Health Organization (WHO) as a condition characterized by rapidly developing symptoms and signs of a focal brain lesion, with symptoms lasting for more than 24 hours or leading to death, with no apparent cause other than that of vascular origin.<sup>1</sup> Intracerebral hemorrhage (ICH) is characterized by non-traumatic abrupt onset of severe headache, an altered level of consciousness and focal neurological deficit secondary to focal collection of blood within the brain parenchyma. An ICH accounts for approximately 7-15% of all strokes and is the most common devastating type of stroke. It carries a high early mortality rate of 34-51% with half of the fatalities occurring within the first 2 days of ictus.<sup>2-5</sup> Multivariate studies have shown that level of consciousness, hematoma size and ventricular extension are the most important risk factors at presentation in patients of ICH which determine outcome and mortality in first month.<sup>5-8</sup>

A recent study suggests age of patient and amount of alcohol consumed within a week of ICH as independent determinant of outcome after hemorrhagic stroke.<sup>9</sup> Diabetes mellitus is a disease which involves almost all organs of the body and associated with poorer outcome in diseases of other organs in comparison to patients without diabetes mellitus. In all emergency presentations of diabetes mellitus is associated with higher mortality.<sup>10</sup> Cerebrovascular mortality rates have been shown to be raised in patients with diabetes relative to the general population.<sup>11,12</sup> Markedly elevated blood pressure on admission and persistent inadequate blood pressure control adversely affect the prognosis in intracerebral hemorrhage.<sup>13</sup> Brain imaging is the cornerstone for diagnosis of ICH. Although MRI is an excellent tool for considerable information on the process of acute stroke; MRI is not readily available to the most patients. CT scan is the imaging modality of choice in patients presented with acute stroke, which can detect ICH within

few minutes of onset of stroke.<sup>14</sup> It is safe and non-invasive, helps to measure the hemorrhage size and the presence of ventricular extension. All these information are extremely useful in assessing the outcome in acute ICH, which cannot be obtained by clinical examination itself.<sup>15,16</sup> In our country income and resources are limited, CT scan cannot be done repeatedly. Therefore, it is an important task for the physician to predict the functional outcome from a single CT scan of the brain done at the time of the hospital admission.

The purpose of this study is to find out how we can predict a short-term in-hospital mortality and morbidity from clinical presentation specially age, presence of diabetes or not, GCS level and CT scan findings: hemorrhage size with or without ventricular extension, influence the clinical outcome in patients with acute stroke.

**Materials and Methods:**

This observational study was carried out in the department of Medicine, Sher-E-Bangla Medical College Hospital, Barisal, Bangladesh. The duration of the study was from 01.07.2010 to 30.06.2011. The study comprises 100 patients with intracranial hemorrhage (ICH) - all were CT scan proved. Out of 100 patients 50 had diabetes mellitus. ICH patient who were referred for interventional therapy, patients were taking antiplatelet or anticoagulant therapy, patients with blood dyscrasia, subarachnoid hemorrhage and hemorrhagic stroke due to trauma were excluded from the study. Data was collected by using predesigned data collection form from patient or attendance in hospital. Initial presentations of patients were recorded and appropriate investigations were advised.

Consciousness level was assessed by Glasgow comma scale. Systemic complications associated with stroke were searched and recorded. Baseline characteristics includes age, sex, living conditions, medication before stroke (antihypertensive, anti-platelet, and anticoagulant therapy), vascular risk factors and co-morbid conditions included hypertension (previous diagnosis, current treatment), diabetes mellitus, previous myocardial infarct or ischemic heart diseases, valvular heart diseases, transient ischemic attack (TIA) or stroke, smoking (current or former habit). Acute stress induced hyperglycemia were differentiated by using HbA1C and standard method of diagnosis of diabetes. A CT scan was done within few hours of the hospital admission. Volume and site of hemorrhage and presence of ventricular

extension were obtained from CT scan. Volume of hematoma was calculated using the formula ABC/2, site of hemorrhage & ventricular extension were recorded. From day 2 to day 7 all patients were followed up twice daily and any change in status were recorded. As shortage of bed in hospital did not allow long duration stay, these patients were discharged on seventh day and followed up on 15th and 30th day. Patients who could not attend this follow up, their information were collected over telephone. Result was calculated using Chi-square test.

**Results:**

A total of 100 patients of hemorrhagic stroke were incorporated in this study. Majority of patients belonged to age group above 60 years 38(38%), most of the patients were male 74(74%) and 62(62%) patients were smoker. 50(50%) patients were diabetic, 70(70%) hypertensive and maximum patient's lipid profile were found normal in this study. In this study, majority of patients 58(58%) presents with loss of consciousness and vomiting, followed by motor weakness 56(56%). Glasgow Comma Scale (GCS) level was ≤ 8 in 52(52%) patients who presents with loss of consciousness on admission; (Table-I).

**Table-I**

Socio-demographic and Clinical Profile of patients (n=100)

| Parameter               | Number of patients |                       |
|-------------------------|--------------------|-----------------------|
| Age (year) mean± SD     | 60.26 ± 11.22      |                       |
| Sex : Male/Female       | 74(74%)/26(26%)    |                       |
| Smoker                  | 62(62%)            |                       |
| Hypertension            | 70(70%)            |                       |
| Diabetes mellitus       | 50(50%)            |                       |
| Hyperlipidaemia         | 10(10%)            |                       |
| Clinical presentations: | ::                 |                       |
| Loss of consciousness   | 58(58%)            |                       |
| Vomiting                | 58(58%)            |                       |
| Hemiparesis/Hemiplegia  | 56(56%)            |                       |
| Aphasia                 | 20(20%)            |                       |
| Headache                | 12(12%)            |                       |
| GCS level: ≤8 / >8      | 52(52%) / 48(48%)  | <b>P-Value = 1.00</b> |

Result was calculated using Chi-square test.



CT scan evaluation of all patients revealed Intracerebral hemorrhage (ICH) size > 30 ml in 50(50%) patients and ventricular extension in 34(34%) cases.

Total 40(40%) patients died in 1<sup>st</sup> month and remaining patients improved gradually in this study. Most of death in this study 38(95%) occurred within first 5 days of admission;(Table-II).

**Table-II**

Outcome of patients (n=100)

| Death in days | No of death | Total death | P-Value < 0.05 |
|---------------|-------------|-------------|----------------|
| < 5 days      | 38          | 40 (40%)    |                |
| 6 – 10 days   | 02          |             |                |

Result was calculated using Chi-square test.

Out of 38(38%) patients ages more than 60 years, 30(84.2%) died in this study. 22(44%) and 32(45.7%) patients of diabetic (50) and hypertensive (70) respectively died in this study. 38(73%) died out of 52 patients who had GCS level < 8. 40(80%) patients out of 50 died whose hematoma volume was > 30 ml and 30(88.2%) out of 34 died who had ventricular extension found on initial CT Scan of brain; (Table – III).

**Table-III**

Prognostic factors and outcome of patients (n=100)

| Factors               | Total no of patients | Death (Total death=40) | P-Value        |
|-----------------------|----------------------|------------------------|----------------|
| Age > 60 years        | 38(38%)              | 30(84.2%)              | P-Value = 0.01 |
| Diabetes mellitus     | 50(50%)              | 22(44%)                | P-Value = 0.50 |
| Hypertension          | 70(70%)              | 32(45.7%)              | P-Value = 0.01 |
| GCS < 8               | 52(52%)              | 38(73%)                | P-Value < 0.05 |
| Hematoma size > 30 ml | 50(50%)              | 40(80%)                | P-Value < 0.05 |
| Ventricular extension | 34(34%)              | 30(88.2%)              | P-Value < 0.05 |

Result was calculated using Chi-square test.

**Discussion:**

Hemorrhagic stroke is the most common devastating type of stroke. It carries a high early mortality and half of the fatalities occur within the first 2 days of attack. This study comprised assessment of outcome of acute hemorrhagic stroke from presenting clinical features and a single CT scan study on admission in one tertiary level medical institute in Bangladesh.

In this study, most of the patient’s 72(72%) age were

above 50 years. This co-relates with two studies abroad and explained by the fact that atheroma of cerebral vessels induced by diabetes occurs at the same rate as other vascular risk factors<sup>17,18</sup> and > 60 years group shows worst outcome, 30(84.2%) out of 38 died in this group. This also co-relates with studies abroad.<sup>19</sup>

Some studies have reported diabetes mellitus as an independent risk factor of early mortality.<sup>20,21</sup> But only 22(44%) out of 50 patients died in this study. This is might be due to, those studies included both ICH and Infarcts, so likely to biased by overestimation or underestimation.

Hypertension has been reported as the most common significant and independent risk factor for ICH.<sup>22,23</sup> Out of 70 hypertensive patients treatment and follow-up were regular only in 28 patients and 32(45.7%) hypertensive patients died in this study. This is similar to other studies abroad.<sup>23,24</sup>

According to some studies, level of consciousness on hospital admission and hematoma volume are the most robust outcome predictors.<sup>25,26</sup> This is also found in this study, patients who presented with loss of consciousness had worst outcome 38(65.5%) died out of 58, specially those whose GCS level < 8,(73%), (P-value = <0.05).

A number of studies showed a direct relationship of hematoma volume with a clinical outcome in ICH.<sup>27,28</sup> A study by Molshatzki et al. demonstrated that patients with moderate to severe stroke had 2.3-fold higher hematoma volume as compared to mild stroke patients.<sup>29</sup> This is also supported by this study, as all died patients(n=40) in this study had hematoma volume > 30ml.

Intraventricular extension of blood from other anatomical location of hemorrhage is an independent poor prognostic factor.<sup>30</sup> This study also found that outcome of ICH stroke patients with ventricular extension is very poor, 30(88.2%) out of 34 died(P-value = <0.05).

**Conclusion:**

Initial clinical presentations and a CT scan of brain give a lot of information from which we can predict the functional outcome in stroke (ICH) patients. Low GCS score and older age are related to high mortality rate. Though it is thought that diabetes mellitus is an independent risk factor of early mortality but it is not statistically significant in this study. Hematoma volume



>30ml and presence of ventricular blood on the initial CT scan have been consistently shown to predict high mortality rate. Short-term outcome was well correlated with the initial CT scan findings and GCS score. But long-term impact of the hematoma and other CT scan parameters on long duration remains to be determined.

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Original Article

## Pattern Of Chemotherapeutic Practice And Their Adverse Effects In Breast Carcinoma Patients Attending Two Public Tertiary Care Hospitals In Dhaka City

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### Abstract

**Background:** Cancer is a group of diseases with creation of abnormal cells which can invade adjoining parts of the body and spread to other organs. Breast cancer topped the list of the women affected with various types of cancers in Bangladesh. It alone accounts for 25% of all cancer cases and 15% of all cancer deaths among females. The present study was done to evaluate the pattern of drug management, their adverse effects and socio demographic characteristics of the patients of breast carcinoma admitted and getting chemotherapy in two tertiary hospitals of Bangladesh.

**Materials and Methods:** It was a cross sectional observational study carried out from January to December 2015 at DMCH & NICRH. During this period, 102 patients were studied in purposive sampling technique by using a set of pre-tested structured questionnaire. Data analysis was done using SPSS version 21.

**Result:** Most of the patients were in 4<sup>th</sup> decade (34.9%), came from low (59.6%) or middle (39.4 %) income family, were married (89.9 %), had one child (40.19 %). The mean duration of treatment for cancer was found 9.35±5.17 months. Cyclophosphamide (57.8%) and Doxorubicin (55.9%) were the most frequently prescribed drugs. Other drugs frequently used were Paclitaxel, 5 fluorouracil, Cisplatin and Gemcitabine. Nausea, vomiting, loss of hair, loss of appetite, mucositis, diarrhea and constipation were caused by any chemotherapeutic agents used whereas myelosuppression, cough, dyspnoea, hypersensitivity, amenorrhoea, anemia, hyper-pigmentation, dizziness, neuropathy, metallic taste, increased risk of infection, bone pain, and allergy were evident for specific chemotherapeutic agents.

**Conclusions:** Cyclophosphamide and Doxorubicin were more common chemotherapeutic agents used in breast cancer in Bangladesh. Difference in ranking of severity of adverse effects were dependant on demographic pattern, drug used and doses of the drugs.

**Key words:** Breast carcinoma, Chemotherapeutic agents, Adverse effects of chemotherapy.

### Introduction

Cancer is one of the major causes of morbidity and mortality among the non communicable diseases. It is the sixth cause of mortality in Bangladesh and 60% of cancer patients die within five years of diagnosis.<sup>1</sup> Different studies showed that there are more than 1200,000 cancer patients in the Bangladesh, 200,000 cases are added to the number and the disease causes death to some 150,000 people every year.<sup>2</sup> Breast Cancer is the most frequently diagnosed cancer and the leading cause of cancer death among females in the world, with an estimated 1.7 million cases and 521,900 deaths in 2012.<sup>3</sup> Rates are generally high in Northern America,

Australia/New Zealand, and Northern and Western Europe; intermediate in Central and Eastern Europe, Latin America, and the Caribbean; and low in most of Africa and Asia. International variation in breast cancer incidence rates reflects differences in the availability of early detection as well as risk factors.<sup>4</sup> Risk factors for breast cancer include reproductive and hormonal factors such as a long menstrual history, recent use of oral contraceptives, and nulliparity. Potentially modifiable risk factors include weight gain after age 18 years, being overweight or obese (for postmenopausal breast cancer), use of menopausal hormone therapy (combined estrogen and progestin), physical inactivity, and alcohol



consumption.<sup>4</sup> Breast carcinoma once diagnosed, becomes a challenge for the surgeons and oncologists. The treatment options depend on type of cancer, stage, drugs availability, sensitivity to the drug and also to the socioeconomic condition. Surgery and radiation therapy, along with adjuvant hormone or chemotherapy when indicated, are now considered primary treatment for breast cancer. Surgical therapy may consist of lumpectomy or total mastectomy. Radiation therapy may follow surgery in an effort to eradicate residual disease and reducing recurrence rates. Hormone therapy and chemotherapy are the 2 main interventions for treating metastatic breast cancer. In Bangladesh several combinations of chemotherapy used to treat these types of cancer as neo-adjuvant or adjuvant therapy with or without radiation by individualization of patients.<sup>5</sup> Common chemotherapeutic drugs used to treat breast carcinoma in Bangladesh include Cyclophosphamide, Doxorubicin, 5-fluorouracil, Paclitaxel, Docetaxel, Gemcitabine, Carboplatin, Methotrexate and Cisplatin. Trastuzumab, Epirubicin, Tmoxifen, Pertuzumab, Anastrozole, Exemestane, Goserelin, Eribulin, Everolimus, Capecitabine, Navelbine, Ixabepilone, Bevacizumab, Fulvestrant, Abraxane, Letrozole are also included in chemotherapy protocol for breast cancer. Two selective estrogen receptor modulators (SERMs), Tamoxifen and Raloxifene are approved for reduction of breast cancer risk in high-risk women.<sup>6</sup> Adjustment of dosage of chemotherapy can be difficult, if the dose is too low, it will be ineffective against the tumor, whereas, at excessive dose, the side-effects will be intolerable to the patient<sup>5</sup>. Traditional chemotherapy agents are cytotoxic and they have potential immediate or late adverse effects; which causes potential fatality. Some newer anticancer drugs are not indiscriminately cytotoxic, but rather target proteins that are abnormally expressed in cancer cells and that are essential for their growth. Such treatments are often used alongside traditional chemotherapeutic agents in antineoplastic treatment regimens. Common side effects of chemotherapy are fatigue, nausea and vomiting, hair loss, increased risk of infection, anemia, bruising and bleeding, mouth sores, loss of appetite, changes in skin and nails, problem with memory and concentration, sleep problem, diarrhea, constipation, depression etc.<sup>7</sup> The result of this pharmacokinetic variability among patients is due to age, immunological state, genetic, environmental factor and idiosyncrasy. So that many patients do not receive the right dose to achieve optimal treatment effectiveness with minimized toxic effects.<sup>8</sup>

In Bangladesh traditional rather than newer anticancer drugs are mostly used. Therefore this study is designed to assess the pattern of use of chemotherapeutic agents

along with their adverse effects to treat breast cancer in Bangladesh. This study might give the policy makers, a guidance for the best and effective management of breast carcinoma with minimum adverse effects.

#### Materials And Method

A cross sectional observational study was carried out among the patients diagnosed as breast carcinoma and getting chemotherapy. The period of study was January to December 2015. Data was collected from DMCH and NICRH. The study population was consisted of 102 patients. The subjects were recruited by purposive sampling technique. Sample was selected depending on inclusion and exclusion criteria. Pregnant, severely ill and patients with other concomitant illness were excluded from the study. Data were collected by a face to face interview by using a set of pretested structured questionnaire. The prescriptions of the patients were reviewed. Data analysis was done using SPSS version 21. Data were presented by tables and graphs. Results were expressed as mean  $\pm$  SD or number (percentage) as appropriate.

#### Results

The mean age (yrs) was 43.17 $\pm$ 8.42 of the 102 subjects. 53(52.0%) of the patients came from low and 47(46.0 %) from middle income group. Married patients were 91(89.2%). Number of children were one or two in 41 (40.19 %) and 39 (38.23 %) of patients. 8(7.84 %) women were nulliparous. The mean duration of treatment for cancer was found 9.35 $\pm$ 5.17 months. Patients were treated by different combinations of chemotherapeutic agents mostly (36.27 %) with Cyclophosphamide and Doxorubicin. 59(57.8%) patients received Cyclophosphamide followed by Doxorubicin 57(55.9%), Paclitaxel (25.5%), 5-Fluorouracil 22(21.6%), Gemcitabine 13(12.7%), Docetaxel 6(5.9 %), and Carboplatin 3(2.9 %). Patients received any chemotherapeutic agents were commonly suffered from nausea, vomiting, loss of hair, loss of appetite, mucositis, diarrhoea and constipation. Whereas nephrotoxicity, myelosuppression, hypersensitivity, alopecia were evident with Cisplatin. Hyperpigmentation, dizziness, neuropathy, constipation and metallic taste were experienced by patients who received 5-fluorouracil. For Doxorubicin increased risk of infections, bone pain, hyperpigmentation, amenorrhoea, anemia, diarrhea and allergy were common. Paclitaxel caused neuropathy, hyperpigmentation, flushing, burning of limbs, anemia, constipation, muscle and joint pain, numbness of hands and skin rash. Peripheral neuropathy and bone pain were caused by Carboplatin. Docetaxel specially causes cough, dyspnea, skin rashes. Gemcitabine shows fewer and some common side effects.



**Table I: Base line characteristics of study population**

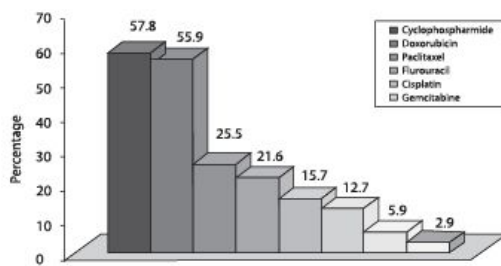
| Variables                            | Values                    |
|--------------------------------------|---------------------------|
| Number of patients                   | 102                       |
| Age (years)                          | 43.17±8.42                |
| Socio economic status - Low / Middle | 53 (52%) / 47 (46%)       |
| Married/ Widow, Separated/ Divorce   | 91(89.2%) / 11(10.8%)     |
| Number of children – One/Two         | 41 (40.19%) / 39 (38.23%) |
| Duration of treatment (months)       | 9.35±5.17                 |
| Total no of drug prescribed          | 2.11±1.09                 |

Results were expressed as mean ± SD and numbers as appropriate

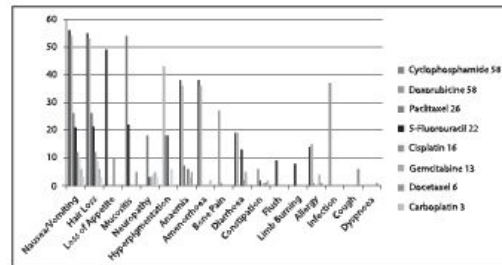
**Table II: Different combinations of chemotherapeutics prescribed to patients**

| Combination of Drugs                          | No of Subjects |
|-----------------------------------------------|----------------|
| Cyclophosphamide + Doxorubicine               | 37 (36.27%)    |
| Paclitaxel                                    | 18 (17.64%)    |
| Doxorubicine+5-Fluorouracil+Cyclophosphamide  | 15 (14.7%)     |
| Gemcitabine + Cisplatin                       | 07 (6.86%)     |
| Gemcitabine                                   | 05(4.9%)       |
| Paclitaxel+Cisplatin                          | 04(3.92%)      |
| Docetaxel + Cyclophosphamide + 5-Fluorouracil | 04(3.92%)      |
| Cisplatin                                     | 03(2.94%)      |
| Doxorubicine + Cyclophosphamide + Docetaxel   | 02(1.96%)      |
| 5-Fluorouracil+ Cisplatin                     | 02(1.96%)      |
| Doxorubicine + Paclitaxel                     | 02(1.96%)      |
| Paclitaxel + Carboplatin                      | 02(1.96%)      |
| Gemcitabine + Carboplatin + Doxorubicine      | 01(0.98%)      |
| 5-Fluorouracil + Cyclophosphamide             | 01(0.98%)      |
| Paclitaxel + 5-Fluorouracil                   | 01(0.98%)      |
| Paclitaxel + Gemcitabine                      | 01(0.98%)      |

Results were expressed as percentage and numbers as appropriate



**Figure 1: Percent distribution of subjects prescribed with different chemotherapeutics.**



**Figure 2: Bar diagram shows adverse effects of study patients**

**Discussion**

In developing countries breast cancer cases in younger women (ages 15-49) now make up 44.1 % of the overall number of cases.<sup>8</sup> In another study it was observed that maximum number of 21 patients were in age group 31-45 followed by age group of 46- 60.<sup>9</sup> In this present study it was observed that, majority 44 (43.1%) patients were in 4th decade; mean age was found 43.17±8.42 years. Similar findings were observed by other studies.<sup>2,10,11</sup> The overall risk accumulation is combined with the tendency for cellular repair mechanisms to be highly effective in a person at the age of 30-45,<sup>11</sup> which is comparable with the current study. Majority of the patients had low socio economic condition (52%). Most of the patients were married (89.2%). Similarly, another studies found married patients 80.0%.<sup>9,10,11</sup> Hormonotherapy and chemotherapy are the 2 main interventions for treating metastatic breast cancer. In this study it was seen that majority of the patients received Cyclophosphamide(57.8%) followed by Doxorubicin (55.9%), Paclitaxel (25.5%), 5-Fluorouracil (21.6%) and Gemcitabine (12.7%). In another study it was reported that Paclitaxel (25%) was the most common antineoplastic agent used. Cyclophosphamide 18.0%, Cisplatin 11.0%, Vincristine 9.0% were also frequently used. Etoposide, Vinblastine and Carboplatin in 7.0%, 5-Fluorouracil and Adriamycin in 6.0%, Dactinomycin and Docetaxel each were used in 2.0% of patients. Paclitaxel is mostly used in the treatment of several types of cancer, either alone or in combination because of its effectiveness in wide range of tumors.<sup>9</sup> Cisplatin was most common drug which caused adverse drug reactions in 13 patients.<sup>10</sup> Cyclophosphamide was second most common drug, which caused adverse drug reactions in 11 patients. After receiving 5-fluorouracil (5-FU) and Paclitaxel five and four patients developed

adverse drug reactions respectively. Most common ADRs experienced were nausea & vomiting (85.45%), loss of appetite 72.72%, mucositis 65.45%, pain 63.63%, loss of breath 40.0%, constipation 52.72% and polyneuropathy 58.18% observed by another study<sup>9</sup>. In a study<sup>10</sup> it was documented that most common adverse drug reaction was nausea and vomiting (16 patients). Neutropenia was the second most common finding (in 12 patients). Other adverse drug reactions were less common. Anemia (in 4 patients), skin rash and hepatotoxicity each in three patients, acute renal failure and severe diarrhea each in two patients, acute stomatitis, tingling, numbness and rare finding like cerebellar ataxia each was experienced by one patient. Cisplatin was responsible for 29.0% of the total ADRs. The ADRs associated with the use of Cisplatin are nausea, vomiting, myelosuppression, peripheral neuropathy, ototoxicity and nephrotoxicity<sup>10,12,13</sup>. Elderly patients are at higher risk of myelosuppression, nephrotoxicity and neurotoxicity due to Cisplatin. Cyclophosphamide, 5-fluorouracil, Paclitaxel and Adriamycin were found to be other important drugs to cause ADRs. Cisplatin and these four drugs were very commonly used for the treatment of cancer. They resulted in development of maximum number of ADRs in our study. In another study<sup>14</sup> it was reported that gastrointestinal symptoms were the most frequently encountered toxicities. Except for 3 patients (6%), nausea and vomiting was in general mild or moderate, stomatitis was noted in 16 patients (31%), mild to moderate diarrhea was seen in 10 patients (20%), twenty patients (38%) developed peripheral neurotoxicity including 1 patient who experienced severe symptoms. Alopecia occurred in 37 patients with complete hair loss in 18 (35%). Gemcitabine associated increases of liver enzymes were noted in 16 patients (31%) including one severe reaction, and drug-related fever was observed in 10 patients (19%), which is comparable with the current study.<sup>14</sup>

#### Conclusion

This study was undertaken to determine the pattern of drug management and their adverse effects in patients of breast carcinoma getting chemotherapy and attending in two tertiary hospitals in Bangladesh. Patients were mostly in 4th decade, came from Low/middle income family and married having treatment for more than 9 months. Cyclophosphamide and Doxorubicin were more common chemotherapeutic agents used. Differences in ranking of severity of side-effects were evident when patient groups were divided by age, sex, marital status, domestic situation, diagnosis, used chemotherapeutic agents, and response. The study population was selected from two hospitals in Dhaka city, conducted at a short

period of time with a small sample size so the results of the study may not reflect the exact picture of the whole country. However, treatment delays, deviations from standard dosing by body surface area or other parameters, use of ancillary medications (such as hematopoietic growth factors and bisphosphonates) were not evaluated. These questions are key priorities for future research.

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Original Article

## Plumbism (Chronic lead poisoning): A Health Hazard at Ship Breaking Industry

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### Abstract

**Background:** Plumbism which is commonly known as chronic lead poisoning may occur due to prolong use of vermilion, dye and cosmetics containing lead.

**Objectives:** To determine plumbism by observing the clinical features and problems among the workers of ship breaking industry and to draw attention of the legal authorities to take necessary measures and steps for prevention. **Methods:** A cross sectional study was conducted at ship breaking industry, Shitakunda, Chittagong in the month of February 2012 among 100 ship breaking workers. Data was collected by direct observation and face to face interview by semi structured questionnaire.

**Results:** A total 100 respondents, 83% (n=83) were found various features of plumbism, 81.93% (n=68) were male and 18.07% (n=15) were female. Maximum workers developed features of plumbism were after exposure to ship breaking industry within 6 to 9 months and the incidence was 27.72% (n=23). Different types clinical features like facial pallor, anaemia, blue line lead (Burtonian line) in the gum, colicky abdominal pain, constipation, hypertension, paresthesia, menstrual disorders, sterility, history of abortion and various general symptoms stand for 66.26% (n=55), 60.24% (n=50), 48.19% (n=40), 89.15% (n=74), 77.1% (n=64), 30.12% (n=25), 8.43% (n=7), 14.45% (n=12), 9.63% (n=8), 3.61% (n=3), 45.78% (n=38) respectively.

**Conclusion:** Lack of knowledge and cautiousness most of the workers suffer from various types of medical problems. Plumbism is one of those. Precautionary steps should be taken to prevent lead toxicity among workers in the ship breaking industries are must, such as using personal protecting equipments (mask, moistening device etc.), to establish and follow workers friendly company rules, strict monitoring of onsite lead concentration, maintenances of proper ventilation, periodical health check up and further exposure should be avoided if clinical features of lead poisoning once appear etc.

**Keywords:** Plumbism, Blue line lead

### Introduction:

Lead poisoning is nearly always of chronic type. It may occur in the industrial environment due to inhalation of lead dust or lead vapor arising from plumbing, ship breaking, glazing, polishing, painting, car welding, coach building, enameling, diamond cutting etc. It may also occur due to low dose consumption from drinking water supplied through lead pipes, food preserved in tin containers having lead lining, food contaminated with lead in the course of preservation or use of insecticides. Poisoning may occur due to prolong use of vermilion, dye and cosmetics containing lead. Absorption of tetra-ethyl lead through skin is common in people who

handle petrol or gasoline.<sup>1-3</sup> Ship breaking is a type of ship disposal involving the breaking up of ships for either a source of parts, which can be sold for re-use or for the extraction of raw materials. It may also be known as ship dismantling, ship cracking and ship recycling or ship disposal. Modern ships have a lifespan of 25 to 30 years before corrosion, metal fatigue and a lack of parts render them uneconomical to run. Ship breaking allows the materials from the ship, especially steel, to be recycled and made into new products. This lowers the demand for mined iron or/ and reduces energy use in the steel-making process. Bangladesh has a long coastal belt of about 710 KM. Shitakunda is one of the Upazilla of



Chittagong district where most of the ship breaking industries are situated.<sup>4</sup> Approximately 70 to 200 ships are dismantled annually in Chittagong. More than 100 companies are engaged in this breaking process<sup>5</sup> but still now they are not under any environmental law. Even the companies are not aware about the health hazards and safety of the workers. The workers of these companies break up various foreign ships without any safety equipments like helmets, goggles, gloves, boots, work suits and even the cheapest facial masks.<sup>6</sup> Lack of cautiousness of the workers and inadequate take care and improper law enforcement from the government the industry is facing several internal and external problems among them the health hazard is most important. Whole process of Ship breaking activities are a series of risky works as they exposed to steel and paint mainly which contain lead, cadmium, arsenic, zinc and chromium and sea salts containing various types of asbestos and several thousand liters of oil (engine oil, bilge oil, lubricant oil and grease).<sup>7</sup> Practically 100% of the ship is recycled. In this regard ship breaking industry is a sound sustainable activity. Ship breaking industry is a major employer in the coastal area of Bangladesh specially Shitakunda, Chittagong where 25,000 persons and indirectly employing another 150,000 in industries such as steel rerolling and reselling salvaged materials.<sup>6</sup> Today most of the merchant fleets' vessels are scrapped by the intensive use of the labor at non developed beaches where workers are easily available at minimum cost as 70% of the ship breakers are internal migrant workers from northern areas of Bangladesh, due to large scarce and irregular employment opportunities there. That's why ship breaking is expanding in our country. Due to the lack of health knowledge all the workers are suffer from various types of medical problems like bronchial asthma, chronic bronchitis, emphysema, fibrosis, silicosis, asbestosis and plumbism which is one of the important common health hazard among the workers of the ship breaking industry. Occupational Safety and Health Administration (OSHA) also identified hazardous work conditions like inadequate worker training, lack of or improper personal protective equipment (PPE) especially facial mask, inadequate fire protection, lack of emergency response and even first aid services<sup>8</sup>. Moreover the employers conceal the information regarding their workers and they treat them as replaceable instruments<sup>9</sup>. Among so many problems the workers, plumbism is a burning issue in the ship

breaking industries. Features of plumbism include facial pallor, anaemia, blue line lead in the gum, colicky abdominal pain, constipation, hypertension, paresthesia, menstrual disorders, sterility, history of abortion and various general symptoms like weakness, anorexia, dyspepsia, metallic taste in mouth, headache vertigo, irritability, drowsiness, arthralgia etc. The purpose of the study is to determine plumbism by observing the clinical features and problems among the workers of ship breaking industry; to draw attention of the legal authorities to take necessary measures & steps for prevention of plumbism which is commonly known as chronic lead poisoning.

**Materials and Methods:**

It was a cross – sectional type of study based on ship breaking industry, Shitakunda, Chittagong in the month of February 2012 among workers of the ship breaking industry, Shitakunda, Chittagong. Purposive sampling and sample size was 100 and data were collected by face to face interview. A semi structure questionnaire was used as research instrument. Analysis was done by using SPSS and was presented in tabular forms.

**Results:**

Total 100 respondents were took part in the study. Most of them 83 (83%) respondents developed various features of plumbism and 17 (17%) were free from any features of plumbism (Table-I).

**Table-I: Distribution of the respondents according to presence or absence of Clinical features of plumbism (n=100)**

| Presence or absence of C/F of plumbism | Number | Percentage (%) |
|----------------------------------------|--------|----------------|
| Having features of plumbism            | 83     | 83             |
| No features of plumbism                | 17     | 17             |

Table-II shows among 83 positive respondents, 81.93% (n=68) were male and 18.07% (n=15) were female.

**Table-II: Distribution of positive respondents according to their Gender (n=83)**

| Gender | Number | Percentage (%) |
|--------|--------|----------------|
| Male   | 68     | 81.93          |
| Female | 15     | 18.07          |

Table III shows that among 83 respondents 22.90% (n=19), 44.56% (n=37) & 32.54% (n=27) were working in the ship breaking industry less than 6 months, 6 months to 1 year and more than 1 year respectively.

**Table-III: Distribution of the positive respondents on the basis of their duration of employment (n=83)**

| Period of their employment | Number | Percentage (%) |
|----------------------------|--------|----------------|
| < 6 months                 | 19     | 22.90          |
| 6-12 months                | 37     | 44.56          |
| >12 months                 | 27     | 32.54          |

Table-IV shows that among 83 respondents, most of them that is 27.71% (n=23) developed features of plumbism within 6-9 months of their joining. And 8.43% (n=7), 19.28% (n=16), 22.89% (n=19), 24.09% (n=20) developed various features plumbism with 3 months, 3-6 months, 9-12 months and more than 12 months respectively.

**Table-IV: Distribution of the positive respondents according to their development of features of plumbism after joining in the current job (n=83).**

| Duration of time to develop C/F of Plumbism after joining | Number | Percentage (%) |
|-----------------------------------------------------------|--------|----------------|
| Within 3 months                                           | 7      | 8.43           |
| 3-6 months                                                | 16     | 19.28          |
| 6-9 months                                                | 23     | 27.71          |
| 9-12 months                                               | 19     | 20.89          |
| >12 months                                                | 20     | 24.09          |

Table-V shows that different types clinical features of plumbism like facial pallor, anaemia, blue line lead in the gum, colicky abdominal pain, constipation, hypertension, paresthesia, menstrual disorders, sterility, history of abortion and various general symptoms stand for 66.26% (n=55), 60.24% (n=50), 48.19% (n=40), 89.15% (n=74), 77.1% (n=64), 30.12% (n=25), 8.43% (n=7), 14.45% (n=12), 9.63% (n=8), 3.61% (n=3), 45.78% (n=38) respectively

**Table-V: Distribution of the positive respondents on the basis of clinical features (n=83)**

| Clinical features         | Number | Percentage (%) |
|---------------------------|--------|----------------|
| Facial Pallor             | 55     | 66.26          |
| Anaemia                   | 50     | 60.24          |
| Blue lead line in the gum | 40     | 48.19          |
| Colicky Abdominal pain    | 74     | 89.15          |

|                     |    |       |
|---------------------|----|-------|
| Constipation        | 64 | 77.10 |
| Hypertension        | 25 | 30.12 |
| Paresthesia         | 7  | 8.43  |
| Menstrual Disorders | 12 | 14.45 |
| Sterility           | 08 | 9.63  |
| History of Abortion | 3  | 3.61  |
| General Symptoms    | 38 | 45.78 |

**Discussion:**

This cross sectional study was conducted in the month of February, 2012 to determine the clinical features and problems of plumbism among the workers of ship breaking industry to draw attention of the legal authorities to take necessary measures and steps for prevention of plumbism. Diagnosis of chronic lead poisoning was confirmed by puncted basophilia cells (basophilic stippling) more than 200/cu mm of blood. Normal blood level of lead is 0-50 µg/dl. In case of children > 55 µg/dl & adult > 80 µg / dl is diagnostic. Toxicity appears when the level is more than 80µg/ dl. Normal level of lead in urine is 80-100 µg / litre, more than 100 is diagnostic.<sup>1,3</sup> Total 100 respondents were took part in the study. Most of them 83% (n=83) respondents developed various features of plumbism and 17% (n=17) were free from any feature of plumbism. Under 83 positive respondents 81.93% (n=68) were male and 18.07% (n=15) were female. Among 83 respondents 20.9% (n=19), 44.56% (n=37) & 32.54% (n=27) were working in the ship breaking industry less than 6 months, 6 months to 1 year and more than 1 year respectively. Out of 83 respondents most of them 27.72% (n=23) developed features of plumbism within 6-9 months of their joining. And 8.43% (n=7), 19.28% (n=16), 22.89% (n=19), 24.09% (n=20) developed various features plumbism with 3 months, 3-6 months, 9-12 months and more than 12 months respectively. Different types clinical features of plumbism like facial pallor, anaemia, blue line lead in the gum, colicky abdominal pain, constipation, hypertension, paresthesia, menstrual disorders, sterility, history of abortion and various general symptoms stand for 66.26% (n=55), 60.24% (n=50), 48.19% (n=40), 89.15% (n=74), 77.10% (n=64), 30.12% (n=25), 8.43% (n=7), 14.45% (n=12), 9.63% (n=8), 3.61% (n=3), 45.78% (n=38) respectively. Plumbism is a crucial issue in ship breaking industry which necessitates taking various steps to save the workers.<sup>10</sup> Precautionary steps should be taken to prevent toxicity among workers in the lead industries are must, such as using personal protecting equipment (mask, moisting device), to establish and follow workers friendly company rules,<sup>11</sup> strict monitoring of onsite lead

concentration, periodical health check up,<sup>12</sup> maintenance of proper ventilation and further exposure should be avoided if clinical features of lead poisoning once appear. Another study revealed that among 100 lead workers from different industries were found with various features of lead poisoning and were categorized in three stages- I. a presymptomatic state of lead exposure (n=37), II. a state of mild symptoms or mild anaemia (n=45), and III. frank lead poisoning with severe symptoms and signs (n=18).<sup>13</sup>

#### Conclusion:

A good number of populations earn their livelihood by working in the ship breaking industry of Shitakunda, Chittagong. Due to lack of health knowledge most of the workers suffer from various types of medical problems such as bronchial asthma, chronic bronchitis, emphysema, fibrosis, silicosis, asbestosis and plumbism, which is one of the important and common health hazard among the workers of ship breaking industry. Maximum of the employers do not ensure any type of safety & security measures for the workers. The workers under study were highly exposed to high lead concentration in the working area. Personal protecting equipments in such working area are not adequate to fully protect them from dust as well as lead inhalation. It is important to find out on-site lead concentrations and take necessary measures & steps to help the workers of ship breaking industry.

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Original Article

## Prognostic value of Serum Uric Acid in predicting Hospital mortality and morbidity in Patient with acute Coronary syndrome

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### Abstract

**Background:** Uric acid is an independent risk factor for cardiovascular disease. At present, Coronary artery disease (CAD) in one of the leading cause of death in the worldwide also in Bangladesh. Although studies were conducted abroad regarding association of serum uric acid with in hospital outcomes in patient with acute coronary syndrome. No data is yet available to show the association in our country.

**Objectives:** The objective of the study was to assess the association of serum uric acid level on admission with in hospital outcomes of the patient, with acute coronary syndrome.

**Materials and Methods:** This study was carried out in the department of cardiology, Dhaka National Medical Institute Hospital, Dhaka from October, 2014 to September 2015. In this case series study, 102 diagnosed Patients of acute coronary syndrome free from gout, renal disease, hepatic disorder and other malignant conditions were enrolled by non random sampling. Serum uric acid of all subject was measured within 24 hours of presentation. During hospital stay the outcome (good and bad) were observed in all subjects.

**Result:** Patients with higher serum uric acid (SUA>6.5mg%, Group-II) were compared with patients with lower serum uric acid (SUA<6.5mg%, Group-I). In Group I (n=60), good recovery, morbidity and mortality were found in 43 (65.2%), 21 (31.8%), 2 (3.0%) Patients and in Group II (n=42), good recovery, morbidity, mortality were 13 (31%), 23 (54.8%) and 6 (14.3%) patients respectively. In group II Patients having high Serum uric acid concentration had low good recovery but high morbidity and mortality compared to group I Patients. In group I (n=60), good outcome and bad outcome was found in 43 (65.2%), and 23(34.8%) patients and in group II (n=42), those were in 13 (31%) and 29 (69%) patents. Logistic regression analysis of serum uric acid concentration of study subjects were done considering uric acid as independent variable but outcome as dependent variable. It was shown that the odds ratio of mortality was 5.38 (95% CI p<0.007), odds ratio of morbidity was 4.10 (95% CI p<0.001) and odds ratio of bad outcome was 4.67 (95% CI p<0.001). This finding indicates a patient having high uric acid had 5.38 times increased bad outcome that patients having low serum uric acid concentration.

**Conclusion:** On admission serum uric acid estimation is a good predictor of in hospital bad outcome in patients with acute coronary syndrome. As it is a cheap and noninvasive procedure, it can be routinely practiced in cardiac emergency department for risk stratification of patients.

**Key words:** Coronary artery disease, Serum uric acid, Acute Coronary Syndrome, Mortality, Morbidity.

### Introduction:

Coronary artery disease (CAD) is the most prevalent manifestation of cardiovascular disease and is associated with high mortality and morbidity.<sup>1</sup> Among the CADs, acute coronary syndrome (encompassing ST-segment elevation myocardial infarction, non-ST segment

elevation myocardial infarction and unstable angina) is the leading cause of death in developed countries and second leading cause of death in developing countries and by the year 2020, CAD will hold the first place in the WHO's list of leading cause of disability.<sup>2</sup>

Uric Acid is the final oxidation product of purine catabolism in



human and higher primates. In last metabolic step, the conversion of hypoxanthine to uric acid is regulated by the enzyme xanthine oxidoreductase (XO). During this process reactive oxygen species (ROS) are produced. XO (xanthine oxidoreductase) activity is up-regulated in many cardiovascular disease, such as ischaemia to myocardium, left ventricular remodeling following acute coronary syndrome and heart failure.<sup>3</sup> Uric acid play a pivotal role in the progression of atherosclerosis. Moreover, increased uric acid levels may be associated with increased platelet adhesiveness, and this effect could potentiate thrombus formation.<sup>4</sup>

The Pathophysiological link between elevated serum uric acid (SUA) and atherosclerosis are endothelial dysfunction and inflammation. ROS (reactive oxygen species) production by XO (xathine oxidoreductase) can induce endothelial dysfunction by reducing bioavailability of nitric oxide. Endothelial dependent vasodilatation is impaired in hyperuricemia patients without any overt or other cardiovascular disease.<sup>5</sup> There is study that patients who have high uric acid level, they have more chance of short term adverse events.<sup>6</sup> Serum uric acid levels are strong independent predictor of cardiovascular mortality in middle aged men without clinical cardiovascular disease.<sup>7</sup> Higher serum uric acid on admission was independently associated with higher in hospital mortality.<sup>8</sup> In hospital mortality rate is significantly higher in patients with elevated uric acid than those with low uric acid. Major adverse cardiac events (MACE) are also higher in raised uric acid.<sup>9</sup> Hyperuricemia patients with acute Coronary Syndrome have a higher rate of left ventricular systolic, diastolic dysfunction and MACE.

**Materials and Methodology:**

This study was carried out in the department of Cardiology, Dhaka National Medical Institute Hospital, Dhaka from October 2014 to September 2015. In this case series study, 102 diagnosed patients of acute Coronary Syndrome free from gout, renal disease, hepatic disorder and other malignant conditions were enrolled. Among 102 Patients, 80 patients were male and 22 patients were female. All subjects were categorized into group-I (SUA less than 6.5 mg/dl) & group II (SUA more than 6.5 mg/dl). All enrolled subjects were explained about the nature and purpose of the study and their informed consent were taken. Then 4 ml blood was taken within 24 hours of presentation from all study subjects. Blood was collected into plastic micro centrifuged tube. Then they were stored at 20 degree centigrade until analysis. All patients were managed according to standard management protocol during their

hospital stay. During hospital stay their outcome (good or bad) were recorded. Bad outcome included mortality & morbidity. Morbidity included cardiac arrhythmia, heart block, cardiogenic shock and acute left ventricular failure. Finally their outcome, good or bad (mortality and morbidity) were evaluated on the perspective of their base line serum uric acid level. Analysis was done by SPSS (Statistical Package for social science) by applying appropriate formula.

**Result and observation**

In this case series study, 102 diagnosed patients of acute Coronary Syndrome were enrolled. Among 102 patients, 80 patients were male and 22 patients were female with the mean age of 54.62±12.14 years in group-I (range 32-80) and 60.29±12.13 years in group-II (range 35-85).

**Table I** shows distribution of SUA in both group. The mean uric acid was found 5.43±0.72 mg/dl in group I and 8.22±1mg/dl in group II. The mean uric acid difference was statistically significant (P<0.05) between two groups in unpaired t-test.

**Table II** shows mean±SD of ejection fraction of patients of group I and group II were 55.94±6.60 and 50.87±10.27% respectively and difference between them was statistically significant (P<0.05).

**Table III** shows good outcome, mortality and morbidity in both groups. Good outcome was found 43(65.2%) in group I and 13(31.0%) in group II. Mortality was 2(3.0%) in group I and 6(14.3%) in group II. Morbidity was found 21(31.8%) and 23(54.8%) in group I and group II respectively. Bad outcome, mortality and morbidity were statistically significant (P<03.05). This table depicts patients with raised SUA had increased mortality and morbidity than lower SUA group. On the other hand lower SUA group had better outcome than raised SUA group.

**Table IV** shows outcome in both groups. Good outcome was high in group-I and bad outcome was high in group-II. Good outcome was found 43(65.2%) in group I and 13(31.0%) in group II. Bad outcome (mortality + morbidity) was 23(34.8%) and 29(69.0%) in group in Chi-square test.

**Table-I**

**Distribution of the study patients according to uric acid level (mg/dl)(n=102)**

|                         | Group (n=60)<br>Mean±SD | Group II (n=42)<br>Mean±SD | P value            |
|-------------------------|-------------------------|----------------------------|--------------------|
| Uric acid level (mg/dl) | 5.43±0.72               | 8.22±1.0                   | 0.001 <sup>s</sup> |
| Range (min-max)         | (3.6-6.4)               | (6.7-10.5)                 |                    |

**Table-II**

Distribution of the study patients according to LVEF

| Echocardiographic findings (LVEF%) | Group I (n=60)<br>Mean±SD | Group II (n=42)<br>Mean±SD | P value            |
|------------------------------------|---------------------------|----------------------------|--------------------|
|                                    | 55.94±6.60                | 50.87±10.27                | 0.007 <sup>s</sup> |

**% Table-III**

Distribution of the study patients according to outcome (n=102)

| Outcome           | Group I (n=60) |      | Group II (n=42) |      | P value             |
|-------------------|----------------|------|-----------------|------|---------------------|
|                   | n              | %    | n               | %    |                     |
| Good              | 43             | 65.2 | 13              | 31.0 | 0.001 <sup>s</sup>  |
| Mortality         | 2              | 3.0  | 6               | 14.3 | 0.020 <sup>s</sup>  |
| Morbidity         | 21             | 31.8 | 23              | 54.8 | 0.001 <sup>s</sup>  |
| Cardiogenic Shock | 2              | 3.0  | 6               | 14.3 | 0.037 <sup>s</sup>  |
| Acute LVF         | 8              | 12.1 | 12              | 28.6 | 0.004 <sup>s</sup>  |
| Arrhythmia        | 5              | 7.6  | 3               | 7.1  | 0.545 <sup>ns</sup> |
| Heart Block       | 6              | 9.1  | 2               | 4.8  | 0.626 <sup>ns</sup> |

s= significant, ns=not significant  
P value reached from chi square test.

**Table-IV**

Distribution of the study patients according to outcome (n=102)

| Outcome | Group I (n=60) |      | Group II (n=42) |      | P Total (n=102) | P value            |
|---------|----------------|------|-----------------|------|-----------------|--------------------|
|         | n              | %    | n               | %    |                 |                    |
| Good    | 43             | 65.2 | 13              | 31.0 | 56              | 0.001 <sup>s</sup> |
| Bad     | 23             | 34.8 | 29              | 69.0 | 52              |                    |

s= significant,  
P value reached from chi square test.

**Table-V**

Logistic regression considering uric acid level as independent variables and out come as dependent variable (n=102)

|             | Adjusted OR | 95% CI |        | P value            |
|-------------|-------------|--------|--------|--------------------|
|             |             | Lower  | Upper  |                    |
| Mortality   | 5.38        | 1.918  | 60.244 | 0.007 <sup>s</sup> |
| Morbidity   | 4.10        | 1.720  | 9.750  | 0.001 <sup>s</sup> |
| Bad outcome | 4.67        | 2.019  | 10.820 | 0.001 <sup>s</sup> |
| Constant    | 0.28        | -      | -      | 0.001 <sup>s</sup> |

s=significant. P value derived from pearson chi-square test.

Table V shows adjusted odds of mortality (5.38),

moribidity (4.10) and bad outcome (4.67). A subject having higher uric acid level had 5.38 (95% CI 1.918% to 60.244% P<0.007) time increased mortality. A subject having higher uric acid level had 4.10 (95% CI 1.720% to 9.750% p<0.001) time increased moribidity. A subject having higher uric acid level had 4.67 (95% CI 2.019% to 10.820% P<0.001) time increased bad outcome.

**Discussion:**

Hyperuricemia was postulated to be a risk factor for coronary artery disease (CAD) more than 5 decades ago. In recent decades, serum uric acid has been recognized as a potential risk factor for CVD.<sup>10</sup> Others reported that it was only confounded by the relation of uric acid with conventional risk factors for Coronary artery disease.<sup>11</sup> Serum uric acid level had a significant statistical relation with cardiovascular disease or mortality due to cardiovascular disease.<sup>12</sup>

The result of present study revealed, mortality was 2 (3.0%) in group I and 6(14.3%) in group II. Mortality was statistically significant (P<0.05). On the other hand lower SUA group had better outcome than raised SUA group. Lazzeri et al. found that In-hospital mortality was higher in “high” SUA patients (9.0% vs. 2.5%), p<0.006.<sup>13</sup> Kojima S et al (2005) made a comparison of mortality between 4<sup>th</sup> quartile and 1<sup>st</sup> quartile of uric acid which was 11% vs. 2% and our study revealed it was 14.3% vs. 3% in group-II and group-I.<sup>6</sup> Bickel C et al made a comparison between highest quartile of uric acid. The mortality rate was increased from 3.4% to 17.1% (fivefold increase). These findings are consistent with our study.<sup>14</sup>

The present study revealed that moribidity was 21(31.8%) and 23(54.8%) in group I and group II respectively. Moribidity were statistically significant (P<0.05). Bae J H et al evaluated the effects of the serum uric acid levels on major adverse cardiovascular events (MACEs). MACE rate increased from 7.2% to 20.1% (Lowest quartile vs. highest quartile).<sup>15</sup> This is consistent with our study. Hyan DW et al<sup>16</sup> showed that for all patients highest uric acid quartile was associated with increased risk of MACE (p=0.000).<sup>16</sup> Basher Net al showed that mortality was 2.8% in lower uric acid group and 6.6% in higher uric acid group (p<0.01). MACE also increased from 5.7% to 11.1% from non-hyperurcemia to hyperuricemia (p<0.01). These findings are consistent with our study.<sup>17</sup>

In our study incidence of acute LVF was 28.6% and 12.1% in case of raised SUA group and low SUA group respectively. Chen Li et al. demonstrated that left ventricular dysfunction was 36.4% vs. 15.1% (p<0.001)

in case of hyperuricemia and non-hyperuricemia. Our study revealed consistent findings.<sup>18</sup>

Our study revealed good outcome was high in group-I and bad outcome was high in group-II. Good outcome was found 43(65.2%) in group I and 13(31.0%) in group II. Bad outcome (mortality-Morbidity) was 23(34.8%) and 29(69.0%) in group I and group II respectively. The mean outcome was statistically significant ( $P<0.05$ ) between two groups in Chi-square test.

In the present study we have found adjusted odds ratio for mortality was 5.38 (95% CI, 1.918-60.244,  $p<0.007$ ) and morbidity was 4.10 (95% CI, 1.720-9.750,  $p>0.001$ ). This indicates a patient having higher uric acid level had 5.38 times increased mortality and 4.10 times increased morbidity than patients with low uric acid level. Kaya MG et al (2012) revealed that high plasma UA levels were an independent predictor of major adverse cardiac events in the hospital (odds ration 2.03,95% confidence interval 1.25 to 3.75,  $p=0.006$ ), MACEs were more frequent in hyperuricemia (16% vs 7%) and in hospital mortality rate was higher in patients with high UA levels (9% vs. 2%,  $p<0.001$ ).<sup>9</sup> Valente S et al. had a study on STEMI patients presenting with a cardiogenic shock. On admission SUA>6.5md/dl was associated with higher odds of in hospital death. OR+ 6.7 (95% CI 1.4-31.8),<sup>19</sup> Kojima et al (2005) demonstrated that mortality was 3.7 times higher in highest quartile of uric acid and lowest quartile of uric acid (OR=3.7 95% CI,  $p<0.0004$ ).<sup>6</sup> Lazzeri et al (2010) found that risk of mortality was 3.9 times more in patients with hyperuricemia than normal uric acid (OR, 3.9, 95% CI,  $P<0.01$ ).<sup>13</sup> These findings are consistent with our study.

#### Conclusion:

On admission serum uric acid estimation is a good predictor of in hospital bad outcome in patients with acute Coronary Syndrome. As it is a cheap and noninvasive procedure, it can be routinely practiced in cardiac emergency department for risk stratification of patients. This can guide the physicians in monitoring Acute Coronary Syndrome patients.

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**Original Article**

**Incidence of supine hypotension syndrome among parturients during caesarean section under spinal anaesthesia with or without wedge under right buttock -A Comparative study**

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**Abstract**

**Background:** Supine hypotension syndrome among parturients during caesarean sections under spinal anesthesia may result in shock which can cause fatal maternal and foetal outcome.

**Objectives:** The aim of study is to compare incidence of supine hypotension syndrome among parturients during caesarean sections under SAB with or without wedge under the right buttock.

**Methods:** Sixty term parturients at childbearing age of a of ASA grade I & II were randomly selected for caesarean sections under SAB and divided equally into two groups:

NWG-Non Wedge group (n=30)

WG- Wedge group (n=30)

In Non Wedge group parturients were kept in supine position without using wedge under right buttock and in Wedge group parturients were tilted 15° left lateral by using wedge under right buttock. Caesarean sections were performed under SAB using minimum effective dose (ED95) of 0.5% hyperbaric bupivacaine(.06mg/cm of height) and parturients were preloaded with isotonic crystalloid solution.

Parametric data like pulse, blood pressure among groups were analyzed by ANOVA test.

**Results:** The results revealed that the incidence of supine hypotension syndrome between two groups were not statistically significant.

**Conclusion:** It can be concluded that caesarean sections can be done with hemodynamic stability under SAB without wedge under right buttock among parturients by using minimum effective dose(ED95)of 0.5% hyperbaric bupivacaine (.06mg/cm of height) and after preloading with isotonic crystalloid solution without affecting maternal as well as foetal outcome. In supine position of the patient without wedge the surgeon is more comfortable and gets better operative field.

**Keywords:** Caesarean Section, Spinal Anaesthesia, Supine Hypotension Syndrome, Wedge under right buttock.

**Introduction:**

Caesarean section is the most common operation in the childbearing age of a women.<sup>1</sup> C-section is necessary to perform in critical conditions where vaginal delivery would put the baby or mother's life in danger. The rate is increasing dramatically in recent years. In few countries caesarean sections were performing more frequently than necessary whereas many governments and health organizations promote programs to reduce the use of C-section in favor of vaginal delivery.<sup>2</sup>

Hypotension is the most common complication of spinal anaesthesia.<sup>3</sup> Among the parturient in supine position gravid uterus causes aortocaval compression during

C-section under SAB and may results in shock which causes fatal outcome of mother as well as foetus.<sup>4</sup> Supine hypotension syndrome can be prevented by manual displacement of uterus with the hands of anaesthesiologist ,left lateral tilting of the OT table or placing the wedge under right buttock to tilt the parturient 15° left lateral position.<sup>5,6,7</sup> Manual displacement of uterus engages anaesthesiologist and prevents monitoring of the patient. On the other hand changing the maternal position or changing the position of OT table hampers the comfort of the surgeon and provides poor operative field.

In this study we have compared incidence of supine

hypotension syndrome between two groups of parturients during C-section under SAB with or without wedge under the right buttock. In order to limit hypotension related to spinal block in this study we have used minimum effective dose(ED95) of 0.5% hyperbaric bupivacaine (.06mg/cm of height)8 for caesarean section under SAB and parturients have been preloaded with isotonic crystalloid solution.

**Material and Methods:**

After obtaining written informed consent, 60 parturients at term (ASA grade I and II ,at child bearing age ) were enrolled for the study . The study was conducted in Dhaka National Medical College Hospital from May 2016 to April 2017. Patients fulfilled following inclusion criteria: ASA I or II, at child bearing age, BMI ≤ 32, and normal coagulation profile. The patients in whom regional anaesthesia were contraindicated or patients with foetal abnormalities,pre eclampsia,eclampsia were excluded from the study. Patients were randomly divided into two equal groups as follows: Wedge group : WG group : (n=30) , Non wedge group : NWG group.(n=30).

All parturients were instructed for overnight fasting, prescribed injection ondansetron 8 mg intravenously 1 hour before surgery. In the operation theatre, all parturients were preloaded with 15mlkg<sup>-1</sup> Ringer's Lactate Solution. Under full aseptic precaution lumbar puncture was performed with 25G Quencke's spinal needle in L<sub>3-4</sub> or L<sub>4-5</sub> inter space in sitting position and minimum effective dose(.06mg/cm of height) of 0.5% hyperbaric bupivacaine were injected as per groups of the parturient. In Non Wedge group parturients were kept in supine position without using wedge under right buttock and in Wedge group parturients were tilted 15o left lateral by using wedge under right buttock.Level of sensory block and grading of the motor block was noted. All parturients received O<sub>2</sub> 3L/min. via facemask. Immediate after administration of SAB pulse, blood pressure and rate of respiration was recorded. Then pulse, BP, respiratory rate recorded every 3min. for first 20 minutes, at 5 min. interval for remaining period of operation.

Monitoring of patients were clinical and instrumental. Blood pressure were recoded by NIBP. Hypotension defined as a decrease in SBP more than 20% from the base line was treated with bolus intravenous 5mg increments of ephedrine. Oxygenation of patients were monitored by SpO<sub>2</sub> during per & post operative period. Respiratory rate, pulse rate were recorded clinically during perioperative period. All data were compiled and analyzed using ANOVA or chi-square tests as

appropriate with the help of SPSS window version 11. The results were regarded as significant if p value <0.05.

**Results:**

Sixty terms parturients were included in this study. They were randomly allocated into 2 groups, 30 in each group (Gr-WG, and Gr-NWG)

**Table-I: Demographic profile of the study population**

| Parameters                  | Gr-WG | Gr-NWG | F value | P value |
|-----------------------------|-------|--------|---------|---------|
| Age in year                 | 25±3  | 25±3   | 0.054   | 0.947   |
| Weight in kg                | 51±6  | 52±5   | 0.828   | 0.440   |
| Height in cm                | 153±8 | 155±8  | 1.37    | 0.259   |
| Duration of operation(min.) | 45±3  | 44±3   | 1.82    | 0.167   |

Values are expressed as Mean ± SD, analysis among groups were done by ANOVA test. Values were regarded as significant if p<0.05.

There were no statistically significant difference in age (p=0.947), weight (p=0.440) and height (p=0.259) among groups. Therefore, patient in these groups were homogeneous regarding demographic characters.

**Table-II**

**SAB data group WG vs NWG**

| Parameter                                              | Gr-WG                  | Gr-NWG   | χ <sup>2</sup> value | P value |
|--------------------------------------------------------|------------------------|----------|----------------------|---------|
| Age ilevel of sensory block at 20 min. T4 T5           | 29(96.66%)<br>1(3.33%) | 30(100%) | 4.286                | 1.38    |
| Quality of motor block (Bromage scale) Grade 3 Grade 2 | 29(96.66%)<br>(3.33%)  | 30(100%) | 1.741                | 1.45    |

Data are presented as frequencies and analyzed among groups with χ<sup>2</sup> test. Values are regarded significant if p<0.05.

Level of sensory block and quality of motor block in between Gr-WG and Gr-NWG are presented in table-II. Level of sensory block as well as motor block in Gr-WG and Gr- NWG were not statistically significant.

**Table-III**

**Incidence of hypotension**

| Parameter       | Group-WG | Group -NWG | χ <sup>2</sup> value | P value |
|-----------------|----------|------------|----------------------|---------|
| Ephedrine given | 1(3.33%) | 2(6.66%)   | 6.923                | 1.031   |

Data are presented as frequencies and analyzed among groups with  $\chi^2$  test. Values are regarded significant if  $p < 0.05$ .

Incidence of supine hypotension syndrome was considered in terms of hypotension in both groups. Systolic blood pressure less than 20% from base line was taken as hypotension. Patients undergoing hypotension were given ephedrine, In group WG 1(3.33%) & group NWG 2(6.66%) parturient developed hypotension. Comparison of the incidence of supine hypotension syndrome among groups were not statistically significant ( $p=1.031$ ).

**Table-IV: Foetal outcome**

| Apgar score | Group WG | Group NWG |
|-------------|----------|-----------|
| 1 min       | 8-9      | 7-8       |
| 5 min       | 9-10     | 9-10      |

Foetal outcome in both groups were similar and uneventful.

**Discussion:**

Supine hypotension syndrome results in severe adverse effects. Pressure of Gravid uterus over inferior venacava results in decreased venous return and cardiac output causing syncope.<sup>9,10</sup> To alleviate supine hypotension syndrome different methods were tried, includes full lateral position, tilt of operation table,<sup>11</sup> placing waterbags, rubberwedges, airbags, sand bags under the hip or flank, mechanical displacement.<sup>12</sup> Among these traditionally using methods are wedge under the right hip. Various studies are going on proper positioning of the mother during C-section to provide better outcome to mother and child and also to prevent supine hypotension syndrome. Here in this study we tried to determine the position of the mother during C-section with cardiovascular stability by avoiding supine hypotension syndrome and providing comfort of the surgeon, good operative field.

12 cm wedge under the right buttock can give to mother up to 150 left lateral tilt. In one study the author<sup>13</sup> used 15° left lateral tilt for positioning of pregnant women by using wedge under right buttock in preventing supine hypotension syndrome. Caval and aortic compression still occurred in many studies whatever the degree of tilt, even at 34°.<sup>14</sup> There are evidences that haemodynamic stability can be obtained by manual uterine displacement by the hands of anaesthesiologist<sup>15</sup> or by full lateral position of the parturient<sup>16</sup> which is not practically feasible in providing comfort to the surgeon as well as good operative field. Besides manual displacement of uterus by

the hands of the anaesthesiologist will engage anaesthesiologist and hamper monitoring of the patient which can endanger maternal as well as foetal life.

In one study it was shown that the use of wedge under right buttock was not effective in reducing incidence of supine hypotension syndrome during SAB for caesarean section. Preloading with isotonic crystalloid solution and use of minimum effective dose of local anaesthetic was effective in reducing incidence of supine hypotension syndrome.<sup>17</sup> This observation is consistent with our study. In our study we used minimum effective dose (ED95)<sup>8</sup> of 0.5% hyperbaric bupivacaine and all parturients were preloaded with isotonic crystalloid solution. In group WG 1 patient & in group NWG 2 patients developed hypotension which was statistically not significant. Foetal outcome in both groups was similar and uneventful.

**Conclusion:**

It can be concluded that caesarean sections can be done with hemodynamic stability under SAB without wedge under right buttock among parturients by using minimum effective dose (ED95) of 0.5% hyperbaric bupivacaine (.06mg/cm of height) and after preloading with isotonic crystalloid solution without affecting maternal as well as foetal outcome. In supine position of the patient without wedge the surgeon is more comfortable and gets better operative field.

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Original Article

## Evaluation of pattern of dyslipidemia in acute stroke in type 2 diabetics

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**Background:** Stroke is a neurological disease, which is a major cause of death and disability worldwide and third leading cause of death in Bangladesh. Diabetes mellitus is more commonly accompanied by dyslipidemia which is the leading cause of atherosclerotic changes in blood vessels and which also increases the risk of stroke.

**Aims:** To observe the pattern of dyslipidemia in acute stroke in type 2 diabetics.

**Methodology:** It was a hospital based cross sectional observational study in DMCH, Dhaka. Total 100 patients of acute stroke with type 2 diabetes were enrolled in this study by purposive sampling after written informed consent. The initial clinical diagnosis of stroke was done from history obtained from patient himself or his/her attendant and confirmed by CT/MRI of brain. Patients taking lipid lowering drugs, brain tumour, meningitis, viral encephalitis and/or metabolic encephalitis, hypothyroidism and nephrotic syndrome were excluded. A standard preformed questionnaire was designed and filled up for each patient. Collected data were checked, verified for consistency and edited for finalized result. Data cleaning, validation and analysis was performed using the SPSS/PC and graph and chart by MS excel.

**Results:** Total 100 numbers of patients of acute stroke with type 2 diabetes patients admitted in DMCH were enrolled in this study. Eighty two (82.0%) patients had dyslipidemia and among them almost two third (60.0%) patients had total cholesterol  $\leq$ 200 mg/dl, 64.0% had LDL  $>$ 100 mg/dl, 81.0% had HDL less than target value and 58.0% had TG  $>$ 150 mg/dl. Ischemic stroke and hemorrhagic stroke were found in 86(86.0%) and 14(14.0%) respectively. Total cholesterol, LDL, HDL, TG were not significantly ( $p>0.05$ ) different between two types of stroke.

**Conclusion:** This study was undertaken to observe the patterns of dyslipidemia in acute stroke in type 2 diabetics. Lipid profiles almost alike between Ischemic stroke and Hemorrhagic stroke. Ischemic strokes were more common in this study. Diagnosis and proper management of dyslipidemia can be an important part of prevention of stroke.

**Keywords:** Stroke, Diabetes, Dyslipidemia.

### Introduction

Stroke may be defined as an acute, focal brain dysfunction due to vascular disease. Stroke is the most common clinical manifestation of cerebrovascular disease, and results in episodes of brain dysfunction due to focal ischaemia or haemorrhage. Cerebrovascular disease is the third most common cause of death in high-income countries after cancers and ischemic heart disease, and the most common cause of severe physical disability.<sup>1</sup>

DM is a metabolic pathology characterized by systemic circulatory glucose accrual, accompanied by diminishing cellular glucose uptake and metabolism, as well as altered lipids and protein metabolism. These abnormalities are

the consequences of either inadequate insulin secretion or impaired insulin action or both. The main types of diabetes are type 1 and type-2 diabetes. Type 2 diabetes accounts for more than 90% cases of diabetes and is a major burden due to its rising prevalence and complications. The most important risk factor for these complications in diabetes is dyslipidemia. Dyslipidemia increases the risk of atherosclerosis which in turn increases the risk of cardiovascular disease, heart attack and stroke. According to US Center for Disease Control and Prevention it affects 70% to 97% of people with diabetes.<sup>2</sup>

With increasing number of diabetic patients diabetic dyslipidemia is also rising and both factors are combinedly

increasing the burden of stroke patients in our country, to our health system and also affecting the economy of a developing country like us. But there is very little studies are available of these problems among our people and also little information available about the pattern of dyslipidemia in acute stroke patient with type 2 diabetes.

**Materials and methods**

It was hospital based cross sectional observational study among 100 patients of acute stroke with type 2 diabetes who were admitted in Dhaka Medical College Hospital from April,2015 to October ,2015(6 months).Criteria for inclusion in this study were. (1) Acute stroke patients, (2)Patients with established known case of type 2 diabetes mellitus, (3) Age more than 30 years, (4) With informed written consent. Exclusion criteria were: (1) Patient taking lipid lowering drugs, (2) Patient with brain tumour, meningitis, viral encephalitis and or metabolic encephalitis, (3) patient with hypothyroidism and nephrotic syndrome.

Clinical information including age, sex, socioeconomic status, blood sugar level, lipid profile and type of stroke were recorded for all subjects. Here lipid profile was measured by automated biochemistry analyzer machine and every sample were taken in fasting condition and after 24 hr of acute stroke after patient stabilization.

Data were collected by a predesigned proforma. Patient’s information was obtained through using patient’s information sheet. All Patients were informed about the nature of the study. Their informed written consent was taken in a consent form before collecting the data. Proper permission was taken from concerned department and local ethical committee.

Statistical analyses were carried out by using the Statistical Package for Social Sciences version 16.0 for Windows (SPSS Inc., Chicago, Illinois, USA). The mean values were calculated for continuous variables. The quantitative observations were indicated by frequencies and percentages. Chi-Square test was used to analyze the categorical variables, shown with cross tabulation. P values <0.05 was considered as statistically significant.

**Results**

**Table I: Distribution of the study patients by age and sex (n=100)**

| Age-Sex distribution<br>Age (in years) | Number of patients | Percentage |
|----------------------------------------|--------------------|------------|
| 31 - 40                                | 2                  | 2.0        |
| 41 - 50                                | 18                 | 18.0       |
| 51 - 70                                | 71                 | 71.0       |
| 71 - 80                                | 9                  | 9.0        |

Mean±SD (in years) 60.0 ±8.9  
Range (min-max) (in years) 35-80

| Sex    | Number of patients | Percentage |
|--------|--------------------|------------|
| Male   | 82                 | 82.0       |
| Female | 18                 | 18.0       |

Table I shows age and sex distribution of the study patients, it was observed that majority (71.0%) patients belong to age 51-70 years. The mean age was found 60.0±8.9 years with range from 35 to 80 years. Majority (82.0%) patients were male and 18(18.0%) patients were female. Male female ratio was 4.6:1

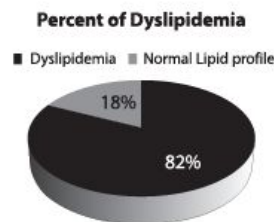
**Table II: Relation between type of stroke with lipid profiles (n=100)**

| Lipid profiles                   | Type of stroke  |      |                    |      | P value |
|----------------------------------|-----------------|------|--------------------|------|---------|
|                                  | Ischemic (n=86) |      | Hemorrhagic (n=14) |      |         |
|                                  | n               | %    | n                  | %    |         |
| <b>Total Cholesterol (mg/dl)</b> |                 |      |                    |      | 0.813ns |
| ≤200                             | 52              | 60.5 | 8                  | 57.1 |         |
| >200                             | 34              | 39.5 | 6                  | 42.9 |         |
| <b>LDL (mg/dl)</b>               |                 |      |                    |      | 0.532ns |
| ≤100                             | 32              | 37.2 | 4                  | 28.6 |         |
| >100                             | 54              | 62.8 | 10                 | 41.4 |         |
| <b>HDL (mg/dl)</b>               |                 |      |                    |      | 0.257ns |
| Male ≤40 & female ≤50            | 71              | 82.6 | 10                 | 11.8 |         |
| Male >40 & female >50            | 15              | 17.4 | 4                  | 4.7  |         |
| <b>TG (mg/dl)</b>                |                 |      |                    |      | 0.944ns |
| ≤150                             | 36              | 41.9 | 6                  | 42.9 |         |
| >150                             | 50              | 58.1 | 8                  | 57.1 |         |

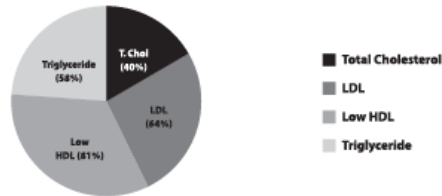
s=significant; ns=not significant

P value reached from chi square test

Table II shows relation between type of stroke with lipid profiles of the patients. It was observed that total cholesterol, LDL, HDL and TG were not significantly (p>0.05) associated with type of stroke.



**Figure-1: Percent of dyslipidemia in type 2 diabetic patient in acute stroke**



**Figure-2: Pattern of dyslipidemia in Acute Stroke with Type II DM**

### Discussion

Dyslipidemia is defined as an abnormal level of one or more blood lipids, which most typically are total cholesterol >200 mg/dl, low density lipoprotein (LDL) >100mg/dl, high density lipoprotein (HDL) <40 mg/dl in male & <50 mg/dl in female, and/or triglyceride (TG) >150 mg/dl.<sup>3</sup>

In this present study it was observed that most (71.0%) of the patients having acute stroke in type 2 diabetics belongs to age 51-70 years and the mean age was found 60.0±8.9 years. In other study like Hossain et al.<sup>4</sup> and Iqbal et al.<sup>5</sup> Rahman et al.<sup>6</sup> found similar findings.

In our study it was observed that acute stroke in type 2 diabetics is predominant in male subject, where the present study was found male to female ratio was 4.6:1. Similar observations regarding male predominant also observed by Pandya et al.<sup>7</sup> Chowdhury et al.<sup>8</sup> and Hasan et al.<sup>9</sup> In this study male ratio much higher may be due to small sample size.

In this study it was observed that total cholesterol and TG were almost similarly associated with type of stroke but HDL significantly lower than target in 82.6% and LDL >100 mg/dl in 62.8% ischemic stroke patients than hemorrhagic patients. Atherogenic dyslipidaemia is characterized by increased triglyceride (TG) levels (TG ≥ 150 mg/dl) and decreased high density lipoprotein (HDL) levels (HDL ≤40 mg/dl).<sup>10</sup> In other similar studies found majority (64.0%) of stroke patients had high TG levels and 68% had low HDL levels and among them ischemic stroke patients had much low 70.4% level of HDL then hemorrhagic stroke. Triglyceride (TG) level was high in 64.0% of stroke patients, among them ischemic stroke patients had more high level of TG (70.4%) than hemorrhagic patients.<sup>5</sup>

Raised serum cholesterol is an important risk factor for myocardial infarction, but its relationship with stroke was not clear.<sup>11</sup> Higher level of HDL cholesterol is associated with significant decrease risk of stroke.<sup>12</sup> During lipid profile assay in acute stroke patients with type 2 DM we found that 82.0% of the patients had dyslipidemia. Among the total patients, 40% patients had high total cholesterol level, 64.0% patients had LDL >100 mg/dl, majority 81.0% patients had low HDL and 58% TG >150 mg/dl. In Hossain et al.<sup>4</sup> study observed 12.0% of the patients had raised serum cholesterol, similar findings also observed by Bashar.<sup>13</sup> In another study Pandya et al.<sup>7</sup> observed the

J. Dhaka National Med. Coll. Hos. 2017; 23 (01): 51-53

mean serum cholesterol level was 188.9±43.70, mean serum triglyceride was 174.6±69.44, mean serum HDL was 46.2±17.08, mean serum LDL was 105.9±34.06.

### Conclusion

Dyslipidemia is the major risk factor for stroke patients and it is more common in type 2 diabetic patients. So control of diabetes and management of dyslipidemia can play a major role in prevention of stroke.

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**Case Report**

## **Vitriolage: A Case of Acid Burn**

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### **Abstract**

Vitriolage means throwing of any corrosive, not necessarily sulphuric acid, on a person with malicious intent. Here we present a case of 18 years old girl Rubina who was a victim of acid burn due to refusal of love proposal. She was admitted in the One Stop Crisis Center (OCC) of Dhaka Medical College Hospital. Acid burn injuries involved left half of the face, left side of the chest, left side of neck, left arm and left eye. Investigation was done and she was treated with first aid after vitriolage by plenty of water and soap, thick paste of magnesium oxide and eyes are washed with water and irrigated with a dilute sodium bicarbonate solution and instilled of eyes by few drops of olive oil.

**Key words:** Vitriolage, OCC, Victim.

### **Introduction**

The term vitriolage literally means throwing of the oil of vitriol (conc. sulphuric acid) on the body of a person with the intention to cause bodily injury.<sup>1</sup> Target groups are usually young and adolescent girls and women due to out of jealousy, revenge or enmity.<sup>2</sup> The chemicals used as vitriolage are corrosive acids or alkalis. Sulphuric acid is one of the commonest chemicals for this purpose and hence it is called vitriolage. Nitric and carbolic acids are sometimes used. The use of caustic soda, caustic potash, iodine and marking nut juice has also been recorded. These fluids are usually thrown on the face with the object of destroying vision or causing facial disfigurement and this result in grievous hurt.<sup>3</sup> New laws have been passed to regulate the frequent use of acids which is a very good step taken by the government. Vitriolage is a great problem in Bangladesh. The alarming increase in its frequency is a cause of concern. The Government of Bangladesh and the people should try to protect it; otherwise it will make the nation lame. Violence against woman is a universal phenomenon but its manifestations differ from one society to another. Violence against woman within South Asia includes rape and sexual abuse, trafficking, prostitution, domestic violence, dowry related deaths and psychological abuse. The incidence of vitriolage seems to be highly prevalent among lower socio-economic groups both in urban and rural areas. The perpetrators are mostly young men and adolescent boys. The targets are primarily females between 12 and 25 years of age though recent trends have shown a change in the profile of targets with older women, children and sometimes men also being attacked. Acid violence is a particularly vicious and damaging form of violence in Bangladesh where acid is thrown in people's faces. The

overwhelming majority of the victims are women and many of them are below 18 years of age. The victims are attacked for many reasons. In some cases it is because a young girl or women has spurned the sexual advances of a male or either she or her parents have rejected a proposal of a marriage. Recently, however, there have been acid attacks on children, older women and also men. These attacks are often the result of family and land dispute, dowry demands or a desire for revenge. Existing laws: The Nari O Shishu Nirjaton Domon Act, 2000 is intended to address the need for more effective prosecution of perpetrators of violence against women and children provides redress for victims of various manifestations of violence including acid throwing.

Punishment- Lifelong imprisonment or Death Sentence. Effects of vitriolage are: The consequences of vitriolage are traumatic physically, psychologically and emotionally. The impact of it on skin is catastrophic. It causes the skin tissue to melt, often leaving the bones underneath exposed. Permanent physical disfigurement is inevitable. Many survivors lose their sight in one or both eyes and sometimes even their hearing if the ears have been exposed to acid. Following vitriolage a dramatic change in their life style occurs. Most of them have to give up their education or previous work because of the time required for their recovery and the debilitating disfigurement that occurs. Social isolation and fear almost always follows the incident which further reduces their confidence. Causes of vitriolage are: 1) Failure in love. 2) Refusal of marriage proposals. 3) Rejection in sex. 4) Vengeance and unmet dowry demands. 5) Family dispute 6) Dispute with respect to property or service. 7) Jealousy or revenge of any causes. 8) Exemption from punishment.



9) Dishonesty of police authority and their non-cooperation inspire the miscreants to commit such type of offence.

#### Case Report

The victim named Rubina, 18 years old girl from khilkhet Dhaka. After taking permission from the concern authority interview was given. According to the statement of the victim, she was a student of class twelve. From her home to college, Kabir, a cycle maker, approximate age 25 years, tries to offer proposal of love for some months before the incident occurs. But she refused strongly to make any relation with Kabir and told him that this is a matter of prestige to her. Finally Kabir said that he would take revenge of refusal of love. After that one night she was reading at her room, one side of the window was opened. Suddenly, she felt throwing of liquid substance to the left side of her face and a man like Kabir was running away quickly from her window. The bottle was recovered from the place of throwing and that is now under the custody of police. She was admitted in Dhaka Medical College Hospital and accordingly she was admitted in One Stop Crisis Center (OCC) of the hospital for treatment and legal aid. On General examination: Pulse -80/min, regular. BP -110/80mm of Hg, Heart -NAD, Lungs- NAD, Anemia -Nil, Cyanosis -Nil, Koilonychias -Nil. On local examination: Acid burn injuries are present on 1. Lt. Half of the face with Lt. Eye 2. Anterior wall of the chest 3. Upper part of the lateral chest both side 4. Rt. And Lt. arm and forearm. On local examination- It is evident that ulcer is present at the affected part which has a distinctive color. Skin is destroyed at and below the site of contact and signs of splashing is found but no sign of singeing. The above-mentioned finding indicate that the injury is caused by some form of chemicals preferably acid suggested by history and findings. Findings of investigations are: 1. CBC:Hb%- 9.5 gm./dl, ESR- 60 mm 1st hour, WBC- 15,600/c.mm of blood, N- 80%,L-15%, M-03%,E-02% 2. RBS-8mmol/L., 3. B.urea -23 mg/dl, 4. S.Creatinine-9 mg/dl 5. S.Electrolytes: Sodium -1134 mmol/L, Potassium -511 mmol/L, Chloride -102 mmol/L, TCO2-23.5mmol/L 6. Blood Group-B+ve, 7. S.Total Protein -7.4 gm/dl, 8. S. Albumin - 4.6 mg/dl 9. S. Globulin -2.8 gm/dl 10. A.G. Ratio -1.6:1. Treatment order on admission: 1) Diet- Normal. 2) Inj. TT- 2nd dose after one month. 3) Inj. TIG. 4) Tab. Isocloxin (400 mg) 1+0+1. 5) Tab. Clobam (10mg) 1 tab at H/S. 6) Diclofen Supp. (50mg) 1 stick P/R. 7) Inj. Emodol (30 mg) 1 amp IM. 8) Tab. Ascason 1 tab, BD. For Eye: Okacin Eye drop for L/E- 3 drops 4 hourly, Spersade eye drop I/E-02 drops 1 hourly for 2 days, 02 drops 6 hourly for 20 days,

Ascason Eye drop L/E- 1 drop 12 hourly. Renamycin eye Ointment apply 3 times/day. Proposed operation: Split type of skin Grafting (STSG).

#### Discussion

When this unexpected occurrence happens everybody should think first about medical treatment in DMCH, Monwara and City Hospital then legal assistance and finally rehabilitation. Acid Survivors Foundation plays a great role with respect to this. Rehabilitation for vitriolage are: 1) Lodging of family members and survivors in Dhaka City to prevent the re-attack of perpetrators and better treatment in Dhaka. 2) Help from NGO in various aspects and treatment facilities by plastic surgeons. 3) Legal help. 4) Vocational training. 5) Sponsor vocational treatment at home and abroad. 6) Donation of medicines and medical equipment by solvent people. 7) Donation of blood. 8) Support the expenses of a survivor and take care of medical/ social needs. 9) Create employment opportunity at private and government levels. 10) Donate household items e.g. clothes, furniture, bedding, crockery etc. needed for the survivors.

#### Circumstance of the incident

Self-inflicted burns with corrosive are rare, though these may be ingested for self-destruction. The motive being suicide. Some persons sometimes try to commit suicide by self-infliction of flame burns upon themselves. They usually pour kerosene over their body and clothing and set themselves on fire. Most of the victims are female. The scene is commonly the Kitchen. Severe burns usually occur. A motive for suicide is usually apparent. No such features are found in this case. Accidental burns with corrosive may occur on persons handling such chemical without proper precautions in places like chemical factories, laboratories, warehouses etc. Bursting of the container with splashing of the corrosives on the face, neck and hands may occur resulting in serious burns. A history in that regard is usually available. This victim was talking at the time of the incident, so this is not an accidental burn. Assaults with mineral acids are still done in some parts of the world. Throwing of corrosive such as sulphuric acid (battery fluid) upon the enemy in order to cause permanent disfigurement and harm is one of the favorite methods of taking revenge. The findings in this case are consistent with the history. Therefore, assault is likely to be in this case. From the history it appears that the assailant wanted to take revenge himself. According to the law prevalent in Bangladesh the punishment of such crimes as vitriolage is sentence to death. Homicidal with corrosives is not known. Vitriolage can be prevented by: 1) Passing of proper laws by the parliament. 2) Rapid verdict and implementation or punishment by special

tribunal. 3) Regulation of sale of acid. 4) Raise awareness in community and society. 5) Encourage participation of men against violence to women and children. 6) Sensitize media reporting and ensure protection of privacy of survivors. 7) Improve networking and agencies or bodies supporting rehabilitation of acid survivors. 8) Consoling potential attackers with special focus on adolescent boys.

#### **Conclusion**

Acid violence is a worldwide phenomenon that is not restricted to a particular race, religion or geographical location. It occurs in many countries in South-East Asia, sub-Saharan Africa, the West Indies and the Middle East and there is anecdotal evidence of attacks in other regions. In many countries acid attacks constitute a hidden form of violence against women and children that often goes unreported, and the true number of horrific attacks taking place has only come to light after in-depth research by ASTI and its part.

The Government of Bangladesh has started to take serious steps and making strict laws. Different NGOs are working seriously and helping the victims in every step. Public consciousness is increasing against this brutal act. So, we do hope that incidence of acid attack or vitriol age will reduce to minimum within few years.

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